BARRIERS TO HIV CARE IN RURAL UGANDA

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ABSTRACT

NNEKA IJOMA EMENYONU: Barriers to HIV Care in Rural Uganda
(Under the direction of Sandra Greene, DrPH)

More than 70% of HIV infections occur in sub-Saharan Africa, where the epidemic continues to have a profound impact on public health and economic growth (1-3). Significant progress has been made over the last decade with the introduction of antiretroviral treatment, which has resulted in an increased number of people living with HIV, and a decreased number of AIDS-related deaths. Many studies have looked at retention in HIV clinics in Africa (4-16) as well as HIV treatment outcomes (17-26), and have concluded that low retention in care threatens the sustainability of the early success of treatment programs in resource limited settings (RLS).

The purpose of this study was to identify barriers to HIV care in rural Uganda and determine the impact of these barriers on HIV treatment outcomes. The study comprised a two part, mixed method approach, including data from the two separate sources analyzed concurrently. A cross-sectional qualitative study was conducted with key informant interviews of healthcare providers and patients at the Mbarara ISS Clinic in Uganda. A sub-study comprised quantitative analysis of secondary data from the Uganda Antiretroviral Rural Treatment Outcomes (UARTO) cohort collected over the first 12 months of enrollment in UARTO.

Findings from the qualitative analysis show that stigma, financial constraints, and inflexible clinic schedules present barriers to patients accessing and sustaining care. The availability of antiretroviral therapy, treatment success, trust in the healthcare providers, social support, and a strong reliance on spirituality emerged as strong facilitators to care. For the Quantitative study, results from the survival analysis showed that travel time to clinic longer than 45 minutes was associated with mortality as was being male. Being male was also associated with increased odds of treatment failure (odds ratio (OR) = 0.5, 95% CI 0.28-0.89). Age was associated with being lost to follow up (OR = 1.00 95% CI 0.98-1.03). Higher levels of internalized stigma were associated with lower MEMS adherence (OR = 0.90 95% CI 0.81-0.99). Having a lower asset index predicted treatment interruptions lasting 7 days or shorter (OR = 0.74 95% CI 0.61-0.91) and increased travel time to clinic predicted a decreased odds of treatment interruptions lasting 30 days or longer (OR = 0.98 95% CI 0.96-1.00). There were no significant associations between the predictor variables of stigma or social support and the outcome variables of loss to follow up, treatment failure and mortality. While the quantitative data did not support the hypothesis that social support mitigates structural and economic barriers to care, the findings suggest points of intervention that are targeted towards reduction of stigma at the individual level.

The study concluded that barriers to sustained HIV care in a rural resource limited setting include a combination of factors that are structural, economic, and social, which act independently or through complex interactions. Strategies to improve HIV care in resource limited settings should aim at targeting all three components of these barriers,

while strengthening health care systems and building local leadership remain the foundation for sustained success.

DEDICATION

Dedicated to two people in my family who represent the breath of my life experiences.

~De Nwanyi, my paternal aunt, who never saw the inside of a classroom, but taught me more about resilience than any institution, and who helped pave the way for me to succeed in Uganda through her wisdom and presence.

~ My maternal grandfather, Charles Stead Thornton, PhD, graduate of Harvard and Princeton Universities, and Professor of Zoology at Kenyon College and Michigan State University respectively. Although I never met grandpa Charlie, his life and academic career in science are a constant source of inspiration to achieve my best.

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LIST OF ABBREVIATIONS

AIDS	Acquired Immune Deficiency Syndrome
AMU	Adherence Monitoring Uganda
ART	Antiretroviral Therapy
CDC	Centers for Disease Control and Prevention
DAI	Drug Access Initiative
DOT	Directly Observed Therapy
FDC	Fixed Dose Combination
HIV	Human Immunodeficiency Virus
IRB	Institutional Review Board
ISS	Immune Suppression Syndrome
MRRH	Mbarara Regional Referral Hospital
MUST	Mbarara University of Science and Technology
NIH	National Institutes of Health
NNRTI	Non-nucleoside reverse-transcriptase inhibitors
NRTI	Nucleoside analog reverse-transcriptase
PC	Pill Count
PEPFAR	President's Emergency Fund for AIDS Relief
PI	Protease inhibitors
PLWA	People living with HIV/AIDS
RLS	Resource Limited Settings
SR	Self Report
SSA	Sub-Saharan Africa

STD	Sexually Transmitted Disease
STI	Sexually Transmitted Infection
UNAIDS	United Nations Program on HIV/AIDS
UNCST	Uganda National Council for Science and Technology
USAID	United States Agency for International Development
VL	Viral Load

CHAPTER 1: INTRODUCTION

A. Statement of the Issue

The Joint United Nations Program on HIV/AIDS (UNAIDS) estimates that 34 million people worldwide are infected with HIV/AIDS(1). Of this number, 70% are estimated to be in sub-Saharan Africa where 72% of the AIDS-related deaths in 2009 were reported (1). Since the onset of the epidemic in the early 1980s, over 25 million people have died of HIV/AIDS, and sub-Saharan Africa continues to be disproportionately affected by the disease (1). Disease management through viral suppression with antiretroviral therapy (ART) and prevention of new infections remains the most effective course of action in controlling the pandemic. In the absence of a cure, current public health strategies aim at expanding the availability of ART and preventing new infections through risk reduction and behavior change.

Significant progress has been made over the last decade with the introduction of ART(1, 24), which has resulted in an increase in the number of people living with HIV/AIDS, and a decrease in the number of AIDS related deaths. In 2010, there were 1.8 million deaths related to AIDS, as compared to previous years with death tolls above 2 million(1). This trend of decline in AIDS-related deaths, coupled with people living longer with the disease, has been consistent in most sub-Sahara African countries since 2004 when the expansion of ART began in the region. Nonetheless, the long-term

effectiveness of ART is dependent on the patients' life-long adherence to a regimen (27), concurrent with routine follow up in care. While the success of ART is evident (24, 28), issues of access and availability continue to present challenges in rural and resource limited settings in sub-Saharan Africa (29-32), where 90% of the disease burden lies (1, 33).

Many studies have looked at retention in HIV clinics in Africa (4-16) as well as HIV treatment outcomes (17-26), and have concluded that low retention in care threatens the sustainability of the early success of treatment programs in resource limited settings (RLS). More recent studies have examined barriers to HIV care in RLS and have highlighted the following target points where barriers are most evident; HIV testing, entry into care, treatment acceptance, treatment adherence, and retention in care (34, 35). These studies suggest the need for targeted interventions at specific time points where retention or linkage in care, are likely to be compromised. These targeted interventions could mitigate the poor treatment outcomes associated with low retention in care by strengthening linkage in care from a patient-centered angle. A recent intervention study by Gardner et al..., assessed the effects of exposing patients in 6 different RLS HIV clinics to brochures, posters and messages emphasizing the importance of retention in care, versus standard of care. The study reported 3% relative improvement in clinic attendance and a 7% relative improvement in attending two consecutive clinic visits in the intervention group, particularly in young patients with lower baseline biological characteristics (35).

A goal of this dissertation was to add to the existing body of knowledge in further exploring what the barriers to care are through a combination of both qualitative and

quantitative methods of inquiry. Given the highlighted target points of intervention from previous studies (35, 36), this dissertation also aimed at highlighting possible strategies for intervention to ensure not only that the current reduction in morbidity continue as a downward trend, but that the lives of people living with HIV/AIDS are improved. The study was carried out in a rural town in Uganda that is representative of resource-limited settings with a high burden of disease. It is important that policies on HIV/AIDS management in these settings be guided by a better understanding of the current challenges, such that programs are tailored to the specific needs of their users in order to achieve long-term success. This study aims at providing insights that could potentially fill this present gap.

B. Specific Aims

The purpose of this study is to identify barriers to HIV care in rural Uganda and to determine the impact of these barriers on HIV treatment outcomes. A better understanding of both the barriers and facilitators of HIV care in rural Uganda will subsequently guide interventions for optimal HIV care in resource limited settings.

The specific objectives of this study are as follows:

Aim 1. To identify the structural and economic barriers to retention in HIV Care in rural Uganda

Aim 2. To determine the impact of the defined barriers on patients' HIV treatment outcomes

Aim 3. To develop intervention strategies to ease the impact of structural and economic barriers to HIV care in rural Uganda

Hypothesis: Structural and Economic barriers to HIV care in rural Uganda are associated with diminished health outcomes through decreased access to and retention in care, increased treatment interruptions, increased AIDS-related morbidity and mortality.

For the purpose of this study, barriers to care were initially grouped under two main categories; the first being structural barriers, and the second being economic barriers. There is need to distinguish between these two factors as they require different interventions. Structural barriers include environmental factors such as seasonal changes, or geographical obstructions that might affect an entire community regardless of the economic status of its members. This definition also includes factors that affect the distribution and supply of medications, clinics and clinicians in rural Uganda of which the individual patients have no influence. Structural barriers can also be defined at the as factor external to the individual's ability to function regardless of their economic status and for which there is no immediate or direct solution. Economic barriers in this study are defined as financial factors at the individual level that impede access to HIV care. By segregating these two concepts, the appropriate interventions can be tailored to address specific problems presented in HIV care and delivery in rural settings. As such, this study

will explore both definitions of barriers described above (structural and economic) and determine where the greatest burden lies for patients, healthcare providers and the healthcare delivery system as a whole.

Following the qualitative analysis, a constellation of barriers were identified but a third category emerged as a leading barrier to care at the individual level, which included psychosocial factors such as stigma, depression and the impact of patient-provider interactions on care. Internalized stigma presented as a barrier to patients' accessing care or seeking support for their HIV disease, while negative patient-provider interactions, centered around rigid clinic policy on missed visits, resulted in missed visits and poor retention in care.

C. Background: HIV in Sub-Saharan Africa

It is estimated that the first epidemic of HIV in Africa occurred in central Africa sometime in the 1970s based on genetic evolution studies (37-40) In the early 1980s the first cases of HIV were reported in Uganda, as a disease that affected both men and women and caused severe wasting. The disease was locally known as 'slim disease' because of the rapid weight loss and diarrhea that the patients presented with (37, 41). The connection was made to AIDS cases in the United States, although the epidemic in East Africa was found mainly in heterosexual individuals. Transmission was rampant in high-risk groups; sex workers, and migrant laborers(37, 41). The rapid spread of the disease was evident in East Africa, particularly in the areas bordering Lake Victoria, due

to a combination of factors including high rates of migration for work and ease of travel, prevalence of sexually transmitted diseases, coupled with low status of women, and lack of male circumcision (37). Truck drivers, trader, miners, soldiers and sex workers were the initial drivers of the epidemic and the patterns of infection were seen along major trade and transport routes. Uganda was hit particularly hard by the epidemic and by the late 1980s the prevalence rate was more than 30% among pregnant women (37, 42). Most patients presented to the hospital in the advanced stages of the disease and died due to lack of treatment. Because little was known about modes of transmission at the time, coupled with the fact that the initial drivers of the epidemic were migrant workers and sex workers, HIV was characterized as a 'disease of prostitutes', and the stigma associated with the disease was born out of this notion. Given the stigma associated with the disease, the motivation to get tested in the absence of treatment was low. Governments in sub-Saharan Africa responded to the crisis by focusing on prevention. Uganda's prevention efforts were outstanding as the country was able to reverse the trends and turn the epidemic around by decreasing its HIV prevalence rate significantly by 2000. Backed by strong political will, Uganda's extraordinary effort resulted in the country reducing the adult HIV prevalence rate down from around 14% in the early 1990s to 8% in 2000, and from a high of 29.5% in 1992 to 11.3% in 2000 in pregnant women (42).

Although prevention efforts were extremely successful in Uganda, it did not erase the need for treatment for those who were living with HIV/AIDS. By 2001, it was estimated that about 19 million people had died of HIV/AIDS in sub-Saharan Africa, and 28.1 million people were still living with the disease (1, 2, 33). Majority of this number

were living without access to treatment given its high cost. Concerns about the ability of poor, illiterate individuals in resource limited settings to sustain a complicated regimen of antiretroviral therapy involving multiple drugs taken at specific times, drove policy in the United States and other developed nations to withholding treatment to low income countries. The fear was that the inability to sustain the required treatment regimen would result in the development of resistant strains of HIV, given the virus' high rate of mutation, and that resistant strains would make the global efforts to control the virus without development of resistance, near impossible. There were strong arguments in favor of withholding treatment and limiting the response to the HIV epidemic in Africa to just prevention. In an article in the Boston Globe on June 7, 2001, Andrew Natsios, administrator of the United States Agency for International Development (USAID), was quoted as saying that "many Africans don't know what Western time is. You have to take these [AIDS] drugs a certain number of hours each day, or they don't work. Many people in Africa have never seen a clock or a watch their entire lives. And if you say, one o'clock in the afternoon, they do not know what you are talking about." (43). The statement was taken as fact and reiterated the notion that withholding delivery of ART to low-income countries was justified.

Treatment Scale Up in sub-Saharan Africa

After much debate and mounting pressure on the pharmaceutical industry to reduce ART prices, and following two decades of devastating outcomes of the HIV/AIDS epidemic in Africa, treatment was finally made available in 2003/2004. This achievement

was made possible by the collaborative effort and funds raised by several countries for the multilateral Global Fund for AIDS, Malaria and Tuberculosis (The Global Fund) and by the United States government through the United States President's Emergency Plan for AIDS Relief (PEPFAR), which was approved in 2004(13). This rapid expansion of antiretroviral therapy (ART) access in Africa made possible by a conglomerate of international aid programs such as PEPFAR and The Global Fund, has proved to be one of the greatest public health successes of this century. Equally outstanding is evidence, following this expansion of ART, of unexpectedly high levels of ART adherence (20, 44, 45) in sub-Saharan Africa where the opposite was expected. Early reports indicate exceptional adherence to antiretroviral therapy in Uganda and findings of a meta-analysis by Mills et al.. showed significantly higher adherence in sub-Saharan Africa when compared to rates in North America(45).

While early ART programs have been successful with increasing the availability of ART, the sustainability of this success has been threatened by low retention and other socio-economic barriers to care at the individual level. Despite evidence of high levels of ART adherence and viral suppression, retention in care and early mortality remain high in resource-treatment limited settings (13, 15). Results from a meta-analysis of retention in HIV clinics in RLS show that close to 50% of patients initiating ART in HIV clinics are not receiving treatment after two years (4) and that the average retention in clinics is roughly 60% (11).

Data from HIV clinics in sub-Sahara Africa have also shown that even when HIV treatment is fully subsidized, ancillary costs and logistical challenges such as transportation to clinic, as well as food insecurity, become major barriers to sustained

treatment adherence and good health outcomes (29, 31, 32, 46-50). Many patients in rural Uganda for instance devote up to 30-50% of their income for transportation to the clinic to pick up their monthly refills and are unable to fulfill the competing demands of adequate nutrition on a daily basis (32, 50). Many HIV patients in rural RLS present to HIV clinics when their HIV infection has progressed to advanced stage AIDS (51). At this point, many of the patients are no longer physically able to work, have exhausted their economic resources at the same time, and are a financial burden to their immediate and extended families (31, 52-54). As the stage of disease progresses, the ancillary costs needed to sustain treatment of HIV/AIDS increases because of the physical, mental and emotional degeneration of the infected persons' state of being. The insurmountable burden on families to overcome these barriers leads to interruptions in care, losses to follow up and subsequently result in irreversible ART resistance, clinical failure and mortality. Transportation costs therefore remain a common barrier to treatment retention and treatment adherence in HIV treatment programs in sub-Saharan Africa.

Questions about the merits of continued government spending on ART programs because of this notion of sustainability and continued economic burden, have led to a closer examination of the economic impact of ART. Recent studies by Thirumurthy et al.. assessed socio-economic factors that impact HIV care in RLS at the individual and household levels have found that being on ART increased productivity and household income of adults, and subsequently led to increased school attendance for children in these households (55-59). These findings support the argument that the economic returns of ART may outweigh the costs of providing ART in RLS and strategies to sustain

treatment should remain a high priority even with the underlying climate of diminishing funding.

Treatment Scale-Up in Uganda

ART was introduced in Uganda in 1998 through the Ugandan government's Drug Access Initiative, supported by the the Joint United Nations Program on HIV/AIDS (UNAIDS). By this time, the country had already achieved a marked success in reducing the adult prevalence from its peak in 1992 at 18%, to less than 10%(42, 60). While the exact reasons for the decline are still speculated, the political drive and support of several prevention strategies involving campaigns for behavior change, had an impact in reducing new infections. The reduction in HIV incidence, coupled with high AIDS-related deaths, are believed to be the main reasons for the drastic reduction in prevalence. By 1998, AIDS related deaths were still high, and over 100,000 people had died of AIDS in Uganda , mainly because of the limited access to ART. Although ART was available for purchase through the DAI program, the high cost (over $100 for one month's dose), made it prohibitive for the average Ugandan, and for 5 years that followed, access remained limited (60).

In 2004 no-cost ART became available in Uganda through increased funding and support from PEPFAR and the Global Fund. In partnership with the Uganda Ministry of Health, and other international develoment partners, the scale-up of ART increased access in Uganda from the capital city of Kampala to the rural villages throughout the country. The Regional Referral Hospitals were the first points of care and subsequently, close to 400 HIV clinics were established in public and private settings across the country

to meet the urgent need of delivering free ART to thousands of patients who previously had no access . Despite this rapid increase in access, by the end of 2007, there were approximately 1 million people infected with HIV in Uganda and only 53% of HIV-infected people in need of ART were receiving it by the end of 2009 (60).

D. Significance

To date, over 50 billion US Dollars have been spent on HIV/AIDS treatment programs in RLS, increasing treatment access to more than 5 million people (1, 2, 33). Despite this significant progress, ART coverage has reached only 53% of those in need of this life-saving therapy in sub-Saharan Africa. The task of reaching universal access has not been accomplished and still presents a huge public health challenge globally. While in line with meeting the goals of universal access, the rapid expansion in antiretroviral therapy access has put enormous strains on the infrastructure required to deliver sustained treatment in resource-limited settings that were already plagued with weak health systems. The challenges of delivering optimal HIV care and treatment in resource-limited settings is exacerbated by the two-directional limitations; one within the health systems, and the second with the socio-economic burden of managing a chronic illness that impacts poverty levels and limits the ability of patients in resource limited settings to access care even when it is delivered adequately.

CHAPTER 2: REVIEW OF LITERATURE

ART Roll Out and Adherence to ART in sub-Saharan Africa

For more than 30 years, the HIV/AIDS pandemic has devastated the lives of individuals, families, and communities around the world and its impact has been well documented in both developed and developing countries. With 70% of the cases (1), sub-Saharan Africa continues to be by far the worst affected region in the world, where the epidemic has had a profound impact on economic growth and poverty. In the first two decades of the epidemic in Africa, much of the effort was put towards prevention, and the push to make treatment readily available where it was previously withheld. The introduction of ART in 2004 and the subsequent rapid expansion created a new forum for discussion around sustainability of the treatment efforts in resource-limited settings. The review of literature for this study focuses on the period following the introduction of ART in sub-Saharan Africa to the present; describing ART treatment outcomes and the challenges and facilitators of HIV care in resource-limited settings.

Since adherence to ART is the most important predictor of virologic failure (27), some of the early studies on treatment outcomes in sub-Saharan Africa focused on ART adherence. The initial research questions asked whether or not it was possible for low-income patients in African to adhere to complicated ART regimens, and whether ART could successfully be delivered to rural communities where the needed physical

infrastructure was limited. One of the first studies on ART adherence was conducted by Bangsberg et al. in Kampala, Uganda in 2002. In a sample of 304 HIV positive adults on self-pay therapy, from three different clinic sites in Kampala, Bangsberg's study found adherence to be comparable to those in most countries. More than half of the participants (68%) reported adherence levels greater than 95%, as compared to developed countries where adherence levels reported by patients ranged between 40% and 70% (20). The most commonly cited reason for missed doses in this population was lack of money to pay for their prescriptions. A direct correlation between income and adherence was observed in this study where participants with a monthly income of less than 100,000 UGX (~$40) had a higher likelihood of achieving less than 95% adherence. A second study by Bangsberg et al., also in conducted in Kampala between 2002 and 2003, showed mean adherence levels of 91%-94% (61) for a population of self-pay participants. Similar results were reported in other studies in sub-Saharan Africa and India with ART adherence rates above 90% (51, 62), in contrast to what was previously expected. Results from a qualitative study conducted by Crane, Bangsberg et al., to better understand the findings of high adherence within the self-pay population in RLS, showed that the financial burden of purchasing ART was the main barrier to adherence (63). The study found that participants were highly motivated to take their medications 'to live' and that the immediate positive rebound from illness gave them an incentive to adhere to their medications (63). The findings from the study suggested that missed doses were as a result of 'failure to access medications' rather than a 'failure to adhere' to medications (63).

Although the unexpected findings were impressive, there was still some speculation as to whether the high rates of adherence observed were due to characteristics of highly motivated and self-paying early adopters, or if the same trend would be observed when ART was provided at no-cost. It was expected that those who were paying for medications at a high cost, would be highly motivated to take their medications, and questions remained about the trends in the treatment programs that were free. Amidst much skepticism and even on the platform of weak health care infrastructure, the roll out of ART in resource-limited settings was launched in 2003. At this time, there was a shortage of healthcare workers in Africa (3), limited laboratory capacity, and concerns about the feasibility of drug supply to remote areas were prevalent, given weakness in the supply-chain management (3). In light of this, the WHO set guidelines for HIV care in Africa that were based on a public health approach, which was the opposite of the model for patient care in the United States. Given prohibitive costs, the US model, which was patient-centered, with specialized physicians and costly laboratory monitoring, was not feasible in resource-limited settings. The WHO public health approach was designed to cater to the needs of the population, rather than the individual, with standardized protocols, so that treatment could be delivered by non-specialist clinicians in a de-centralized health system. Tools for clinical decision-making were simplified into what was called 'the 4-Ss'. The '4-Ss' referred to a standard treatment algorithm that guided clinical decisions on when to: 'start drug treatment; substitute for toxicity; switch after treatment failure; and stop' (3). The WHO guidelines in the public health approach also provided simplified options of ART for both first-line and second-line therapy. The first-line recommendation included two options; one with a

combination of 3 different nuclease analog reverse-transcriptase inhibitors (NRTI) or the second option with 3 different NRTIs combined with one non-nucleoside reverse-transcriptase inhibitor (NNRTI). The second-line options were given based on what was prescribed as first-line therapy and included fixed–dose combinations of either 2 NRTIs plus one protease inhibitor (PI), or a combination of one NRTI, one NNRTI, and one PI. Production of the fixed-dose combinations in generic formulations enabled the prices to drop dramatically (3). The generic pill burden was subsequently reduced to as few as one pill, taken twice a day.

In 2003, the WHO launched its 3 by 5 initiated, which strived to treat 3 million HIV positive people in low-income countries by the year 2005. Although the initiative failed to meet its goal by 2005, with only 1.3 million people on treatment (1, 3), it set the pace for increased access and shaped national policy on HIV treatment in almost all focus countries (3), making it possible for the success of ART scale-up. As with the self-pay patients, adherence rates were unexpectedly high in non-paying patients on ART in Africa in the initial years (64, 65). In 2009, Ware et al. conducted a qualitative study to explain the adherence success experienced in sub-Saharan Africa. The study spanned three countries; Nigeria, Uganda, and Tanzania, and involved 414 in-person interviews carried out with 225 HIV-positive adults taking ART, their treatment partners and healthcare providers. This study found that patients were highly motivated to take their medications and prioritized adherence to ART despite multiple obstacles and challenges to accessing and retaining in care (48). The main driving force behind prioritizing adherence was explained not only by a need to improve health, but also a need to fulfill responsibility in social relationships. Social relationships were particularly important

because through them, patients received tangible assistance to meet their treatment needs. In return, patients felt obligated to reciprocate the support from their friends and family by adhering to their medication, and staying alive, in order to preserve these relationships (48). Ware et al. noted that in resource-limited settings, where formal social welfare programs and government/public assistance were absent, consistent goodwill expected from social relationships were essential for survival (48). The concept of social capital in this case, is described as a resource for prioritizing adherence and overcoming economic barriers to care.

Barriers to Care

Despite the motivation to stay in care, evidenced by high adherence rates, the findings in recent literature show that access to care and retention in care continue to pose challenges and threaten the sustainability of the initial ART successes. In a qualitative study conducted in Uganda in 2009, patients recounted several challenges in making their routine monthly clinic visits to pick up medications. Transportation costs emerged as a key obstacle, alongside food insecurity, competing demands, alcohol use, and financial constraints linked to poverty (32). Several studies throughout sub-Saharan Africa reported similar findings (28, 46, 47, 50, 66-69). Difficulty in meeting transportation costs to clinic visits sometimes caused participants to miss visits and have treatment interruptions due to an inability to refill their prescriptions in a timely manner.

Other barriers to accessing care included long waiting times in over crowded clinics, coupled with unexpected user fees for clinics that could not afford to deliver the

'free' medications without a fee for service (46). Many patients continued to feel stigmatized and discriminated against. Respondents in a multi-national qualitative study involving Uganda, Tanzania and Botswana, reported negative experiences as a result of disclosing their HIV status which included loss of jobs, domestic violence or being abandoned or treated badly by their partners, and being isolated by community members (46, 47, 52, 66). Medication side effects, especially with the fixed doses that included d4T, a common NRTI used in initial formulations, were common and included body rash, swollen legs, nausea, headache, increased heart rate, diarrhea and vomiting (46). Although direct effects of alcohol consumption on HIV disease progression were not sited in the literature, alcohol was found to be a barrier to adherence by impairing memory, concentration and physical coordination (52), which most likely lead to missed doses.

The overwhelming numbers at the centers of treatment made it difficult for the healthcare providers to administer treatment and the required counseling in a systematic flow. The increase in patient volume was not met by a correlated increase in human resources required to manage care. The WHO public-health approach proposed task-shifting to lower cadre health providers such as clinical officers and nurses, who were authorized to prescribe ART and give comprehensive HIV care, but this still did not meet the growing patient needs. The quality of pre and post ART counseling within the clinics varied by region and in Uganda, the counseling was done mostly by 'lay counselors' with limited training, who were HIV positive themselves in many cases (46). The poor quality of HIV counseling, among other compounded issues of overcrowded clinic settings,

made for sub-optimal patient-provider interactions that were frustrating for both parties (66, 70).

Retention in care emerged as a significant challenge in the recent literature (4, 11, 12, 14, 71). A systematic review of patient retention in care from 2000 to 2007 carried out by Rosen et al. in sub-Saharan Africa revealed that by the end of the 2nd year of follow-up ART programs had a retention rate of only 60% of their patients (4). This review included 32 publications on 33 patient cohorts totaling almost 75, 000 patients in 13 countries and found that rates for retention in care ranged from 27% to 77% in the clinics studied (4). Forty percent of the patients no longer in care in these facilities were either lost to follow-up or dead (4). A mixed-method study by Roura et al. in 2009, aimed at better understanding attrition from ART programs in Tanzania, revealed that although patients were highly motivated to stay in care at the individual level, programmatic constraints and structural barriers at the community level contributed to lowered retention rates (72). Geng et al. also sought to understand attrition using a sampling-based approach in an HIV clinic in rural Uganda and found that the main reasons for losses to follow-up were lack of transportation or money to return to clinic visits, and competing demands at the family level with childcare and work responsibilities (11). This study revealed that mortality was highest following the last clinic visit, and the predictors of mortality included lower CD4 T-cell counts at baseline, being older, and having lower blood pressure at the last clinic visit (11). Although the study concluded that social and structural factors were the main reasons for patients being lost from care, much of the attrition was due to patients transferring to other clinics that were possibly more conveniently located to their homes (11). This suggests that not all

patients who are lost to follow up have poor treatment outcomes and the issues surround retention in care are complex, and need further investigation.

The decline in clinical outcomes for patients who are no longer linked in care (4, 11, 71, 72) provide the impetus for a shift in focus from not just increasing access to ART, but ensuring retention in care to maximize the benefit of increased access (65). Recent interventions to improve adherence and/or retention in care have focused in four main areas: 1. Use of some form of directly observed ART therapy (DOT) (73-78); 2. Use of community-based peers and treatment supporters (6, 9, 79-83); 3. Use of community based follow-up systems of mobile clinics (84-87); 4. Use of technology and devices such as cellular telephones or alarm systems for monitoring adherence and to serve as appointment/regimen reminders (88-90).

Strategies for Mitigating Barriers to Care

There have been a few other attempts at improving access to health care services by provision of vouchers or cash transfers to mitigate the economic barriers to accessing care (91, 92). These interventions were not specifically for HIV/AIDS patients in RLS, but serve as proof of concept for the intervention. In Nicaragua, a voucher system initiated by a public-private sector partnership proved successful at increasing the use of STI services by commercial sex workers (91). This incentive to access care had a significant impact on the outcome of sexual health in this particular population. In a study among HIV-positive methadone patients in San Francisco, voucher reinforcement improved medication adherence in a randomized trial (92). Other studies in RLS

including Kenya and Cambodia have found that implementing a voucher approach has been successful at improving reproductive health behaviors in the studied communities (93-96).

CHAPTER 3: METHODOLOGY

A. Overview of Study Design

This study comprised a two part, mixed method approach to better understand the barriers to HIV care in rural Uganda and the impact this has on HIV treatment outcomes. Data from the two separate sources were analyzed concurrently.

I. Qualitative Study. A cross-sectional qualitative study was conducted with key informant interviews of the Mbarara ISS Clinic healthcare providers and patients on ART. The study took place in a government HIV treatment setting in Mbarara, Uganda; the Immune Suppression Syndrome (ISS) Clinic, at the Mbarara Regional Referral Hospital (MRRH), from June, 2010 to December, 2011.

II. UARTO Sub-study. This study comprised quantitative analysis of secondary data from the UARTO cohort collected over the first 12 months of enrollment in UARTO. The purpose of the quantitative analyses was primarily to describe the study population in the study setting; Mbarara, Uganda, and further clarify the relationship between structural and/or economic barriers to care and health outcomes in HIV positive patients in Mbarara, Uganda.

Study Site

Mbarara Regional Referral Hospital (MRRH) Immune Suppression Syndrome (ISS) Clinic served as the study site for participant recruitment, informed consent, data collection and analysis. Mbarara has a population of approximately 65,000 residents and is located 275 kilometers southwest of the capital city of Kampala in Uganda. Mbarara lies at the cross roads leading either to Rwanda, Congo or Tanzania. Mbarara is one of the fastest growing towns in Uganda, although most of the district it is still considered rural, representative of the Ugandan population, which is almost 90% rural.

The MRRH ISS Clinic is part of the Mbarara University of Science and Technology (MUST) Teaching Hospital. This Hospital was built as a district hospital in 1952 and the University (MUST) was established in 1989. The MRRH has 350 beds and the ISS Clinic is an outpatient clinic housed within the hospital premises. The Mbarara ISS Clinic serves as the regional referral HIV clinic for the entire Southwestern region of Uganda, with a few additional patients from Rwanda, Congo and Tanzania. The Mbarara ISS Clinic was started in 1998 and has a total cumulative enrollment of over 20,000 patients, of which more than half are active to date. The clinic enrolls approximately 150 new patients per month and an average of 150-200 new and returning patients are seen each day. About 7,000 patients are receiving antiretroviral therapy. The clinic has 37 staff in total. These include 23 healthcare providers who have direct patient contact: (Physician (1); Medical officers (5), Pharmacy dispensers (2); Clinical officers (2); Senior nursing officer (1); Nurses (2); Nursing assistants (3); Counselors (3); Phlebotomist (1); Health Educators (3)), and fourteen additional staff that provide care indirectly including: 4 laboratory personnel, 10 data personnel, 2 administrators, including a clinic director. What

about the expert patients or peer counselor? The clinic is open 5 days a week and sees patients with confirmed positive HIV status.

The Mbarara ISS Clinic is a free government run clinic with a mission of caring for the rural population in the community surrounding it. Although it is a government run clinic, there are several international collaborators that are affiliated with the clinic. These include Harvard University, Massachusetts General Hospital, University of California San Francisco, USAID, the CDC, and others. The HIV treatment program at the Mbarara ISS Clinic is funded jointly by the Uganda Ministry of Health, The Global Fund, PEPFAR and research/donor funds through collaborating institutions.

B. Qualitative Study Methods

Study Design

A cross-sectional qualitative study was conducted via in-depth interviews with healthcare providers (n=14) and a sample of patients (n= 19) at the Mbarara ISS clinic. The Mbarara ISS Clinic patients in this study were recruited from a sub-sample of UARTO study participants enrolled between June 2005 and June, 2011. At the time of this study, the UARTO cohort was still open to enrollment. The study took place at the Mbarara ISS Clinic, in Mbarara, Uganda, from July, 2010 to June, 2011.

Study population

This study included two groups of participants;

1. Healthcare providers at the Mbarara ISS Clinic;

2. Patients on ART at the Mbarara ISS Clinic, sampled from the UARTO study.

1. Healthcare providers at the Mbarara ISS Clinic

The sample of healthcare providers at the Mbarara ISS Clinic consisted of 14 healthcare providers who were working full time at the clinic. At the time of the study there were a total of 20 healthcare providers at the clinic and all of them were invited to participate in the study during an informational meeting session about the study. Six of the providers were either unavailable at the time of the study, and it was determined that the fourteen interviews were sufficient to answer the research questions. No subsequent attempt was made to contact the remaining six healthcare providers for interviews. Consent was obtained for all who were interested at the Mbarara ISS Clinic, where the interviews also took place. The study investigator and research assistant both conducted one-on-one, in-depth interviews, with open-ended questions, with the healthcare providers to determine their perceptions on barriers to HIV care as experienced by their patients.

2. Patients sampled from the UARTO study

Twenty UARTO participants were randomly selected from two defined communities with ten participants in each community. There were a total of 505 enrolled UARTO participants at the time of the selection, of which 463 were active, 63 had died, and 39 were lost to follow up. All 505 participants were included in the list of UARTO participants from which the qualitative sample was drawn. From a total of 505 possible unique numbers representing unique individuals, 20 random numbers were generated using an online random number generator (http://www.random.org/). When a randomly selected participant was dead, lost- to -follow up or withdrawn from the UARTO study, the following participant in the sequence of UARTO enrolment replaced the original randomly selected number. The list of 20 potential participants was reviewed to assess the geographic location of all participants and the 20 selected participants were sub-divided by geographic location. The communities were defined by their geographic location as measured by a global positioning system (GPS). Although GPS data were not collected on all UARTO participants, GPS data were complete for the randomly selected participants by chance. The sub-divided groups included 10 participants in each group and the first community included participants who lived within ten kilometers of the Mbarara ISS Clinic. The second community included participants who lived between ten to twenty kilometers of the Mbarara Clinic. The limitation of this method of clustering was that we grouped participants together based on geographic locations that did not necessarily coincide with natural socio-cultural boundaries of given communities. The assumption was that a 10-kilometer radius in each particular region was small enough to establish a level of homogeneity within communities to answer the questions posed in

this study. The goal of random sampling was to ensure a systematic approach, and to enable a wide variety of perspectives.

All twenty randomly selected participants were invited to participate in the study. Permission to contact the selected participants was obtained verbally by existing UARTO research staff during routine UARTO follow-up visits, or via a phone call. Once permission was obtained, a research assistant for this study, fluent in Runyankole (the local language), and trained in qualitative research methods, approached the participant for consent. Consent was obtained either at the Mbarara ISS Clinic or at the participant's home. In-depth interviews were also conducted either in the Mbarara ISS Clinic or the participant's home, depending on the participant's preference.

The study was approved by the University of North Carolina Institutional Review Board, the Mbarara University of Science and Technology Institutional Ethical Review Committee, and the Uganda National Council for Science and Technology. All participants gave written informed consent to participate in the study.

Data Collection

Data were collected using qualitative methods. One-on-one, in-person interviews, with both open ended and semi-structured questions, were conducted by the study investigator and a Ugandan research assistant trained in qualitative research methods, who was fluent in the local language, Runyakole. The interviews were semi-structured, meaning that an interview guide with questions covering the core topics of interest was used to guide the interview process. However, questions to the participants were open-

ended and the participants were probed to elaborate on certain areas of interest for more in-depth understanding of their responses. The open-ended approach also enabled additional themes to our core areas of interest to emerge. The qualitative methodology employed allowed participants to freely discuss their opinions whilst being prompted by a predetermined course set by the interviewer using the interviewer guide (97).

The core areas of interest for the healthcare providers included: 1. Concerns about how their patients were managing their HIV disease; 2. Challenges they experienced in delivering care in this setting; 3. Barriers to care expressed by some of their patients.

Core areas of interest for patients being interviewed were: 1. Disclosure of their HIV status and stigma in their communities; 2. Challenges faced with their clinic appointments and general HIV care; 3. Their rating of the clinic services and their providers; 4. Challenges with food insecurity, childcare, transportation, physical ability, and general feelings about their HIV treatment and health.

The goal of the interviews was to understand barriers to optimal HIV care in a rural setting, from both the perspective of the patients and their healthcare providers. All interviews were conducted in a private setting with no one outside the research team and the study participant present. All healthcare provider interviews were conducted in English, and all patient interviews were conducted in the local language, Runyankole. Interviews were recorded using a digital audio-tape recorder with permission from the participants and lasted an average of one hour per participant. The participants received a small snack and drink after the interviews and transportation reimbursements were given where applicable.

Data preparation and analysis

All interviews were stored digitally on a designated, pass-word protected computer. Following each interview, a transcript was generated by the researchers from the audio-recorded interview sessions. The transcripts captured the exact words of the respondents and did not summarize the interview sessions. For the patient interviews in Runyankole, the transcripts were translated from Runyankole to English, after they were transcribed from the audio-recordings by the research assistant. The transcription and translation were verified for completeness and accuracy by a second researcher, who was not part of the interview sessions. In addition to the transcribed interviews, interview write-ups were generated during and after each interview session to record impressions and activities observed during each session that were not captured by the audio-recordings.

Data from the patients and providers were analyzed concurrently. The study investigator reviewed the data to identify relevant themes and categories using the long table approach (97). Major themes and categories were developed based on the following factors: 1. Frequency of occurrence within each participant, and also within the group; 2. Specificity of the theme to the core areas of interest; 3. Intensity and extent of emotion expressed with the response. The data were sorted, coded with specific text grouped under the major themes identified. The data were refined through multiple reviews of the transcripts and additional relevant sections of text were extracted and grouped accordingly.

C. UARTO Sub-Study Methods

Study Design

This study involved analysis of secondary data from a longitudinal cohort study, the UARTO study, on HIV treatment outcomes in HIV patients attending the Mbarara ISS clinic. UARTO participants included in this study were enrolled into the UARTO study between June, 2005 and June, 2011. For this study, we analyzed data from the first twelve months of their enrolment into the UARTO.

Data Source

Three sources of data were imported into a relational database specifically for this study and analyzed using SAS. The three sources of data included:

1. Self report data from interviewer-administered UARTO study questionnaires collected on all participants at baseline, and quarterly thereafter. Summary data were compiled on specific variables of interest listed in the data dictionary below.

2. ART adherence data derived from measures collected monthly during study participant follow-up in the UARTO cohort. The adherence measures were collected using an electronic pill bottle cap; the Medication Events Monitoring System (MEMS), and were downloaded monthly into a 'MEMS database', from which the data were analyzed.

3. Biological data from plasma specimens collected concurrently with the UARTO study questionnaires. The variables included in the analysis were CD4 cell counts and viral load counts of all participants over the first 12 months of their enrolment.

Study population: Participants of the UARTO cohort

Data from all participants of the UARTO cohort were included in this study. UARTO participants consist of ART-naïve patients above 18 years of age who live within 30 kilometers of the Mbarara ISS Clinic and who were initiating free therapy at the same clinic. Initiated in June, 2005, the UARTO cohort is an observational cohort study of HIV treatment outcomes (clinical and behavioral) among 505 HIV positive men and women attending the Mbarara ISS Clinic in Uganda. It is funded by an NIMH grant with Dr. David Bangsberg of Harvard Medical School/Massachusetts General Hospital as the Principal Investigator. The primary objective of UARTO is to determine adherence levels as well as predictors of virologic failure and ART resistance in HIV positive adults initiating therapy. UARTO participants are nested within the larger Mbarara ISS Clinic cohort of patients and continue to receive their care at the Mbarara ISS Clinic after enrollment in the study. All eligible patients of the Mbarara ISS Clinic who are ART-naïve and initiating therapy are invited to participate in the UARTO study and are recruited upon consent. All patients initiating ART at the Mbarara ISS Clinic are consecutively approached by a study research assistant during the clinic visit to ascertain

eligibility and obtain informed consent. Both biological and behavioral data are concurrently collected at baseline, and during monthly and quarterly follow up visits.

Biological and Behavioral Measures

Biological and behavioral data were collected at baseline and quarterly afterwards. Biological data include data on CD4 cell count, HIV viral load, viral resistance, and immune activation. Behavioral data are obtained from questionnaires administered by a research assistant and include information on demographics, socio-economic status, sexual behavior, drug and alcohol consumption, depression, functional status, ARV side effects, health status, quality of life and adherence. Participants are offered free transportation to the research site adjacent to the Mbarara ISS Clinic for quarterly follow-up visits.

Transportation Assistance

Although transportation assistance was not a direct study procedure, retention efforts in UARTO included provision of transportation assistance to participants to their quarterly study visits. Transportation assistance came in the form of free rides in study vehicles from participants' homes or reimbursement of transportation fares when participants came to the clinic for their study procedures. For some participants, transportation was provided to the clinic following their monthly adherence visits. For a few others, opportunities for free rides to the clinic occurred randomly through chance

encounters with study drivers and research assistants in their neighborhoods and communities and requests for free rides in these cases to the study team were rarely denied. These free rides to the clinic often coincided with clinic visits.

Adherence Measures

Based on the concept of patient adherence to therapy described by Urquhart and Vrijens, adherence measures for this study were defined in terms of persistence and execution (98). Persistence refers to the duration on therapy from the time the first dose is taken to a time when treatment is discontinued. Execution is the actual level or degree of compliance between the doses the patient takes and what is prescribed. In other words, execution refers to how well a patient takes their prescribed medications and persistence refers to how long they adhere to a regimen. To understand adherence patterns in this study, both treatment persistence and execution were examined. Treatment persistence in all individuals initiating therapy in the UARTO cohort was examined to determine their mean adherence each month while on therapy. Treatment execution was also examined to establish patterns of treatment interruptions over time for each participant.

Adherence monitoring in the UARTO cohort was done monthly in the first 12 months via unannounced home visits. Data are collected electronically using Medication Event Monitoring System (MEMS). The MEMS includes a standard pharmacy-sized bottle cap with an electronic chip that clocks bottle openings in a 24-hour period. This objective measure provides information on patterns of adherence, including treatment interruptions and missed doses. At the time of enrollment, each UARTO participant is

given a MEMS (MEMS Track V, Aardex Ltd.) pill bottle cap equipped with an electronic device to monitor the date and time of pill bottle openings. The MEMS pill bottle caps are screwed onto the pill bottles into which the prescribed antiretroviral medication is placed. The MEMS caps replace the original pill bottle cap and the event of unscrewing the MEMS cap to open the pill bottle registers electronically. Data from the MEMS caps were downloaded during monthly, unannounced pill count sessions in the participants' homes. The system makes the assumption that each cap opening coincides with a pill taken by the participant.

Data collection procedures

A comprehensive dataset of summary measures was requested from the UARTO cohort data management team for participants, who initiated antiretroviral therapy between June, 2005 and June, 2011. The dataset included the first 12 months of follow-up for each participant, and the baseline visit was determined by their ART start date. The ART start date served as the defining point at which a participant was included in the cohort, therefore, the data file included a cohort of ART starters between June, 2005 and June, 2011.

A SAS file was generated with a set of tables that represented summary measures of interest which included: biological data, demographic data including reported cost of transportation, travel time to clinic from patient's homes, ART information, laboratory data, disease stage, alcohol use and data on opportunistic infections. Adherence data was derived and analyzed from an independent MEMS database.

Predictor Variables

The predictor variables for the UARTO analysis were:

1. **Travel time to clinic**: Duration of travel to clinic was defined by the patient's self-reported total time spent traveling from home to the Mbarara ISS Clinic. This variable was analyzed both as a continuous variable and also as a dichotomous with 45 minutes set as the limit above or below which participants travelled to clinic.
2. **Socio-economic status**: This was determined from a combination of variables from self-reported data including income, education, job training, literacy, marital status and employment type. The data were summarized such that each participant fell within a classified socioeconomic position using the Henkel-Pritcht scale, which groups defined assets and expenditures reported by the participant together such that participants fall within a defined level on the scale. This was an ordinal variable.
3. **Alcohol and drug use**: This was determined from self-reported data. The data were collected using a standardized questionnaire that is part of the Alcohol Use Disorders Identification Test (AUDIT). The AUDIT is a screening tool that identifies patients who are heavy drinkers and have disorders associated with alcoholism. The AUDIT-C is a revised version of the AUDIT test which scores patients on a scale of 0-12, with a score of 0 reflecting non-use of alcohol and 12 reflecting the most hazardous levels of drinking. Scores of 4 and higher for men are considered positive while a score of 3 or higher in women is positive for alcohol use. The AUDIT-C has been validated in this

setting and provides the best determination of alcohol use in this cohort. The AUDIT-C score was determined for each participant from these data. From the AUDIT-C score, each participant's alcohol use was classified as non-drinker, moderate drinker or heavy drinker. Data were analyzed using these summary measures and the alcohol use variable was ordinal.

4. **Adherence to HIV therapy**: This was assessed from MEMS and self report data. Mean adherence via MEMS was calculated separately for each participant to determine their average adherence per month over time. These summary measures classified participants with low adherence, defined by an average MEMS adherence measure below 90%, and high adherence, defined by an average MEMS adherence above 90%.
5. **Persistence on ART or Treatment Interruptions**: Treatment interruptions were defined as no pills taken for greater than 48 hours, as recorded monthly through MEMS and Self-Report. Treatment interruptions were further categorized by duration of interruption into four categories: $\leq$7 days, 8-14 days, 15-30 days and >30 days. The number of times participants interrupted their treatment for 7, 14, and 30 days or longer was calculated and the rate of treatment interruptions over time was determined for each participant quarterly, after their baseline study visit. Treatment interruptions were analyzed as a predictor variable for loss to follow up and mortality.
6. **Disclosure of HIV Status:** The effects of disclosure of HIV status on adherence, LTFU and mortality were measured with disclosure as a standard covariate and also as an interaction term with distance to clinic. Disclosure

status was obtained from participants' clinic data that were merged with UARTO data, from a single binary variable that indicated whether or not the participant had disclosed their HIV status to anyone. The disclosure question was asked at the participants' baseline visit and the variable was analyzed as dichotomous.

7. **Internalized Stigma:** Internalized stigma was measured using the Internalized AIDS-Related Stigma Scale (IARSS) (99). On a scale of 0-6 on the IARSS, a higher score indicated a greater degree of internalized stigma for each participant. This was an ordinal variable.
8. **Social Support:** Social support was measured using the Functional Social Support Scale (100), a modified version of the Duke University-University of North Carolina Functional Support Questionnaire (101), which consisted of questions on both emotional and instrumental support. Higher scores indicated higher levels of social support received by the participants. The effects of social support on adherence, treatment interruptions, treatment failure, LTFU and mortality were measured with social support as a standard covariate. Social support was analyzed as an ordinal variable.
9. **Effects of Seasonality:** The effects of rainy season on treatment interruptions, treatment failure, LTFU and mortality were measured and also as an interaction term with distance to clinic. Rainy season included standard months with heavy rain: March –May and October –November.

The data were adjusted for confounding variables including disease stage, and functional status.

Outcome Variables

The main outcome variables were:

1. **Treatment interruptions**: Treatment interruptions were defined as no pills taken for greater than 48 hours, as recorded monthly through MEMS and Self-Report. Treatment interruptions were further categorized by duration of interruption into four categories: ≤7 days, 8-14 days, 15-30 days and >30 days. The number of treatment interruptions or breaks in treatment per participant and length of interruption was calculated for each interruption for each participant. This variable was analyzed as a dichotomous with data points defined by breaks of each participant given length and number of breaks of each participant given length.

2. **Patient execution of ART regimen:** This was defined by participants' execution of their prescribed treatment while persisting on therapy and the mean adherence over time was calculated for each participant.

3. **Treatment failure**: Treatment failure was defined as viral load >400 copies/ml after > 3 months on ARV therapy. Any participant with a viral load level greater than 400 copies after the 3-month mark was counted as having experienced viralogic failure. Viralogic failure was assessed at 4 quarterly intervals over the 12 month follow up period and summarized for each participant. Virologic failure was analyzed as a dichotomous variable.

4. **Mortality:** Deaths in the cohort were confirmed by hospital records or through key informants. Kaplan Meier survival curves with even rates and 95% CI were stratified by predictor variables of interest.

Preliminary analyses and data cleaning

All data were checked for completeness and accuracy. Missing values in the SAS relational database were excluded from the analyses and reported as missing. The MEMS data contained several gaps and additional steps were taken to clean the data and confirm inconsistencies. The purpose of cleaning the MEMs data was to ensure that all missed doses that were identified by the electronic MEMS tool, were accurately identified as missed doses and not merely due to equipment mal-function etc. Data from the MEMS database were verified by comparing the MEMS results with other adherence measures (self report, pharmacy refill data, and unannounced pill counts) that were collected concurrently. The process of data cleaning involved the steps outlined below:

1. A list of all UARTO participants with missed ART doses was generated from a review of the MEMS database. The list included all UARTO participants with missed doses that occurred between the date they initiated ART, and their last known visit time-point.
2. A missed dose was identified when a MEMS reading was recorded as '0%' for a given day in the database. Each participant was expected to have 2 MEMS reading recorded each day with a value of 0% or 100%, with 0% representing a missed dose and 100% representing a completed medication dose.

3. The distribution of gaps was summarized and reported from the MEMS data by length and year of occurrence.
4. The length of each gap by year was determined for each participant as follows:
    i. 0-6 days
    ii. 7-14 days
    iii. 15-30 days
    iv. greater than 30 days
5. From the summarized list, each missed dose was investigated independently for each UARTO participant.
6. For the purpose of this dissertation, missed doses for all UARTO participants identified by MEMS, broken down by length, for the first 12 months of follow-up only, were included in the final review to determine the validity of the MEMS identified gap. Four different sources were used to determine whether the MEMS identified gaps were true or false gaps; in order of priority:
    a. **Adherence Monitoring Uganda (AMU) study visit notes** to confirm MEMs use, blister pack use, ARV status, definitive comments on gaps for missed doses or interruptions
    b. **Pill counts** (PC) – concurrent adherence measure during period of MEMS gap
    c. **Pharmacy refill data** - confirmation of refill during the time of gap
    d. **Self report (SR) from UARTO questionnaire** – patient report of interruption and/or adherence in UARTO questionnaire

7. An access database was created with the following variable codes that served as criteria for confirming whether a MEMS identified gap in medication dosing was a true gap or a false gap:

'**Notstarted**' Some MEMS gaps occur before the participants actually start taking medication. "1" in that column meant that this gap happened before the ARV start date.

'hadpocketdose' in this column it was recorded whether a participant reported taking pocket doses at the time a gap was reported by MEMS. "1" in this column meant they had a 'pocket dose'. Pocket doses refer to pills removed from the pill bottles prior to the time when they are supposed to be taken by the participant.

'hastelegap' If the participant reported to have missed taking drugs in the teleforms completed at the regular quarterly visits, it recorded as '1' in this column.

'haslossgain' in the AMU monthly visit, a "lossgain" was registered if a person lost drugs or borrowed drugs. A negative "lossgain" would mean the participant lost drugs and it is likely that they missed a dose. A "1" in this column meant that the participant reported losing drugs at the time of the MEMS reported gap.

'malfunction' represented times when the MEMS cap recorded a strange date or

numerical value that was not recognizable. A "1" in this column meant there was a malfunction with the MEMS cap.

'laterrefill' This column represented pharmacy reports for participants who returned to the ISS Clinic pharmacy after their prescribed refill date. The assumption was that the participant missed doses in the days following their prescription refill date. "1" in this column meant a late visit to the pharmacy, and "n/a" for no information from the pharmacy in the time of gap.

'haddrug' This variable showed whether or not a participant had filled their ART prescription, and therefore had their medication in their possession at the time of the gap as reflected in the pharmacy database. "1" in this column meant that the participant had drugs at the time of the MEMS recorded gap, and "n/a" for no information from the pharmacy in the time of gap.

'AdhPCAdj' This was the adherence value recorded in the AMU database calculated from the monthly pill counts. If the adherence was >0.5 then a "No" to the gap was recorded in this coloumn. If the adherence was <0.5 then a "yes" to the gap was recorded in the column. "n/a" was registered for times when there were missed visits and no pill count.

'VisitNotes' These were notes recorded at monthly AMU visits by UARTO research assistants. All visit notes were read to see if the participants mentioned anything about missed doses, adherence etc. at the time of the MEMS recorded gap. "Yes" in this column meant that the notes confirm there was a gap, "No"

meant that the notes clearly state that there is no gap e.g., a note that participant had ART prescribed in blister packs, and therefore was not using the MEMS cap. "n/a" meant that there were not notes written at the time of the MEMS recorded gap or that the notes written do not help classify the gap.

8. A Microsoft Excel spreadsheet was created to summarize the result of the review variables with options of yes/no or n/a. To make a definitive statement whether gaps were true or false the results of all variables for each participants were reviewed.

A MEMS identified gap was confirmed as a true gap if:

1. There were corresponding gaps in the
    a. AMU study visit notes
    b. Pill Count
    c. Pharmacy refill data

For purposes of this study, true gaps were confirmed and reported if 3 out of 4 review criteria (AMU study visit notes, PC, Pharmacy refill, SR), were considered true gaps and were included as gaps in the MEMS adherence calculations.

A MEMS identified gap was confirmed as a false gap if:

1. One or more of the 4 review criteria (AMU Visit notes, PC, Pharmacy refill, SR), confirmed that the participant was taking his/her pills at the time of the suspected gap including:
    a. Pharmacy refill at the time of gap
    b. Adherence was 50% and above by PC
    c. No missed doses via SR

d. Visit notes were also assessed to see if any interruption was reported

MEMS Data from this group were highlighted as MEMS non-use and not included in the MEMS analysis as true gaps. Adherence was calculated in this group using the confirmed measures.

A MEMS identified gap was confirmed as Inconclusive if:

1. There was insufficient data to determine whether these were true gaps or false gaps because
    a. Data from corresponding sources were missing
    b. Visits were missed and visit notes did not exist

Data from this group were treated as missing data in the MEMS analyses.

The data cleaning exercise yielded an adjusted MEMS database used in the univariate and multivariate analyses of ART adherence and treatment outcomes.

Statistical Analysis

Univariate Analysis:

The demographic characteristics of all participants in UARTO were summarized and described in Table 1.

Bivariate Analyses:

The primary analyses examined associations between the predictor and outcome variables, while controlling for potential confounders described earlier. These analyses included Chi-square and Fisher's Exact tests to compare categorical variables, and t-tests

for continuous variables. Predictor variables that were found to be associated at $p<0.25$ with the outcome variables listed above, were retained for multivariate regression models.

Multivariate Analyses:

Logistic models were used for dichotomous variables and ordinary least squares for continuous variables.

Repeated Measures:

The SAS GLIMMX procedure for numeric outcomes was used to account for within-subject correlation of measurements over time for the outcome variables: treatment interruption, and adherence measured over a twelve month period.

Survival Analyses:

Survival analyses were used for time-to-event outcomes including loss-to-follow-up and mortality. For these two outcome variables, Kaplan Meier survival curves were generated with event rates and 95% confidence intervals. The curves were stratified by the following predictor variables: gender and travel time to clinic with the predetermined cut-point of 45 minutes.

D. Ethical Considerations

The study was approved by the Institutional Review Boards of University of North Carolina Chapel Hill, Mbarara University of Science and Technology and Uganda

National Council for Science and Technology. The ethics approvals for the quantitative study of secondary data allow for the analysis of de-identified data already collected in the UARTO study, therefore no specific written or verbal consent was obtained. Written consent was obtained in English for all healthcare providers enrolled in the qualitative study, and all patient participants gave written consent in either English or Runyankole, the local language in Mbarara, Uganda.

CHAPTER 4. RESULTS

A. Qualitative Study Results

Demographic Characteristics of the Qualitative Study Participants

A total of 33 participants were interviewed for this qualitative study including 19 patients and 14 healthcare providers.

Results of Patient Participants

I. Descriptive Analysis for Patient Participants

Sixteen out of Nineteen (84%) of the participants were women. More than half of the participants (53%) were widowed; 32% were either divorced or separated from their partner; 1 participant (5%) was currently married; and 2 (11%) had never been married. Almost all the participants (95%) were Christian and 1 person was Moslem (5%). The majority (90%) had no formal job training and 74% of the participants had received only primary education or no formal education at all. The age of the participants ranged from 33 to 42 years old, with the mean age being 37 years. The average household size included 4 members and the mean monthly income for most households was 97,500 UGX, which is approximately $39 per month. The participants took almost an hour on average to travel to the clinic from their homes, and spent an average of 4,250 UGX

(~$2) on transportation costs (each way) to the clinic. The mean CD4 cell count at baseline was 183 cells/mm and the mean viral load at baseline was 303,275.

II. Key Findings from Patient Participants

Using the long-table approach, the findings were interpreted and organized under two main categories: 1. Barriers to Care and; 2. Facilitators of Care.

Under the category of Barriers to Care, there were three main themes that emerged. These include:

1. Stigma and issues of disclosure of HIV status are major barriers for accessing care and sustaining adherence
2. Financial constraints and resource scarcity are recurring challenges for patients managing their HIV disease
3. Inflexible clinic schedules and delays at clinic are frustrating and challenging

Under the category of Facilitators of Care, the following emergent themes are summarized below:

1. There is a high level of trust in the ability of health providers/clinic to deliver good quality care
2. Positive health outcomes are attributed to a higher being, God, and patients' spirituality is important in sustaining care

3. The availability of ART is appreciated and there is a high level of trust in its effectiveness

4. Participants relied heavily on social support to sustain their HIV care and for survival

Barriers to HIV Care Reported by Patients

1. Stigma and Issues of Disclosure of HIV Status are major barriers for accessing care and sustaining adherence

Stigma associated with being infected with HIV emerged as a major theme for all the participants, although it did not present as a barrier to care for everyone. The fear of being 'stigmatized' or 'discriminated against' presented as a barrier when it prevented participants from accessing care, taking their prescribed medications, or seeking social and financial support to help them adhere to their care and treatment. Stigma was also noted to affect participant's emotional well-being and self-esteem, ranging from 'feelings of worthlessness' to actions of attempted suicide in one instance. Overall, the emotional well-being of all the participants influenced their ability to 'cope with' and 'manage' their HIV disease effectively. Interviews with the participants revealed that whether or not the individual had experienced or perceived acts of discrimination due to their HIV disease, they were all aware of its prevalence in their communities and had developed different coping mechanisms for dealing with it. About half of the participants had experienced or perceived the effects of stigma in their communities and about a quarter of them had made conscious decisions not to disclose their HIV status as a result of prior

negative experiences. The fear of discrimination, described frequently as 'what people would do' or 'what people would say' to them and the subsequent effect this might have on their emotional and psychological well-being was sited as a reason for not disclosing their status. A woman in care at the clinic for 5 years, who had disclosed to only a few of her friends and family members spoke about disclosure and stigma in the community and described specific acts of discrimination and its potential effects:

> *Only some of them* [in response to whom she had disclosed to*] because most of our friends are rumor mongers… People are different, there are people who discriminate, they don't want to use a plate or cup an infected person has used and this lowers one's self esteem. Someone was once discriminative towards me but I forgave them.* (woman in care 5 years)

A female farmer who sells fruit to raise money for her transportation fare to the clinic described her experience as having changed over the 5 years she received care at the clinic:

> *Some people do treat me bad, at first people used to rumor about me how I am infected but they no longer do that… My husband was positive so my in-laws thought with this disease if they mistreated me I would die of stress but I did not.* (Female farmer in care 5 years)

Another woman who had been in care for more than 6 years in clinic and had only disclosed to family members that live in the same home with her, responded to a question about whether or not she had disclosed to people in her village:

> *No, probably they know since they see me visit the clinic occasionally but I never tell them. Even when you talk to them about it as a friend they show you a bad attitude, so since I have my strength, I don't see why I have to tell them, they are not health workers nor are they counselors, why should I tell them anything? They only laugh at you since they are not affected.*

(woman in care > 6years)

[In response to disclosing to her friends] *I have told few of them, I trust very few with my issues. Isn't that the reason I was telling I only tell few of my friends the close ones, Some of them, you think they are friends but at the end of the day they are rumor mongers….* (Woman in care >6 years)

The same participant gives specific examples on how disclosure issues can be a barrier to care, as patients take extreme measures to protect the confidentiality of their HIV status:

One barrier is self esteem; people shy away till they are so weak. If they find out their colleagues are receiving treatment at the same clinic, they stop coming to that clinic. (Woman in care >6 years)

Another participant, who had fully disclosed her status, and had been a patient at the Mbarara ISS clinic for more than 10 years, also commented on the same issue:

Some people have low self esteem if they are found HIV positive. Sometimes when they are at the clinic and they see someone they know, they leave their medication letters behind and when their time comes to be called in, they are nowhere to be seen. (Woman in care 10 years)

A female casual laborer, in care for 4 years and highly motivated to stay in care, described a similar situation she believed posed a barrier to care when patients forfeit filling their prescriptions at the clinic:

Some people have weird characters, they don't want to wait for long in queues, and some don't want to be recognized as infected people. There are people I know but when I meet them at this clinic they shy away and don't get their medication. (Female casual laborer in care 4 years)

Another woman who had been at the clinic for 4 years, described instances when patients find other community members, such as herself, present at the clinic. The unexpected and uncomfortable meetings at the clinic lead to patients forfeiting their prescriptions in an attempt to hide their status:

> *They always think when I get back home I will spread the rumors about them since they have been visiting the clinic in secrecy. They leave without the drugs to give me the impression they were on their other businesses*. (Woman in care 4 years)

There were several reports from participants of internalized stigma and feelings of shame about their HIV status. In many of these cases, the individuals had not necessarily experienced discrimination but anticipated negative judgments from their family, friends and community members towards them. For those who had high moral standards, the idea of being HIV positive tested their self worth and they worried about how others might perceive their character regarding how they contracted the virus. There was a general belief by this sub-group of people that HIV was a disease of 'prostitutes' and that all who were HIV positive were 'useless' and had 'looked for it'. This belief contributed to their inability to accept their status, disclose it, and maintain their routine in care with the necessary support needed. One participant describes the emotions about the shame felt because of how the disease was contracted; ***"****So there is nothing more shameful than this."* An older woman, recently diagnosed with HIV, after her husband died more than a decade prior was not only shocked by her diagnosis, but limited the disclosure of her status to just two of her children who were present when she was tested:

> *Yes I have another son, but if I told him about my situation, he would tell my daughter-in-law who does not like me very much. And then she would*

say that, "considering that your mother is not a prostitute how did she come to contract the virus?" And so I chose not to tell him about it, it is only those 3 people who know about my situation….

It makes me feel very very very ashamed. Seeing that I am an old woman, do you think that I should be having HIV? Looking at how old I am, I am not one to be falling sick or acquiring HIV. I mean what should be making me become infected? Don't you see that it is embarrassing?

[In response to a question clarifying what is embarrassing about her HIV disease] *It is the question of how I might have acquired the virus and people coming to question how I might have acquired it. That is what is shaming. And so that is what is causing me not to tell people in the village about it. No, no I see that it brings me shame because at the age at which I am, to find that I have HIV, they would start wondering and thinking that how did this one come to contract the disease. And so I decided to leave them and keep silent about it. Ehhhhh, you can't you see how old I am? I mean eventually having to die from HIV isn't that the unthinkable? Yes.* (Older woman in care less than a year)

For some of the participants, their decision to keep their status private went beyond the fear of hurt emotions and translated into the fear of loss of financial support and threats of physical violence. These individuals experienced a high level of anxiety about being 'caught in lies' they created to keep their HIV status hidden. One participant, a 34-year old woman, who had not disclosed her status to her husband and father of her two children, noted fear of domestic violence as a reason for not disclosing her status to her husband:

[In response to why she had not disclosed to her husband] *eeh, it's very difficult. (Laughs) aaaaayyyii, it's not possible. When the man is not infected, then you wonder even how you will tell him. eeehhh, I just know that it has happened as a big mistake and he can even cut me into pieces (laughs). A person like him whose you don't know, won't he cut you. He can do something terrible to me.* (34 year old newly married woman)

In addition, she described the intricacies of avoiding discussions of HIV with her husband and refusing to get tested jointly with him when the opportunity presented. The stress of 'lying' and trying to hide medications (ART) from family and friends becomes a barrier when it interferes with one's persistence on their treatment regimen or leads to interruptions in their clinic visits.

> *You know when you go to test* [for HIV*]; they tell you that you should go the two of you. But every time I dodge him* [her husband*]. When I am going to Mbarara, I tell him that I am going to visit Jennifer (sister) and I will test from there. I try and confuse him... I lie to him that am visiting Jennifer.* (34 year old newly married woman)

> *.. Of course when I ask him* [speaking of transport money to Mbarara town], *he says that for you why do you want that money? Where are you going? ... He has never seen my medical forms, I try very much and hide them, like my handbag, he rarely checks in it.* [When asked about taking her medication*] I take them when he is away; the issue of money becomes more complicated because sometimes, I really try very much to see that I don't end up badly*. (34 year old newly married woman)

This particular account by the 34 year old woman illustrates how stigma is a barrier to accessing social support. This is an important concept as stigma is often viewed as an emotional/cognitive construct as described above, but can also function as a barrier to accessing tangible support to overcome structural-economic barriers.

It was not uncommon for the participants who had not disclosed their status to face challenges in explaining their frequent visits from their villages to Mbarara town to their family and community members. It is also likely that this sub-set of participants traveled away from clinic facilities closer to their homes, which equally provided ART, and chose to come to Mbarara to seek care just to seek more privacy and protect the confidentiality of their sero-status. For women who had been pregnant in the past, their ante-natal care provided an excuse for monthly visits to the health centers or clinics. However, once their babies were delivered, the

challenge of explaining where they were going each month, and for what purpose, resurfaced. This placed an enormous emotional burden on the participants. Such was the case of a 34-year old mother of two, who described the difficulties of obtaining her transport money to go for her monthly clinic visits and having to come up with a valid reason for travelling to Mbarara.

> *Yes, because when you see, if you don't have money, you cannot go to Mbarara now, like when am going to the clinic. Because you see, most of the things* [talking about purchases for the home] *he brings them. So he will ask that what do you want the money for or he says that tell me what you want and I will bring it. So now if you tell him that I want to go to Mbarara, he will ask what I want from there. There is no way I can say it. If he would give me money, then I would lie that this thing is not there and if he still gives me the money while lying, then I would obtain the money through lying and I would get it and go immediately. But now he brings everything. So now the money for going to Mbarara, I don't have it in my head. So as I see the days drawing near, I go to my brother in Nyakabira, though he is a bit difficult, but I also insist until he gives me the money. Then, he gives me money for going and then Jennifer* [sister] *pays my transport back. (*34 year old woman)
>
> *No, as for him,* [speaking of the husband] *the money for taking me to Mbarara is not part of his pocket. It cannot happen. (*34 year old woman)

One key finding was that almost all of the participants found it the most difficult to disclose to their religious community and even when they did disclose to their church community, this was the last community to hear of their status. The responses were almost unanimous when asked about disclosing to their church member and leaders in particular:

> *'No, I mean going to tell them to I am infected, there is no way'…*
>
> *"No and I don't think I will ever tell them… Definitely there are rumors but they are not sure."*
>
> *"I have not told the church leaders …"*

Almost half of the participants had made a conscious decision early in the course of the HIV disease to disclose their status and be open about their experience to their family, friends, colleagues and beyond. For this group of individuals, they acknowledged the positive effects disclosing their status had on their ability to maintain their HIV care and treatment. Many of them saw no reason to hide their status as they believed that many members of their community were equally infected. Typical responses to questions about perceived stigma in the community were: "No, most people are infected, they no longer hide their status". Another common response on questions about experiencing the effects of stigma in the community was: "I have not experienced that, most of the people are infected so they don't discriminate." For those who responded in this manner, there was a general consensus that HIV was a 'normal' part of life in their community and affected almost everyone. The respondents also reported benefiting from social support in dealing with their HIV disease.

2. Financial constraints and resource scarcity are recurring challenges for patients managing their HIV disease

All participants reported financial constraints and resource scarcity as a recurring challenge in the management of their HIV disease. The cost of transportation to the Mbarara ISS Clinic for routine care was prohibitive to many participants. Therefore, 'raising' funds for transport fares required advanced planning with concerted effort, and for some, this task consumed their thoughts and actions regularly. A female trader, with a higher income level than most of the other participants, still had issues with paying for her routine visits to the clinic:

The only challenge is the funds because I have a lot to cater for. I get

> *problems with funds, sometimes my day comes when I have no money for transport and I miss my visits yet I can't walk; my legs are weak. I failed to raise the money for transport*. (Female trader)

Another women reports the same issue:

> *There are times I fail to raise transport money, I walk and may be board from Kijungu or sometimes I walk the whole journey but when I get home I weaken a lot.* (Woman in care 6 years)

Most participants described the issue of transport fares as a 'problem' or 'challenge' or 'difficulty' that caused them stress.

> *The challenge and the only one is money. I may fail to raise the money for fares to the clinic.*

> *The problem really is money; there is no money that is the important thing. Because you see someone may owe you money and they say to you that, "I will give the money back to you on Monday because you told me that you are going to clinic on Tuesday". And when you get to the person they tell you that, "the one who was going to give me the money did not show up". And so you starting looking everywhere for money to make sure that you go to the Clinic.*

Many participants 'borrowed', 'begged' or 'got' funds from friends or relatives to meet the cost of their transportation to clinic in the event that they were unable to raise money before their scheduled visit. Borrowing was easier when one had disclosed their status and could give a 'straight-forward reason' for needing the funds. A female farmer who has been a patient at the clinic since 2004 and was highly motivated to stay in care because of her children reports:

> *Sometimes I don't have money; I borrow since I have to go get my drugs.*

Other participants share the same experience:

> *It* [transport fare] *is not always available, but I find other means. I told you about my son who works in town; I get money from him if I can't raise it myself. Sometimes he refuses but lends me money for transport which I pay back after some time. It is not enough money really.*

Even when transport fares were realized, for some of the participants there were additional challenges with getting to their routine clinic visits. Although seasonal, they did present significant barriers to accessing care for those involved. For some it was as simple as traveling on a day of the week that was busy and transportation options were limited, or for others the situation was more complicated. Many individuals worked as casual laborers or sold their own crop to raise transportation fares. This strategy of raising money was dependent on sufficient crop yield and availability of employment. Given seasonal changes, the outcome of the yield as well as need for casual labor varied. It was during these times of scarcity that raising transportation fares became daunting.

> *May be sometimes I have money for transport but I fail to get vehicles going to town which forces me to take a boda boda [public motor bike] which are dangerous but since they are the available means I use them.*
>
> *Mondays are usually tricky days; I delay a lot on the road because cars are not there. I reach the clinic late and sometimes I am told they are not receiving more patients.*
>
> *No big challenge, maybe one that I may soon face is raising the transport fare. During school holidays, there are no jobs because people feel the children can work on the farms. To be honest, there are times I fail and I have to beg my brother to ride me to the clinic.*
>
> *If you say to cultivate crops, yet in Mbarara it is demanded you go every month. By the time the crops grow and the month reaches, where will you be? If you have cultivated on borrowed land and sometimes the crops fail, then you have to first give the yield to the owner of the land and what remains is for only for eating in at home..*

There is lack of sufficient income, there are times the farming business is not booming and you are run with a lot of thoughts that I sometimes forget the day I am supposed to visit the clinic.

Walking to clinic, to avoid paying unaffordable transport costs, was an option for those whose functional status permitted.

I walk 15 Kilometers from home then I board to the clinic, boarding a taxi to Mbarara costs me Ush. 2000. If I am to use a motor bike, it costs Ush. 5000.

Since I have not failed to walk, I find no problem with that. I usually walk most especially when I have not found work to do to raise transport…

No, even if I don't have transport I make sure I walk to the clinic unless I am having a fever that's when I miss coming to the clinic.

A few participants talked about having to purchase food at their clinic visits when they spent long hours waiting for their turn to see their clinicians. It was not uncommon for a clinic visit to turn into an 'all-day' affair. While the long wait was generally expected, purchasing lunch at the clinic canteens went beyond the financial capacity of many participants and posed a challenge in their ability to cope during their clinic visits. The challenge was exacerbated when there were multiple family members who were infected and who received care at the clinic. Some expressed a compounding of factors when family members were scheduled to come to the clinic on different days. In such cases, coordinating the logistics of travel, food and treatment was overwhelming.

I have a challenge because both I and my wife are on medication and different review dates, so I have to look for her transport money and some more for some food at the clinic.

There is also hunger as one sits for long and can't move anywhere in case your name is called out you need to be around.

Financial resources were often stretched with large families and difficult choices were made to accommodate competing demands. Basic necessities such as food and school fees for children, were not often met, and therefore took priority when funds became available. School fees for children were typically required three times in a year, and it was a difficult but necessary choice to pay the fees for families who wanted a brighter future for their children. Because adherence to the prescribed regimen was equally important to the participants, the diffusion of resources required additional 'borrowing' and several gave accounts of going further into debt to accommodate all their needs.

> *When I have raised some money and it's all gone into school dues, I find myself with no transport.*
>
> *Because for us you see we have problems and if you look at all the other expenses; school fees, rent you find that we end up in debt to make sure that we go to the clinic.*
>
> *The other challenge is school fees for my children I spend many days with little or no food so that they go to school.*
>
> *I always have time to go when my day comes, the only problem is when I don't have transport. But there are times my day collides with the market day, the market day is really important for me since that is where I earn a living so end up not going to the clinic. I go on another day. Of course the hospitality is not good.*

Food insecurity presented as a competing demand, as has been noted in previous studies, but in this case, participants were as concerned about the quality of their nutrition as they were with the quantity and availability of food. Participants were conscious of being adherent to the advice given by their healthcare providers regarding food. For some, getting enough food to eat for themselves and their families was a struggle, but for most participants, there was a sense of failure to abide by the instructions of their nurses

in eating a balanced and nutritious diet. The clinic counselors emphasized the importance of a nutritional diet to functional recovery, and many participants viewed this as an essential part of HIV treatment. Knowledge about the types of food needed for optimal health as an HIV positive patient was extensive, regardless of the respondent's level of education or socio-economic status. Several respondents described:

> *To be honest, sometimes I don't have food but I make sure I swallow my medicine whether the food is there or not. It is a problem because I have to take the drugs without meals.*
>
> *To be honest, food is not enough for me, like I had told you earlier some days I go hungry.*
>
> *Food in the village is scarce, but we try to have our regular meals only that I failed to get the food the nurses recommend.*
>
> *I have found it big challenge because in most cases I have insufficient food, I eat less. I buy expensively the matooke, which is all I feed on. I have failed to feed on Posho. When there is only Posho at home, I take water and sleep. I cannot even afford to buy milk.*

3. Inflexible clinic schedules and delays at clinic are frustrating and challenging

Like many other HIV clinics in sub-Saharan Africa, Mbarara ISS Clinic experienced a rapid expansion and a 20-fold increase in patient volume. This increase in number of patients was equally overwhelming to the patients as it was to the healthcare providers. Patients found it difficult and frustrating to navigate a system with thousands of patients and very few healthcare providers. In order to limit their length of stay at the clinic, some patients came to the clinic 2-3 hours before the start of the clinic to ensure a good spot in line, as patients were seen on a first-come-first-serve basis each day. Long waiting times at the clinic were expected and many planned for this, but did not look

forward to it.

> *Since I know people are many, I tell the bike rider the day before to pick me at 6am then by 6:30 a.m. I arrive at the clinic.*
>
> *I feel I spend too much time at the clinic sometimes I leave the clinic after one and other times I spend the whole day there… Sometimes when I delay at the clinic I am forced to buy lunch since I don't take breakfast having travelled so early.*
>
> *The services are good but there are some things that can be changed. I do not know if it is because the number of people increased but you can easily sit at the clinic for the whole day. Like when I went there in December, it became too much, we were even about to pass out from there. But usually* [speaking of the past] *when we arrive they just treat us and we leave.*

In 2009, clinic appointments became a standing order in a clinic that previously saw patients on a walk-in basis. Appointments were given to participants for specific days, but without specified times, and strict instructions were given to the patients to adhere to their appointments. Patients were seen on a first-come-first-serve basis on their assigned clinic appointment dates. Although the system was necessary to maintain an organized flow of services, many participants found it too rigid in its implementation. According to the participants, there was no room for deviations from assigned appointments and for those who had challenges meeting their transport costs, or other conflicting obligations, they expected that they would not be treated if they came on an unassigned day. The consensus among many participants was that the clinic reception was hostile when they showed up on an unassigned day, and for some, this prevented them from going to the clinic at all. The fear of being 'shouted at' or 'chased' [being sent away] caused many to worry about missing their visits and sometimes they actually did miss their visits as a result.

The clinic officials insist everyone should come on the assigned day because when you appear on a different day you may make those supposed to receive drugs that day, miss. I am not sure what happens when you go on a day not assigned to you because I have never visited the clinic on an unassigned day. I think I might forget one day since I have many thoughts.

So, when my days pass and I go to the clinic when I am sure I'll be served after all the rest. Even when you explain to them that I failed to raise the money for transport they don't understand.

The reception received by patients who came outside of their assigned clinic visit date was often described as 'rude' and with 'no understanding' of their plight.

People in records [records room staff*] usually disturb us a lot; they don't respect us and it hurts us.*

In order to be seen for an unassigned clinic visit, patients had to present valid evidence for missing their appointments. It was required for them to obtain letters from their local political leaders to verify their reasons for a missed visit. Most of the participants viewed this requirement as extremely rigid and representative of a lack of understanding of the challenges involved in making their clinic visits. The participants describe almost in unison below:

The care takers here told us that if at all you have a reason why you missed to come on your assigned day, you should be able to come with the chairman's letter explaining all the reasons of your absence then that is when they serve you on a different day.

They (at the clinic) said that even though it's your father-in-law who has died and you failed to go there [to the clinic]*, you have to take the chairman's letter showing the problem that prevented you from coming or if you give birth around that time. But you just cannot skip that date without bringing solid evidence with you. They cannot accept it.*

If at all I go before or not on my assigned day, they ignore you and treat patients meant to be treated on that day first. You have to sit for long

hours waiting.

There are times you receive treatment elsewhere because sometimes when you go before your visiting day they are rude to us since we have come on a day not assigned to us and you try to explain to them how you are feeling sick and that is where we always get treatment, they insist we should not appear when our day are not due, we should try other clinics.

In response to questions about their experience with missed clinic visits, two participants replied:

Like twice [referring to the number of missed visits]*, because there are times I feel so sick and I go to the clinic on a day not assigned to me but when I realized I will stay unattended to for long hours while am feeling weak, I decided I go to some other clinics when I have some money.*

*Well, usually it's [*speaking about challenges] *transport especially where you are a widow. When you miss* [clinic visits*] that also disturbs because when you reach hospital they delay to work on you or you are chased* [sent away], *which is not okay.*

For a few participants however, the strictly enforced clinic guidelines on appointments served as motivation to plan and get 'organized' in preparation for their visits, to ensure that they did not miss them. In these cases, the motivation to stay in care mitigated all barriers and challenges and the participants expressed a lack of understanding for those who could not be as diligent.

There are people who fail to get transport means, time schedule and some don't know the days they have to pick their drugs so they end up blaming the doctors for the bad treatment; yet it is a problem of their own making.

Some people have transport issues even when they are given ample time to look for it, some say they forget their visiting days and they are served late on another day which hurts.

Facilitators of HIV Care Reported by Patients

1. There is a high level of trust in the ability of health providers/clinic to deliver good quality care

The experience of being very ill was not too far in the past for many participants. They remembered clearly how their HIV infection had incapacitated them both physically and emotionally and did not want to 'go back to that state'. There was a strong motivation to adhere to medications as a direct result of the positive outcome of their treatment. But the participants' description of their healthcare experience went beyond the medications and attributed their treatment success to the quality of care of the clinicians. Many participants in this category felt that their 'death sentence' had been reversed as a result the quality of care they received at the Mbarara ISS Clinic. Many described the quality of care as good, and detailed the caring nature of their doctors in particular. In general, there was a high level of regard for the clinicians and specifically, a high level of trust in their ability to deliver good quality care.

> *They have really cared for us; they are so good. The time I tested I had CD4 count of 15, I now have 200 or so, why wouldn't I appreciate? They give us the drugs in time and in good amounts, great counseling, they are never rude, we pray, what more can I really ask for? I award them with 10* [in response to ranking the clinic on a scale of 1-10].

> *Because they have given me life, when I look back the point I had reached and I compare it to the way I am doing now, it is a great job they have done for me. I used to be so sick and weak but I am better now*. (Female in care for 4 years)

> *Even it is 100% I can give it to them because for me I was already dead, because I was really weak and sick. And look if they managed to get me treated and here I am standing by myself again, why shouldn't I thank them?* (Male bar tender in care for 5 years)

All participants unanimously agreed that the clinic had done an excellent job of making sure that they had a steady supply of drugs. More importantly, the patients expressed gratitude about the fact that the clinic did not charge additional service or user fees, typical in other treatment centers. For some participants who had been patients at the clinic at a time in the past when ART was either not available, or was available at a prohibitively high cost, the receipt of ART at no cost was particularly well appreciated. For many who sacrifice resources to make it to the clinic, the expectation of leaving the clinic with medications was motivating enough for them to find ways of making it to the clinic. Some remembered the times when clinic visits constituted being on long waiting lists in anticipation for ART availability.

> *Even their meds do not run out; I have never gone to the clinic and gone away without meds.*
>
> *They really take good care of us. Long ago we used to be so many and we would take so long there till they allocated each of us a day to receive treatment and now everyone goes with medication at the end of his visiting day. I give them 10 [referring to the clinic rating on a scale of 1 to 10].* (Female farmer in care for 5 years)

2. Positive health outcomes are attributed to a higher being, God, and patients' spirituality is important in sustaining care

The Mbarara ISS Clinic was founded in 1998 by an American Baptist Missionary doctor, who instilled a religious culture at the clinic for both health care providers and patients. Long after the founding doctor left, the clinic has continued to have a strong religious foundation, although it is not affiliated with a religious institution. In addition to the Mbarara ISS Clinic having a strong Christian religious foundation, participants seemed to express a high level of spirituality in their conversation and description of experience with regards to their treatment outcomes. A strong theme that emerged, not

previously discussed in other studies was the attribution of positive clinical outcomes to a higher being, God. The participants expressed their beliefs about the impact of God on their health in two main ways. The first category of responses focused on the participants personal belief system and faith in God. They described their personal relationship with God and viewed God as the divine healer of HIV. Participants described praying to God and expecting healing and positive outcomes as a result of their personal relationship with God. There was a feeling that no matter how challenging or insurmountable their disease might have presented, that there was a 'way out' that was guaranteed by God. An older female participants, whose husband died in 2000, and who had previously attempted suicide when she found out she had HIV described her relationship with God:

> *My faith helps me a lot because I know what God has done in my life from that time till now. When I got saved, I now have peace. God helps me deal with the daily challenges.*

Another female participant:

> *There are challenges but I know God will help. They say when God has blessed someone, somebody else can delay that blessing on the way but it will definitely reach its destination/owner.*

A male participant, who became religious and 'born again' after receiving his HIV diagnosis, attributes his being alive to his personal relationship with God.

> *God had made it possible for me* [to live] *but all this came as a result of being born again because if I was not then I would not have managed.*

Other participants describe their relationship with God, and one even attributes the decision to get tested as a direct order from God.

It has not been easy but I always pray to God to make a way for me. He knows I did not go to look for the disease. I have never gone out with men for sex, so I tell God to be my husband and provider and he has done that. (Female who contracted HIV from her deceased husband)

God has to make a way for me because I am not getting help from either uncles or aunts. (Female participant in care for 3 years)

I also believe in my medication but I believe in Jesus who advised me to go and get tested because if I had continued believing every time I got sick it was malaria then I would have died and left my children. It's not easy to wake up one day and you decide to go for HIV testing but to know that God is the one that did it. (Female participant in care for 5 years)

In the second category, some participants talked about the healing effect of God through their health care providers, and described the healthcare providers as 'messengers' of God in delivering care. They equally described their ART regimen as tools used by God to heal them. Almost all of these participants strongly believed that faith and medication 'go hand in hand' and that God works through the medicine or through the hands of the providers. There was a high level of faith in the belief that the HIV treatment was delivered from God through the healthcare providers. There was a notion that effectiveness of their medication depended on their faith in God.

I always thank God who has used the care givers/whites to do the tremendous job they are doing I pray for more blessings upon them. I don't think I will die, I actually don't consider AIDS a disease nor do I even worry about it. Faith is all that one needs. Medicine in its self cannot cure a disease if one does not have faith that the medicine will actually work. If one does not love their doctor, their chances of good health will be minimal. Faith that you will get fine heals.

People who get medication but have no faith are like those that don't receive medication because every challenge they get they go to the bar for waragi [locally brewed gin]. *This I know because I remember what I used to do.*

I prayed to God to help me take the medication without any side effect. I prayed that the medication would do its work and I believed in what I had prayed for. Faith is everything. I have no complaints.

Well my faith may be more important than the medication because if I had not believed and remained in denial I would not have taken the medication because I think you have seen people who get it but don't take it because they don't have faith that the medication will help.

No, maybe to thank you for the services offered and to God who enables the medication to work because others take it but their health still deteriorates.

God is the one that brought this care because if it were not for him we would not have accessed this care so God helps us get free care.

God is a healer of many diseases; he uses many ways he may heal through someone or through medication

3. The availability of ART is appreciated and there is a high level of trust in its effectiveness

Many of the participants had been in the clinic long enough to experience healthcare before and after the introduction of ART. Most of them had close relatives, either a spouse or other family member, who had died of AIDS in the era when treatment was not available. There was a genuine appreciation of the availability of ART and an overwhelmingly high trust in the effectiveness of ART. In that regard, participants prioritized their treatment, and sacrificed tremendously to overcome significant structural and economic barriers to their accessing care. The positive effectiveness of treatment was evident for many participants, who kept accurate count of their progress, especially with their CD4 T-cell counts. Many knew their CD4 T-cell counts before they started treatment and after, and made the correlation of their positive outcomes to the treatment.

Yes, I even got 100% because of taking my medication, as I should in about 5000 people. I have never forgotten to take my medication because I

*know how my health was in the beginning and I don't want to go back to that. (*Female in care since 2000, and on ART for 5 years)

So I tell them that if you know you have the virus and you choose to take care of yourself, you won't die. Don't you remember where I came from? I was already dead but I recovered and now I am doing well. (Female, who sells alcohol and works as a casual laborer to raise transportation fares)

Health was a priority for many participants, who placed a high premium on life, which they believed they gained from effectively taking their medications. The level of motivations was high as they forfeited all other activities to ensure that they took their medicines.

I always get the time to go to the clinic, I can never forget because it's important for my health. Even when in have what to do I leave it behind and go for my visit.

I find no challenge, and if at all I am to attend a burial in the neighborhood, they say I had better get my treatment first and go burial besides that person is dead and am struggling for my life.

Since life is the most precious thing one has, I can't fore go my treatment to go to the garden.

I always give up all the activities of that day, I don't mind the loss.

Prioritizing treatment came at a cost, but many participants felt this was a cost worth absorbing.

Hey, fighting for your life has never been wastage of time. When I have made a day a visiting day at the clinic, that is all, nothing else I can fix in that time.

I always know my visiting day, so whatever other business is there on that day is postponed. That day one is sure of no other business so you sit and

wait to receive your treatment. The time is long but I have to be patient always.

4. Participants relied heavily on social capital to sustain their HIV care and for survival

As described in a previous study in 2009 by Ware et al. (48), the importance of maintaining relationships played an important role in facilitating access to care, retention in care as well as adherence to therapy. Many of the financial barriers that plagued the participants were mitigated by social support that served as the foundation of these relationships. The social support went beyond emotional support and encouragement to take medications on time, but provided a tangible resource that translated into tangible 'help' including getting rides to the clinic visit, help with childcare, and sometimes even physical cash to borrow. Participants relied heavily on their social capital not only to make it through their HIV care, but also for survival.

There are times when I don't have the money and then I talk to my neighbors how my hospital day is up, yet I have to buy fuel, they get me Ush. 5000. It was only once when it rained a lot, but then I have a neighbor who owns a motor vehicle, he brought me to the clinic.

It needs that if you are infected with HIV, you tell someone about it. Well if the person is your friend, you tell that I am infected with this disease and then they help you. Well the person will always comfort you, counsel you and encourage you. It is important to me because even after I told them about my situation they continue to encourage me and comfort me and this has encouraged me to continue swallowing my drugs. This has helped my health improve.

Some participants relied on their family and friend to remind them to take their medication.

> *Most of them don't disclose so that they are not known, they hide when taking their medication so even when they forget no one can remind them because myself in case I forget to take my medication, even when I am asleep they wake me up to take the medication.*

The concept of reciprocity, described in an earlier study (48), was brought up by one participant. This female laborer/farmer wanted her neighbors, families and friends, who had supported her emotionally to know that she was doing well. She felt a sense of responsibility to reciprocate their good will with adhering to her treatment regimen and doing what she needed to do to stay healthy.

> *Well, remembering how much pain you went through, how sick I was and how I looked like, that is why I decided to tell them. What I mean is that I was disclosing to them since they had encouraged me that to take my medicines that I would be better, I wanted them to know that I was feeling and looking better*

Another participant talked about being motivated to stay alive because she did not want to 'leave behind additional burden' on her family.

> *That was not a reason to die, where would I leave my children.*

> *Well it's not good the relatives think you will die and leave behind infected children that will disturb them so they are not happy*

Results of Healthcare Providers

III. Descriptive Analysis of the Healthcare Providers

Fourteen healthcare providers participated in this study, out of a total of 23 eligible healthcare providers at the clinic. All who were approached gave informed consent to participate in the study. Nine healthcare providers were unavailable because they were either on study leave or on assignment in other sections of the hospital, and were not within the vicinity of the clinic at the time of the interviews, therefore were not approached to participate in the study. More than half (57%) of the healthcare providers who participated in this study were men. The mean duration of working time for all participants at the Clinic was 5.5 years, and the range of service time as healthcare providers in the clinic was between 2 and 10 years. Five (36%) of the healthcare providers were medical officers; 1 (7%) was a clinical officer; 2 (14%) were nurses; 1 was a medication dispenser; 2 (14%) were counselors; and 2 (14%) were patient educators. One participant (7%) was a physician and director of the clinic. All categories of caregivers at the clinic were represented in this study, with the exception of the data management team and the laboratory technicians. The data management team was excluded from the study because they do not have direct contact with the patients at the Clinic. The laboratory technicians also did not communicate directly with the participants, and as such were not included in the study.

IV. Key Findings from the Healthcare Providers

Using the long-table approach, the findings were interpreted and organized under two main categories: 1. Barriers to Care and; 2. Facilitators of Care.

When interviewing the healthcare providers about barriers to care in their clinic setting, they discussed two main approaches to viewing the barriers. In the first approach, the health care providers talked about barriers experienced by their patients, which were discussed during clinic visits. The discussions served as a 'second-hand' account of patients' experiences recounted by their providers. In the second approach, the healthcare providers discussed challenges they faced as providers directly, while working within a health care setting with limited resources. These latter discussions centered around how their experiences as healthcare providers, the structure of their clinic, and the healthcare system in general in a rural, resource-limited setting, had an impact on the patients' experiences and care. From these two approaches combined, there were six main themes that emerged as barriers to care from the prospective of the healthcare providers at the Mbarara ISS Clinic. The first two themes below describe barriers experienced by patients, but shared with their healthcare providers during clinic visits. The last four themes are based on the healthcare providers' direct experiences from treating patients in a rural, resource limited setting. The emergent themes are outlined below:

1. Stigma and issues of disclosure of HIV are a major barrier to HIV care

2. Poverty and financial constraints area the main barriers to HIV care

3. A challenging work environment and work overload reduces quality of care

4. There are too few centers that offer HIV services, requiring patients to travel long distances to access care
5. Limited drug supply and distribution problems are major ongoing challenges
6. Challenges with poor ART adherence, routine monitoring, and sub-optimal treatment outcomes threaten the sustainability of HIV care

Under the category of Facilitators of Care, the main themes that emerged were:

1. The efficacy of ART and quality of care at ISS Clinic are recognized and valued
2. The success of HIV treatment programs in sub-Saharan Africa is dependent on a positive global response and continued global support.

Barriers to HIV Care From Healthcare Providers

1. Stigma and issues of disclosure of HIV are a major barrier to HIV care

Stigma and issues of disclosure of HIV status are perceived as a main barrier to care. The patients' inability to disclose their status frequently had a negative impact on their ability to keep their clinic appointments, subsequently leading to missed visits. Some patients were described as having missed doses because they could not find a private time to take their medications because they were hiding their status and medications from close family members. It was not uncommon for patients to disguise

themselves and change their names at the clinic, which made it difficult for the clinic to keep track of them.

> *And others even do not disclose to their people. They are still having stigma in them so somebody tells you, "I couldn't come" because they couldn't allow her at work. And then we advise them that but you tell them, 'please I am sick, and whenever I want to seek medical help I have to move away on this day', but they don't want to say that. They fear for their jobs some of them* (Dispenser, 5 years at the Clinic)

> *And even some change their names from the real names to new names of ISS Clinic names. Those are new names that are used after testing positive, in opening the file… I have no problem other than clients giving their false names at the clinic and sometimes you read, read at the end of the day without getting the owners file when actually he is inside seated. Another thing is when following up in their villages; we get problems in getting to their homes since they had given wrong names. They can tell the clinic the real village, treatment supporter but deceive them their names.* (Health Educator, 5 years at the Clinic)

Patients still come to the clinic at a huge expense because they are hiding their status from the community members. Even when HIV clinics are established close to their homes, patients find it difficult to access care within their communities because they are afraid of being recognized as HIV positive, and subsequently being discriminated against.

> *But also, another challenge which I have observed is the stigma especially if the patient is to get care in an area near their home especially things to do with HIV, there is still stigma. That's what most patients tell us; why they cannot get services nearer to their homes. It's stigma a number of patients mention that.* (Clinical Officer)

> *The most difficult thing, personally from my experience; I have found it difficult to get them to disclose. It is hard; it is like writing on water like people say. You explain to them, the advantages and the good thing about disclosure and all that and they will simply come back to you and say; I can't, it is hard. Even when you have told them the beauty of disclosure, in them getting support from the people they have disclosed to so that they can swallow their pills well. They'll say yes, all that is good but it is*

difficult. (MO, 6 years)

For resource-limited settings where people rely heavily on social support and financial assistance from friends and family, not disclosing one's status may make it more difficult to access tangible resources.

> *You may find that some patients have not totally disclosed to relatives and this sometimes has affected them especially where they get support from the relatives, may be the husband you might find that the lady has tested positive but she fears to disclose to the husband. Especially maybe if she gets pregnant because they need special care, so disclosure is important because it is a problem that affects the adherence and the support one would get from the relatives and the community.* (Clinical Officer, 6 years at the Clinic)

> *Maybe social reasons for example couples; if someone is married and they are attending clinic and the spouse doesn't know, they miss the drugs or miss appointments for example if your husband is around and you don't want him to know that you are coming to the clinic, you don't come. Then when he has gone that's when you know, you come. But the social bit is mainly for women; you know the cultural bit, everyone has to know where you will be. Your spouse, mother in-law, uncles; they all have to know where you are going and what you have to see.* (Medical Officer at clinic for 4 years)

The emotional stress experienced by patients when they have not disclosed their status was described by many of the health care providers. Having to hide, and carry the burden of their status in secret, created additional stress factors for people who already had compromised immune systems.

> *And then it is also related with stress; because if someone lacks something and they don't get it in time, then his life doesn't do well. And then others are lacking disclosure; they have not disclosed to the family members, so the family members are not ready to help that person. So whenever he wants to come to the clinic he has to devise other means to see that he gets transport in a secret and then he has to come to the clinic. And then others are employed and they have not disclosed to their bosses so they fail to*

make it to the clinic because of lack of disclosure… because they fear to be stigmatized and discriminated. (Health Educator)

Another thing that has made people fail to access care it that some women come when they are pregnant. They maybe pregnant while swallowing their ARVs and the husbands might think that they are pregnancy drugs. So when they deliver, they won't have any more excuse for swallowing the drugs or coming for them and thus they will disappear. (Counselor)

Two of the healthcare providers were frustrated by the helplessness they felt with the fact that there was no legal framework to protect patients from work-related discrimination. This presents a challenge to the healthcare providers when they encourage patients to disclose.

It is a big problem. It is happening amongst our clients but we don't have a legal framework to help them and so even when it has happened, apart from asking them to find legal redress from the courts of law, as a clinician or a doctor, I don't have a way to help them. I don't have that legal framework to say I will do a, b, c; if this happened to help them. The only thing I can do as of now is to advise them, for them to take their initiative; to go to the courts of law. Otherwise, it is a big problem. (MO, 6 years)

Some of them have come up with complaints of being discriminated at the places of work; some of them have been retrenched because their HIV status has been somehow discovered. Someone gets to know, especially their bosses get to know that they are HIV positive and they are taking drugs and the next thing is; they are sacked. So they come back to us and they are like, Dr. you see, you encouraged me to disclose and so forth, now I have no job? (MO, 6 years)

Another grave consequence of disclosure was domestic violence, experienced almost exclusively by women. As with work related discrimination, the laws protecting women are not strongly upheld, and in some instances, the women do not know their rights, even when the laws are in place to protect them. In some instances, seeking protection from the law required financial commitments and expenditures that the women

were not privileged to have.

> *There is also gender-based violence and I think that also moves along with stigma where a man realizes that the wife is getting better care and therefore, women are beaten. You can even see these women that come here and pick drugs sometimes keep them at there neighbors' places and we have some violent cases reported to police mainly because the woman is getting drugs and the husband isn't.* (MO, 10 years)

2. Poverty and financial constraints are main barriers to HIV care

'Poverty' was the word used by almost all the health care providers as the main barrier to HIV care for their patients. Poverty affected the patients' ability to raise transportation costs, stay food secure, and manage competing demands effectively in such a way that it didn't affect their care.

> *The big word is poverty. Some of them have found it difficult to come back to the clinic; some have found it hard to find food to eat. Because we give them drugs, them come to the clinic, even when they have been out of service for long, or they have not been working for a long time, so they virtually have not a single coin. You start them on ARVs and you tell them you are going to take these drugs but at the same time you are going to eat and drink well. And they will tell you, Dr. I don't have the food. So it is difficult. Others find it difficult to even just maintain the clinical appointments; just to have money to transport them to the clinic. So, poverty generally has complicated this care; this kind of chronic care and it is a big big draw back.* (MO, 6 years)

> *The main problem is social-economic. Ok like economically, most of them are peasants. You find most of them, maybe due to their sickness, are not able to work and get like transport to come here and obtain their care. And also most of them are unable to buy good foods and of course if you don't have what to eat, you become more weak and the more you become weak, it hinders your ability to work, and there are no free services like outreach to the patients homes and therefore they have to cater for their transportation. And the nature of our communities; they are poor, and they have big families to support, that one also worsens the situation. So it's mainly the transport problem.* (Clinical Officer, 6 years at the Clinic)

Patients' finances played a role in the clinical decisions that were often taken by the health care providers, particularly in the length of time given before their next clinic visit.

> *The commonest thing they share is lack of transport, funds to come to the clinic more frequently, some of them say "doctor I would like you to give me medicine for four months because I don't have income that can help me come back every month" and that is done by several patients because 50% of them say "I would like to have medicine for more months" because I find it difficult; I stay very far, that's the scenario they keep sharing.* (Physician)

Social issues, including family burdens, where overwhelming from a financial and emotional standpoint for many patients.

> *I mean like those most of these people come from families where like say the head of the family has died and he has left many orphans, so the burden is left to the other relatives in the family or the wife. So it becomes very hard to support all of them especially when they are all HIV positive*. (Clinic Officer, 6 years at the Clinic)

> *Under social I must say the few examples I can give are the people who live with discordant couples and relatives where there is a bit of misunderstanding when one is positive and the other is negative, the feeling they get towards the partner who is positive yet people like women have to stay and cope for purposes of the children* (Physician)

3. A challenging work environment and work overload reduces quality of care

All the healthcare providers discussed the challenges of working in a congested clinic space, with a high patient volume and work overload. The main point of frustration expressed was with the government health referral system. With the Mbarara ISS Clinic being part of the Regional Referral Hospital system, the clinic serves as the main referral

site for HIV treatment centers and clinics throughout Southwestern Uganda. The overwhelming volume of patients seen at the ISS clinic comprises referrals from the lower health centers that are ill equipped to manage comprehensive HIV care. The respondents were also frustrated by the weak communication lines they had with the lower health centers that made linkage in care and tracking of patients problematic. The health care providers were often fatigued and tired of 'doing the same thing over and over again'.

> *The most difficult thing you need to talk a lot about HIV to patients and to some of them they don't understand what HIV is or what you are actually talking about so its always challenging explaining the same things, telling them to do the same things and also doing the same thing every day you get bored.* (Dispenser, 5 years at the Clinic)

Limited space presented a constant challenge in the delivery of care and the ISS Clinic was often congested and laden with delays. To handle the issue of congestion and spread of disease, the Clinic sees patients who are the sickest, with suspected tuberculosis or other highly infectious diseases first, to help infection control among patients and clinicians within the Clinic.

> *There is a lot of congestion in the clinic. We have so many patients and the clinic is not as big to accommodate all those patients so you find that we are stuck in the corridors and fail where to pass and in the clinic we cannot pass. They are planning to destroy the lower area of the clinic and we are going next because we are going to get more squeezed in those small rooms. It can easily lead to the spread of other infections like TB, you know when you stick people together there are those who have TB so when you mix them together the others will get it.* (Dispenser, 5 years at clinic)

> *No clinician would want to work in a congested place because of the increased infection rate like T.B and whatever, so that's a challenge because we have to share rooms both as clinicians and other nursing teams. The congestion; yes we are working, but it's not comfortable when you are working someone is coughing right into your face and the room is so tight.* (Physician)

All of the healthcare providers reported that their patient load was too high, making it difficult to manage the flow of the clinic, especially when patients came on unassigned days. Patients were given follow-up appointments depending on health status and where they fell in the timeline of their HIV treatment. The time between appointments ranged from two weeks to four months. The clinic patient load was managed through an electronic database that kept track of patient appointments and projected the number of patients expected each day. Typically, the ISS Clinic sees approximately 200 patients a day. Of this number 10 are usually new patients coming to the Clinic for the first time, and 170 are returning patients with appointments. However, it is not uncommon to have about thirty returning patients shown up in one day, without appointments.

Many healthcare providers felt that the patients had unrealistic expectations of their healthcare providers and the clinic services. The providers all felt the stress of being over worked and a counselor described the work load as one that 'breaks us down' and makes us 'loose morale' because 'the clinicians cannot handle'. Almost all the providers were frustrated with the quality of care they delivered and believed they could deliver higher quality of care if given a lighter patient load.

> *They expect much more than what we are providing and they expect heavens and earth. Could we have a cup of tea? Could we have some transport given? Could we have a, b, c, d? All that sort of thing, and they expect heaven and earth.* (Nurse)

> *Yah. Another problem is the number of patients; with time the number is increasing almost everyday and it happens that the number of the health workers has remained almost the same.* (Clinical Officer)

> *And then in terms of the amount of work done, sometimes we have more patients to be attended to than one can handle and what that one means is if you have 200 patients to see yet you have two or three clinicians it means the clinicians are over stretched they have to work an extra mile to*

be able to see all these patients and all that comes with a cost, many are attended to but the quality of service given will not be as good as if you saw fewer patients, to elaborate on this, if a clinician is given say 30 patients to see in a day and another is given 100 patients a day, the latter will not give them as good the service as the one who has seen 30 patients, they are few, you have more time to listen to their challenge, do all the examinations, making a consultation at the next door or from another clinician as compared to when you have so many patients. (MO, 8 years*)*

There was a general concern about the increasing levels of stress experienced by the healthcare providers as a result of treating a chronic disease with no cure. A few healthcare providers, particularly the counselors, reported that they were having difficulty coping with their work-related stress. Some providers noted that their heightened emotional state resulted to an impatient and negative response to patients at the clinic.

The other challenge is stress at work, the professional stress here is high because like me the counselor, I always deal with people who are traumatized, they have a lot of issues they raise and then we get more stress because we don't have any stress management policy at this clinic and many others. (Counselor)

The most difficult thing for me as a clinician is seeing patients come back when they are stable even when you know you are unable to cure them. That to me, I find disturbing most. As a clinician what I hate is to see the patients suffering with so many ailments and I can't put a stop to their complaints. (Physician)

Some providers acknowledged that the Clinic was sometimes a hostile environment for the patients, and their inability to handle the patient load, especially when they had special needs e.g. mental health patients, caused them additional concern.

Sometimes we bark at them they don't feel comfortable with us and some of the clients who are some how mentally disturbed, we don't know how to handle psych patients and we react poorly towards those patients. (Health Educator, 5 years at the Clinic)

I can't say that all could be well with the way health workers always speak to the patients, a few have expressed the fact that they may not want to come to the clinic more regularly because they may interact with a few health workers who may be not kind to them, a few have come to my office and even slid small notes under my door saying "so and so who is brown and the first name is this" is being rude to us and I would say it's a draw back to a few patients. (Physician)

4. There are too few centers that offer HIV services, requiring patients to travel long distances to access care

All of the healthcare providers agreed that the number of centers that offered HIV services was too few. Some patients travelled over 100kms to receive care at the Mbarara ISS Clinic, because they did not have a closer clinic to the patients' homes. Even when there were health centers in closer proximity, the quality of services was far less comprehensive than the care offered at the ISS Clinic. Many providers were frustrated by the limited communication between the lower health centers and the regional referral clinics.

The biggest is the referral system is still poor. We don't link with other lower centers so we end up taking everyone and we are carrying a lot which we cannot handle. Sometimes that's why you see so many people get lost because somebody is admitted on the ward and you find he is HIV positive and they can't first think of where the person is coming from and they refer them to the nearest center but for us on receiving it has become difficult for us to maintain these patients at our care because come in from very far they end up getting lost so the major problem is the follow up because you can have patients like ten thousand but you find in actual sense you have like three thousand. The rest have disappeared.
(Dispenser, 5 years at clinic)

The loss to follow-up as you know, we have failed to keep good track of some of these patients, it's a bit difficult but because we are in a referral hospital, we tend to accept a few more patients who come via the medical order and several often find centers where they can access care and we don't officially transfer them out, they self transfer themselves out, and we have a problem juggling to know whether somebody has died or self transferred out. (Physician)

One provider felt that the healthcare providers were not doing enough to reach out to patients in the community, and that this may be a common reason for the disconnect between the Clinic and the patients.

> *This clinic has not reached out to the people; that's the major challenge. It's a big clinic; it can do a number of things but it is away from the people who need the services, so people go through thick and thin to come to the clinic. I rather have the service and go to them, but it can't. Now that's a big time challenge. If there was a way of the service that is provided in this place to get to the people, it would be much better.* (MO 6 years)

5. Limited drug supply and distribution problems are major ongoing challenges

Although there were several incidents of drug shortage, the healthcare providers managed to bridge these gaps with donor drug supplies so that patients were not aware of the shortages. Even with the added resources of donated drugs, some of the providers still expressed frustration with their limited access to a wide variety of medications for both HIV and other opportunistic infections.

> *The most difficult thing that I find in the clinic has been the occasional inconsistence of the ARVs availability from the Ministry of Health whereby we have to struggle, be on the phone all the time, contacting the National medical stores that the drugs are running out of stock, yet we can't let our tension spill over to the patients.* (Physician)

> *Well, we still have some problems with supply of drugs…, especially with the Ministry of Health supplies. Some times they bring one drug with no combination, sometimes they bring what you have not ordered for. It becomes a challenge to us and patients themselves because we can't give them a drug which is single, not combined. Then also people get lost from the clinic and we don't have any mechanism. Ok, the mechanism is there we have but they are not a hundred percent that we can get everyone.* (Dispenser, 5 years at the clinic)

> *The other thing is we do provide drugs free but there are some times when*

> *you need to prescribe a specific type of medication that the patient may not afford to buy when at the same time you do not have that drug at the shelf so in other wards you want to give someone a medication that they cannot afford and you also don't have at a free.* (MO, 8 years at the Clinic)

While the donor-driven structure for ART supply and distribution was appreciated, many of the providers would have preferred greater stability, and ownership of HIV managed in general, by the Uganda Ministry of Health. Many providers felt that the Ugandan government needed to take more responsibility for managing the health care system, particularly with the lower-level health centers that were not empowered and equipped, even with human resources, to handle HIV services appropriately.

> *The other challenge is about our mother institution owner; mother institution I mean Ministry of Health. Much of the work we do here is donor driven… it is the development partners who are supporting the clinic in terms of ARVs, the labs and paying even majority of the staff in the clinic. So Ministry of Health for our country is a bit laid back and that's a big challenge and that's why, the service cannot go to reach the people, to find the people where they are so that they can access the service within their areas of reach. Now that's a big challenge, I may not do much about it but it's the major challenge. You will find that all these other problems are coming up because of that.* (MO, 6 years)

The donor-driven system has its challenges when there are multiple parties working within one system.

> *Different projects which have different rules or SOPs to follow sometimes we have had some conflicts whereby one project would have loved this to happen like that and vice versa, and it becomes a challenge to marry all the projects together. But in the long run the fact that it's one clinic we try to compromise and do the best for the patients.* (Physician)

6. Challenges with poor ART adherence, routine monitoring, and sub-optimal treatment outcomes threaten the sustainability of HIV care

Many of the providers were concerned about ART adherence and did not feel that enough was being done by the Clinic to prevent lapses in adherence on the part of the patients. They talked about the difficulties they had in monitoring patients with limited resources in the Clinic to effectual optimal care.

> *The minority; of course not every body is doing well, some fail on their drugs; you give them the drugs and they fail to work, others don't adhere to the medication, so eventually they don't do well clinically. That's it. So they keep getting infections, infections and infections. I think patients not keeping their appointments is kind of a bigger problem because it reflects on their adherence; if I am not keeping my appointment, maybe am also missing my drugs. You understand? Because we are saying that most people don't have the transport, but there are those who have and they feel they have other things to do. So if there are so many things going on in your mind, maybe will also forget to take your drugs. So it's kind of a problem.* (Medical Officer, 4 years)

Missed appointments were often made up by patients who 'feel they can drop in at any time', which disorganized the flow and organization of the Clinic. The providers did not welcome this practice.

> *...you give them appointments wait for them and they don't come. Some of them come after some many days when they have already missed some doses, when they have contracted some other sicknesses which need extra care and maybe to be admitted on the ward, and with those challenges they can not be admitted at the ward because there is no one to care for them. So it becomes a big problem. And then others shift from one place to another. You wait for someone to come, he isn't coming; when you trace for that person, he's not at home and the people at home can't allocate where he is and when they allocate where he is, you can't reach there. It becomes a problem because you can't tell whether that person has died or he still exists, or whether he still gets any medication. And then after some time, you see him coming back. He tells you; you see, I got a job somewhere, I was working and they couldn't let me come. Then you just*

have to go through counseling again; heart counseling which takes some time, so to improve the life of such a person again becomes a problem. (Health Educator)

There those who think spend a lot of time at the clinic because when they come here they want to be worked first but the queue as you see today so they have to bear with us as the principle is first come first served so some feel it's a barrier to them then they tend to dodge their return dates and when some forget their return dates, they think when they come here some health workers will be harsh on them so they tend to stay away and may be come when we send our tracker to look for them. (Counselor)

Management of HIV is changing and becoming more complex for the already overburdened clinicians. Despite the long lines, and the growing patient population, in 2010, the clinicians decided to have an administrative day to have continuing education, discuss difficult cases and have management meetings to better manage the Clinic needs.

Maybe another thing we observe are the difficult cases, we are seeing more complicated cases in HIV management where by you can get stuck and you find that you cannot do much for the patient. Especially things to do with treatment failure, resistance; because we are seeing patients nowadays who are failing on second line and yet the options we have, which are available are limited. (Clinical Officer*)*

It's the workload really, because when you have so much work, by 5pm you are so tired, you can't read and it's so hard to keep up to date because you know HIV keeps changing; the drugs keep changing, new things keep coming up so you kind of lag behind. So you find that you have only weekends to catch up and after 5pm when you are so tired. (Medical Officer at Clinic 4 years)

Poor ART adherence and sub-optimal treatment outcomes were of major concern to almost all the providers.

The one I would consider as most challenging is not being able to ensure patients have maximum adherence to therapy when we do not have the abilities to improve the adherence, for instance when someone comes with

poor adherence, all we can do is to counsel them but remember when you counsel, you are only going to help the person who will have developed poor adherence due to reasons say if someone was forgetting. Then you can tell them to use an alarm. If one had a source of income but has been wasting that money, that one can improve, but one who had absolutely no source of income and was depending on another's funds and that other person doesn't give them the funds, in that case it is very difficult to improve on that person's adherence because they will repeatedly have the same problem. (MO, 8 years)

Getting these people to swallow their drugs is a major challenge. Some of them have been bold enough to tell us that they get tired, fatigued; they get tired of swallowing the drugs/pills so they tell us. Others because we monitor; we do monitoring for that; we want them to take their drugs. So you discover it and then you ask them; what is happening, why are you not taking your drugs? So it is either way, some of them will tell you, others you simply find out as you do the monitoring. (MO, 6 years)

Facilitators of HIV Care from Healthcare Providers

1. The efficacy of ART and quality of care at ISS Clinic are recognized and valued

Almost all the providers talked about the efficacy of ART and described the positive effect of the successful treatment outcomes on patients' motivation to stay in care and adhere to their prescribed regimen. Many of the providers were equally encouraged by the visible improvement in clinical and physical symptoms experienced by their patients.

What I see mainly in these patients is the improvement they get when they start at because previously most of them used to come when they are very sick, and like when they start and adhere to their treatment they really improve and that one gives us joy seeing them improve on their treatment. (Clinical Officer, 6 years at Clinic)

Basically, majority of the patients are doing very well. The simplest way I can put this is patients come to the clinic when they are having repeated infections, when they have lost weight, when they are not eating well,

they've lost appetite, they have infections like wounds in the mouth and they are not able to eat and when you initiate them to Anti-retroviral therapy and after a period of time you begin to see them when they have no complaints in other words they are able to take their drugs as they carry out their routine work well and they only come to me when they want medication without any complaints which is a good indicator that they are faring well with their medications. (MO 8 years)

They are improving on their health, because when people are started on ARVs, eventually I see them coming up becoming productive getting back to their normal lives and doing their normal activities. Ideally, we have seen people go back to school, those who thought will never get married are now married, couples are giving birth that is basically what I meant by doing well. (Counselor 2 years)

2. Success of HIV treatment programs in sub-Saharan Africa is dependent on a positive global response and continued support

There was a general consensus that the success of the HIV treatment programs was as a result of a concerted effort by international partners working together with Ugandans to respond adequately to the crisis.

But I think all has been running well because we have other stakeholders and other projects which have been helping us that is the Harvard, the MJAP; they have all been to our support and buffering the stocks we have from Ministry of Health but without those other projects, buffering the stocks would have been so difficult to handle the loads of patients we have who are on ARVs because they are about 5500 patients on ARVs. So if all of the drugs went out of stock from one project and we had no one to buffer, it would really be so difficult. (Physician)

B. UARTO Sub-Study Results

I. Descriptive Analysis of the UARTO Study Participants

There were a total of 505 UARTO study participants included in this analysis, of whom 360 (70%) were female. Majority of the participants were Christian (91%) and 9% were Moslem. Almost one quarter (20%) of the participants were not literate with 12% having no formal education. More than half of the participants (62%) had received primary and 26% had received some secondary education or higher. More than half were either unemployed or worked as subsistent farmers. Ages ranged from 18 to 75 years and the median age was 35 years. Only 26% of the participants were married, with 22% widowed, 25% separated or divorced and 8% were never married. A little less than three quarters (67%) had a household size consisting between 2 and 8 members. The median CD4 cell count at baseline was 152 and viral load was 4.9 log copies per mm^3. Mean adherence was 94% over 12 months of follow-up and participants had an average of 2 treatment interruptions greater than 48 hours, with each interruption averaging 17 days long.

Public transportation was the main mode of travel to clinic for 82% and included public buses, taxis and motorbikes and the average travel time was 52 minutes. Participants spent an average of 4,250 UGX ($2) per trip to the clinic. Only a few (6%) participants reported depression but 63% scored between 1 and 6 on the Internalize AIDS-Related Stigma Scale, indicating some level of internalized stigma. Baseline summary statistics are described in **Table 1.**

Table 1. Characteristics of UARTO Participants (N=505)

Characteristics	Mean or N	(%) or 95% CI	Missing Observations
Gender			
Female	360	(69.9)	6
Religion			8
Christian	466	(90.9)	
Literacy			9
Cannot read sentence	104	(20.2)	
Education			37
No Education	56	(11.6)	
Primary Education	300	(62.0)	
Secondary and above	108	(26.4)	
Marital Status			9
Never married	41	(8.0)	
Divorced/separated	126	(24.6)	
Widowed	112	(21.9)	
Married	134	(26.2)	
Means of transport to clinic			233
Walking or Bicycle (private means)	50	(17.7)	
Public Transportation	236	(82.0)	
Internalized AIDS Related Stigma			324
No Stigma	73	(37.1)	
Stigma (ranked 1-6 on IARS scale)	124	(63.0)	
Age (years)	35	(34.0, 35.4)	7
Monthly Income (UGX)	93081	(73540,112622)	182
Travel time to clinic (Minutes)	52.3	(48.5,56.2)	7
Cost of travel to clinic (UGX)	4248.6	(3780.2,4717.0)	237
Mean MEMS Adherence (% over 0-12 months)	93.6	(89.9,97.3)	47
Mean CD4 cell count at Baseline	152.0	(142.235,161.762)	13
Mean log Viral Load at Baseline	4.9	(4.8,5.0)	22
Number of Treatment Interruptions ≥48 hours (among those with interruptions)	1.9	(1.5,2.3)	35
Average length of Treatment interruptions (# of days among those with interruptions)	16.8	(14.076,19.498)	35
FP Asset Index	-0.012	(-0.195, 0.171)	11

II. Predictors of High Adherence (greater than 90%) Using MEMS

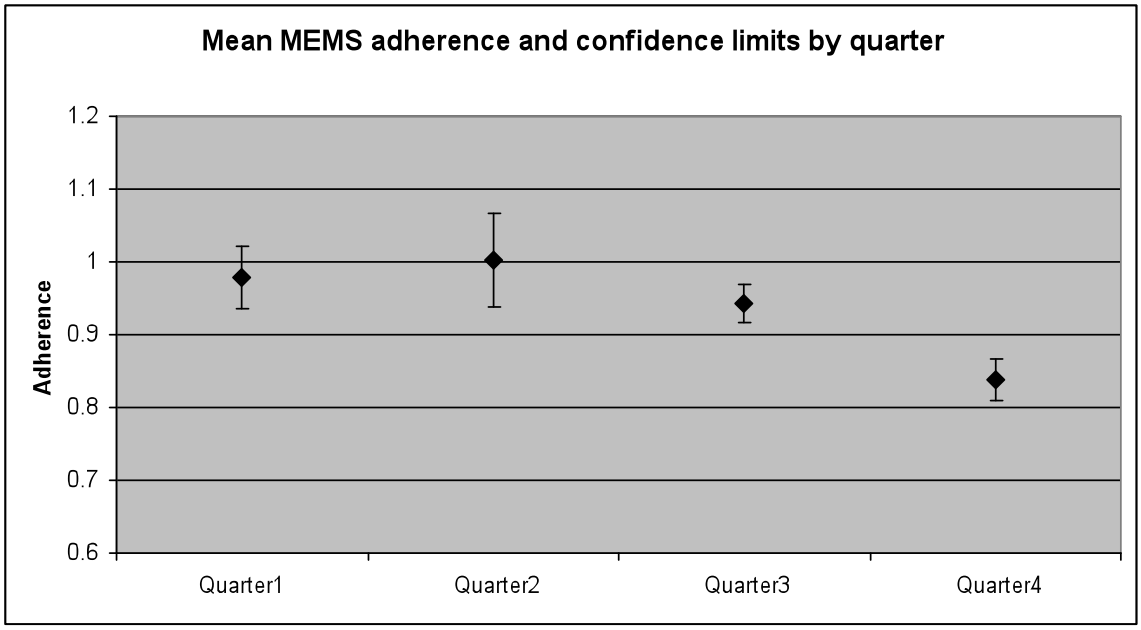
Mean adherence in this population was high at 94% over 12 months. However, when stratified by quarter adherence levels were varied; mean adherence was 98% in the first quarter (3 months), peaked at 100% in the second quarter (6 months) and by the third and fourth quarters, a decreasing trend was observed with mean adherence at 94% and 84% respectively. See **Figure 1.** Increased age was associated with higher MEMS adherence in the univariate analysis, but these results were not statistically significant in the multivariate analysis. Higher scores on the internalized stigma scale were associated with lower adherence in both univariate and multivariable regression model. Results are summarized in **Table 2**.

Table 2. Predictors of High Adherence (≥90%) using MEMS

Variable	**Univariable**	**Multivariable**	
	OR (95% CI)	**OR (95%CI) (excluding IARSS)**	**OR (95% CI) (with IARSS only)**
Gender (ref = male)	1.14 (0.89,1.45)		
Age	1.02 (1.00,1.03)*	1.01 (0.99, 1.02)	1.00 (0.98, 1.03)
Travel Time	1.00 (1.00, 1.01)	1.00 (1.00, 1.00)	1.00 (1.00, 1.01)
Asset Index	0.97 (0.91,1.02)	0.99 (0.93, 10.5)	0.94 (0.85, 1.03)
Stigma	0.88 (0.80, 0.98)*		0.90 (0.81, 0.99)*
Travel Cost	1.00 (1.00, 1.00)		
Disclosure	1.01 (0.73, 1.39)		
Social Support	0.87 (0.60, 1.23)		
Rainy Season	1.13 (0.90, 1.42)		
Alcohol Use per AUDIT-C	1.07 (0.54, 2.11)		
Distance to Clinic (KM)	1.01 (0.99, 1.02)		

* denotes statistical significance at the $p<0.05$ levels

Figure 1. Mean MEMS Adherence by Quarter (3, 6, 9 and 12 months)



III. Predictors of High Adherence (greater than 90%) Using Self-Report

Increasing age and internalized stigma were both associated with higher Self-Reported adherence in the univariate analysis and both were statistically significant in the multivariate analysis. While alcohol consumption (defined by having a positive AUDIT-C score) was associated with lower odds of high adherence, the results were not statistically significant in the multivariate analysis (p=0.06). Higher scores on the internalized stigma scale were associated with lower adherence in both univariate and multivariable regression model. Results are summarized in **Table 3**.

Table 3. Predictors of High Adherence (≥90%) using Self Report

Variable	Univariable	Multivariable		
	OR (95% CI)	**OR (95%CI) Excluding IARSS and distance)**	**OR (95% CI) With IARSS only**	**OR (95% CI) With distance only**
Gender (ref = male)	0.99 (0.67, 1.46)			
Age	1.08 (1.05,1.10)*	1.01 (0.99,1.02)*	1.06 (1.03,1.10)*	1.06 (1.03,1.09)*
Travel Time	1.00 (1.00,1.00)			
Asset Index	0.97 (0.88,1.07)			
Distance to Clinic	1.03 (0.99,1.06)		0.99 (0.96,1.03)	1.02 (0.99,1.05)
Travel Cost	1.00 (1.00,1.00)			
Disclosure	1.21 (0.76,1.90)			
Social Support	0.96 (0.57,1.60)			
Rainy Season	0.85 (0.60,1.22)			
Alcohol Use	0.45 (0.21,0.95)*	0.48 (0.22,1.04)	0.44 (0.17,1.13)	0.46 (0.20,1.05)
Internalized Stigma	0.89 (0.78,1.01)*			0.89 (0.81,0.99)*

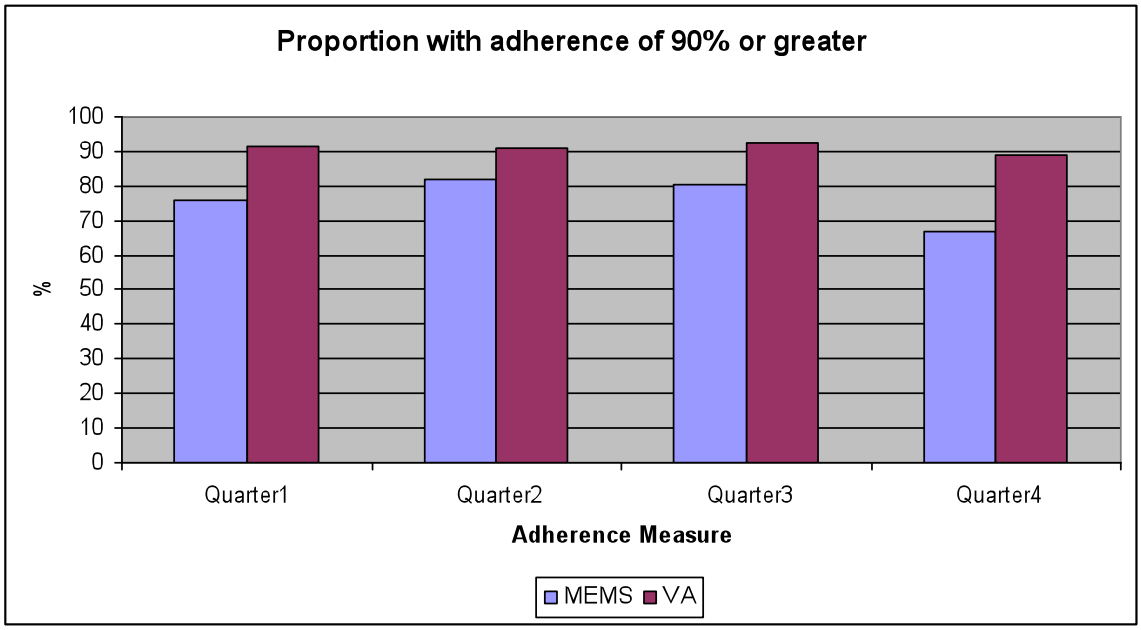
* denotes statistical significance at the p<0.05 levels

Proportion of Participants maintaining high levels of adherence, stratified by quarter:

When stratified by quarter, to assess adherence trends over time, Figure 2. below illustrates that more than 90% of the participants retain high levels of adherence throughout the 12 months, with a slight decrease to 88% at 12 months. Self-reported

adherence is lower overall and is more variable by quarter with the proportion of participants reporting high levels of adherence being 75% at 3 months, 82% at 6 months, 81% at 9 months and 68% by 12 months. The trend stays the same for both measures.

Figure 2. Mean MEMS and SR Adherence by Quarter (3, 6, 9 and 12 months)



IV. Predictors of Treatment Interruptions (7, 14, and >30 days):

On average, participants had 2 episodes of treatment interruptions with an average of 17 days for each interruption. When examining any interruption, Asset index was the only variable associated with an interruption in the univariate analysis, but this was not statistically significant as with other variables in the multivariate analysis.

Interruptions of 7- Days or shorter:

Higher asset index was protective of interruptions lasting 7 days or less in both univariate and multivariate analyses. Increased travel time as a continuous variable was associated with a decreased odds of interruptions lasting 7 days or less. Summarized in **Table 4.**

Interruptions of 8-14 Days:

Gender and Age were associated in 14 day breaks in the univariate analysis but not in the multivariate analysis when asset index, age and gender were added to the multivariable models. Summarized in **Table 5.**

Interruptions of 30 Days or longer:

Increased travel time was associated with decreased odds of interruptions lasting 30 days and longer. Summarized in **Table 6.**

Table 4. Predictors of Treatment Interruptions lasting 7 days or shorter

Variable	Univariable	Multivariable
	OR (95% CI)	**OR (95%CI)**
Gender (ref = male)	0.97 (0.53,1.77)	
Age	0.98 (0.95,1.01)	1.0 (0.96,1.04)
Travel Time	0.99 (0.99,1.00)	0.99 (0.98,1.00)*
Asset Index	0.81 (0.68,0.98)*	0.74 (0.61,0.91)*
Distance to Clinic	0.99 (0.94,1.04)	
Travel Cost	1.00 (1.00,1.00)	
Disclosure	1.00 (0.48,2.09)	
Social Support	0.66 (0.21,2.08)	
Rainy Season	1.06 (0.59,1.88)	
Alcohol Use per AUDIT-C	0.62 (0.08,4.60)	
Internalized Stigma	0.85 (0.61,1.18)	

* denotes statistical significance at the p<0.05 levels

Table 5. Predictors of Treatment Interruptions lasting 8-14 days

Variable	Univariable	Multivariable
	OR (95% CI)	**OR (95%CI)**
Gender (ref = male)	2.51 (1.03,6.14)*	1.25 (0.54,2.88)
Age	0.95 (0.91,0.99)*	0.98 (0.94,1.03)
Travel Time	1.00 (0.99,1.00)	
Asset Index	0.87 (0.71,1.06)	0.87 (0.71,1.06)
Distance to Clinic	0.96 (0.89,1.03)	
Travel Cost	1.00 (1.00,1.00)	
Disclosure	1.09 (0.48,2.09)	
Social Support	1.44(0.50,2.37)	
Rainy Season	0.67 (0.33,1.36)	
Alcohol Use per AUDIT-C	<0.00 (0.00,0.00)	
Internalized Stigma	1.11 (0.81,1.50)	

* denotes statistical significance at the p<0.05 levels

Table 6. Predictors of Treatment Interruptions lasting longer than 30 days

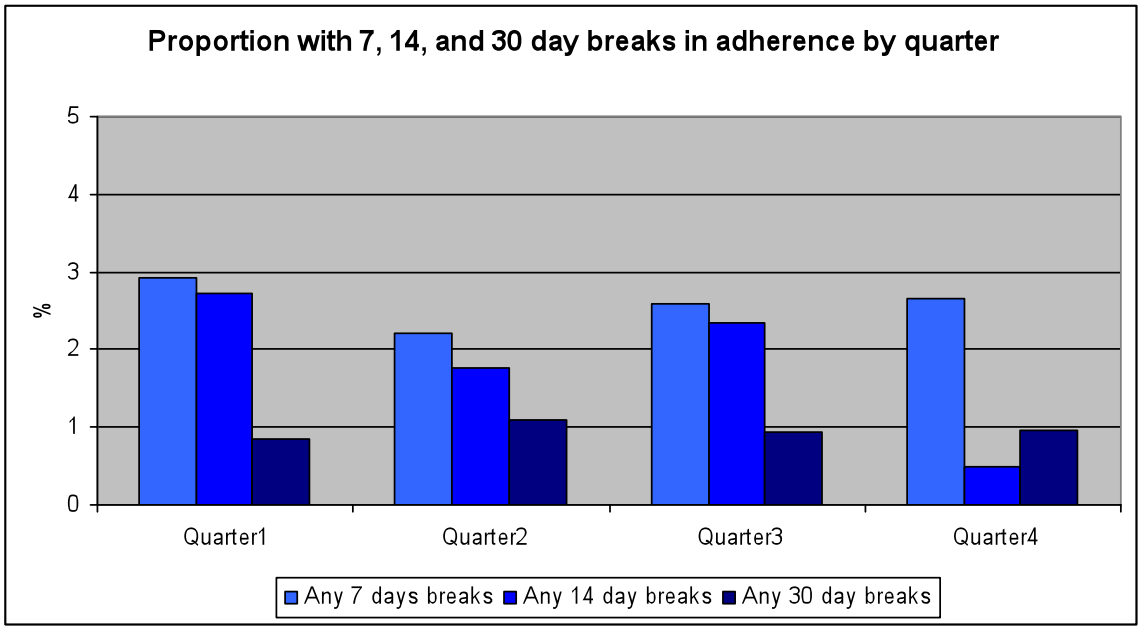
Variable	Univariable	Multivariable
	OR (95% CI)	**OR (95%CI)**
Gender (ref = male)	0.81 (0.33,2.03)	
Age	0.95 (0.88,1.01)	0.97 (0.91,1.02)
Travel Time	0.98 (0.96,1.00)*	0.98 (0.96,1.00)*
Asset Index	0.85 (0.64,1.14)	
Distance to Clinic	0.95 (0.86,1.05)	
Travel Cost	1.00 (1.00,1.00)	
Disclosure	1.08 (0.36,3.24)	
Social Support	0.91 (0.20,4.20)	
Rainy Season	0.91 (0.37,2.24)	
Alcohol Use per AUDIT-C	<0.00 (0.00,0.00)	
Internalized Stigma	0.94 (0.59,1.50)	

* denotes statistical significance at the $p<0.05$ levels

Proportion of Participants with Treatment Interruptions, stratified by quarter:

When stratified by quarter, to assess treatment interruption trends over time, Figure 3. below illustrates that treatment interruptions of 30 days or longer are experienced in 20% or less of the participants in all quarters. Close to half of the participants experience interruptions of 7 days or shorter in all quarters, and both 7 and 14 day breaks assume a U-shaped trend with the highest proportions experiencing these breaks at the first and last quarters.

Figure 3. Proportion with Treatment Interruptions by Quarter (3, 6, 9, &12 months)



V. Predictors of Treatment Failure Defined by Viral Load less than 400

The proportion of participants with a VL less than 400 increased within the first quarter from 88% at 3 months, to 92% at 3 and 6 month, and to 94% at 12 months. Increased MEMS and Self-Reported adherence were associated with decreased odds of treatment failure in the univariate analysis. Higher internalized stigma was consistently associated with decreased odds of treatment failure in both univariate and multivariate analyses. Although not significant in the univariate analysis, the multivariate analysis showed that women were less likely to have a treatment failure when included in the model that was restricted to only participants with data on distance to clinic. Women have 0.5-decreased odds of a treatment failure as compared to men, while adjusting for

distance to clinic, alcohol consumption and MEMS adherence. See **Table 7.**

The associations between travel time, social support, stigma, serostatus disclosure and treatment failure (VL>400) were not statistically significant for any of the multivariate models.

Social Support and Travel Time:

In the multivariate model with travel time and social support as independent variables of treatment failure, the findings show a trend of travel times shorter than 45 minutes having a 1.7 increase in the odds of treatment failure while social support had slightly decreased odds of treatment failure. There were no significant interactions between social support and travel time.

Internalized Stigma and Travel Time:

In the multivariate model with stigma and travel time as independent categorical variables of treatment failure, the findings show a trend of lower internalized stigma having a 2.8 increased odds of treatment failure, while travel times shorter than 45 minutes having a 2.8 increase in the odds of treatment failure. There were no significant interactions between internalized stigma and travel time.

Any Disclosure and Travel Time:

In the multivariate model with disclosure and travel time as independent categorical variables of treatment failure, the findings show a trend of disclosure having a 2.2 increased odds of treatment failure, while travel times shorter than 45 minutes having

a 3.1 increase in the odds of treatment failure. There were no significant interactions between disclosure and travel time. See **Table 8**.

Difference between participants with high levels of stigma versus low levels of stigma:

Interaction between stigma and social support were not significant in the analysis. Further assessment of differences between participants with high levels of stigma, defined by those having IARS scale scores of 3 and above, versus those with low levels of stigma, defined by scoring below 3 in the IARS scale, showed that there were no differences between the groups when social support was included in the model. **See table 9**. Depression, however, was the only significant variable in the stratified stigma table below.

Table 7. Predictors of Treatment Failure (Outcome = >400 VL at 6, 9, or 12 months)

Variable	Univariable		Multivariable	
	OR (95% CI)	**OR (95%CI)**	**OR (95% CI) Excludes IARSS, distance**	**OR (95% CI) With distance only**
Gender (ref = male)	0.77 (0.49, 1.20)	0.65 (0.34,1.23)	0.69 (0.42,1.11)	0.50 (0.28,0.89)*
Age	0.99 (0.96,1.01)			
Travel Time	1.00 (0.99,1.00)	1.00 (0.99,1.00)		
Asset Index	0.97 (0.87,1.08)			
Distance to Clinic	1.02 (0.99,1.05)			1.03 (0.99,1.05)
Travel Cost	1.00 (1.00,1.00)			
Disclosure	0.75 (0.40,1.40)			
Social Support	0.72 (0.33,1.61)			
Rainy Season	1.02 (0.67,1.56)			
Alcohol Use	1.77 (0.67,4.67)	1.29 (0.36,4.66)	1.88 (0.70,5.04)	2.09 (0.75,5.81)
Internalized Stigma	0.77 (0.59,1.00)*	0.77 (0.59,1.01)*		
MEMS Adherence	0.30 (0.13,0.69)*		0.99 (0.98,1.0)*	0.99 (0.98,1.00)
SR Adherence	0.96 (0.94,0.98)*			

* denotes statistical significance at the $p<0.05$ levels

Table 8. Predictors Treatment Failure and Interactions between Support, Travel Time, Disclosure and Stigma

Outcome viral load>400	**OR**	**(LCLM, UCLM)**	**P**
Social Support (continuous)	0.99	(0.31, 3.14)	0.99
Travel Minutes Categorized (<45=1,≥45=0)	1.72	(0.23, 12.64)	0.59
Interaction Social Support*Travel	0.89	(0.21, 3.76)	0.88
Outcome vl>400	**OR**	**(LCLM, UCLM)**	**P**
Stigma Categorized (≥3=0,<3=1)	2.84	(0.63, 12.92)	0.17
Travel Minutes Categorized (<45=1,≥45=0)	2.87	(0.57, 14.47)	0.20
Interaction Stigma*Travel	0.38	(0.065, 2.20)	0.28
Outcome viral load >400	**OR**	**(LCLM, UCLM)**	**P**
Any Disclosure (1=disclosure,0=no disclosure)	2.16	(0.57, 8.11)	0.25
Travel Minutes Categorized (<45=1,≥45=0)	3.08	(0.79, 11.97)	0.10
Any Disclosure*Travel	0.31	(0.06, 1.55)	0.15

Table 9. Difference Between Participants with High and Low Stigma Levels

	Stigma Category (Missing=324)							
	High Levels of Stigma with IARS score ≥3(n=52)				Low levels of Stigma with IARS Scores <3 (n=145)			
Variable	**n**	**mean**	**lclm**	**uclm**	**n**	**mean**	**lclm**	**uclm**
Age	52	33.6	31.0	36.3	145	34.8	33.4	36.3
Asset Index	52	-0.1	-0.7	0.6	145	-0.2	-0.5	0.1
Depressed	52	0.80	0.6	1.0	145	0.3	0.1	0.5
Baseline CD4	50	157.0	117.1	196.9	144	164.9	147.0	182.9
Baseline log viral load	49	4.9	4.6	5.2	143	4.7	4.6	4.9
Social Support	49	1.4	1.2	1.6	131	1.3	1.3	1.4
Household Size	52	3.5	2.7	4.3	145	3.3	2.8	3.7
Travel Cost	52	3625.0	3008.7	4241.3	145	4631.0	4082.7	5179.4
Adherence (12 month mean)								
MEMS	43	86.5	81.2	91.90	130	87.7	80.3	95.2
Visual Analog	47	94.4	91.9	96.81	127	95.7	94.3	97.0

VI. Predictors of Being Lost to Follow Up from Clinic:

Age was the only variable that was significant in both univariate and multivariate analysis with younger participants having higher odds of being lost. After adjusting for the effects of rainy season and travel costs, the findings show that increase in age has decreased odds of being lost to follow-up in the clinic. Summarized in **Table 8.**

Table 10. Predictors of Being Lost to Follow-up from Clinic

Variable	**Univariable**	**Multivariable**	
	OR (95% CI)	**OR (95%CI) (excluding travel cost)**	**OR (95% CI) (with travel cost)**
Gender (ref = male)	1.15 (0.69,1.91)		
Age	0.97 (0.94,1.00)*	1.01 (0.99, 1.02)*	1.00 (0.98, 1.03)*
Travel Time	1.00 (1.00, 1.01)		
Asset Index	1.00 (0.89,1.11)		
Distance to Clinic	0.98 (0.93, 1.04)		
Travel Cost	1.00 (1.00, 1.00)		1.00 (1.00,1.00)
Disclosure	1.01 (0.55, 1.87)		
Social Support	1.17 (0.90, 2.28)		
Rainy Season	1.44 (0.90, 1.42)	1.42 (0.89,2.28)	1.56 (0.84,2.92)
Alcohol Use per	0.83 (0.45, 1.52)		
Internalized Stigma	0.99 (0.81, 1.22)		

* denotes statistical significance at the $p<0.05$ levels

VII. Survival Analysis

When travel time was assessed as a categorical variable, with the cut-point of less than or greater than 45 minutes, travel times longer than 45 minutes were associated with increased mortality. Gender was equally associated with mortality as men had increased

odds of mortality. Being female was protective of mortality within the first year of enrolment and follow-up in the study. Summarized in **Figures 3 and 4.**

Figure 4. Survival by Gender

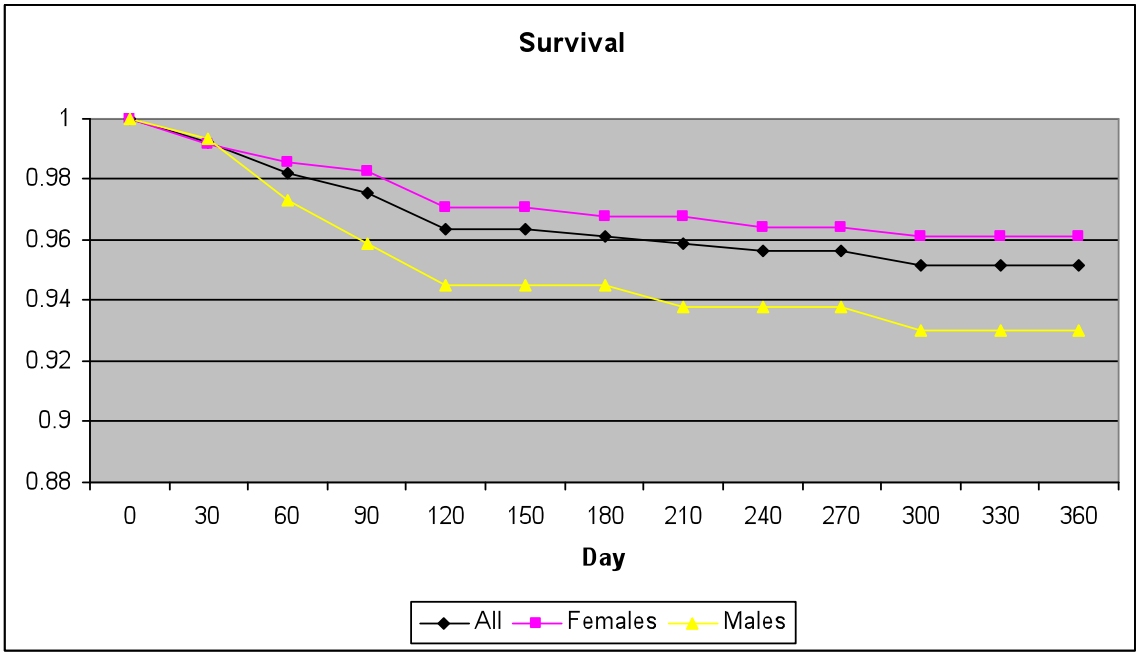
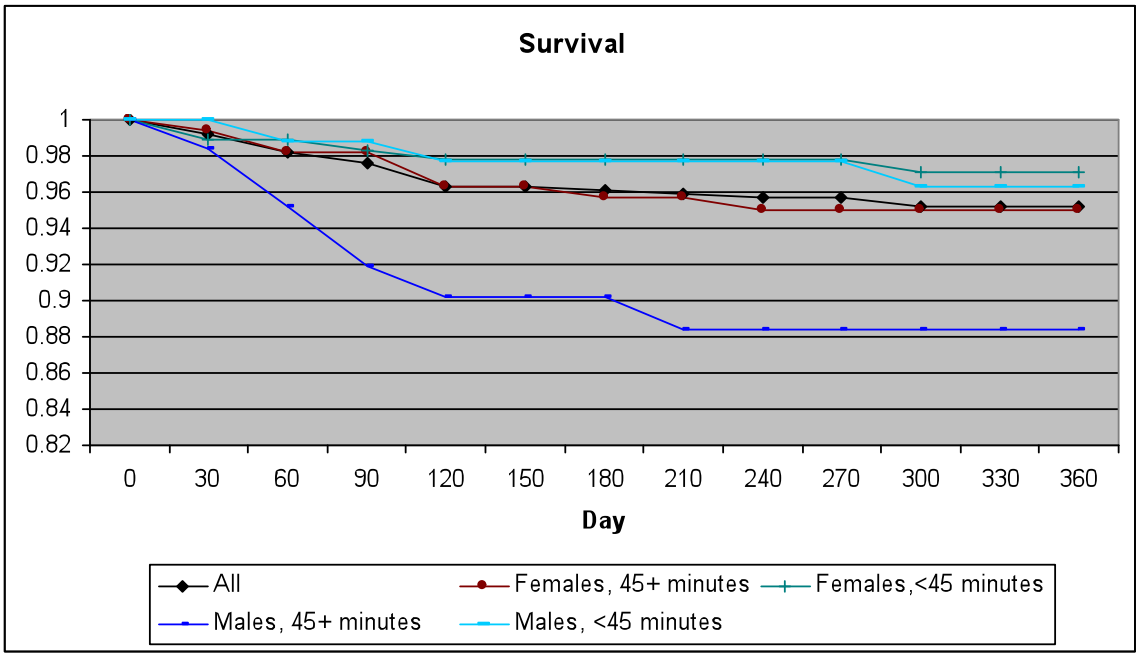


Figure 5. Survival by Travel Time to Clinic



CHAPTER 5. DISCUSSION

The findings from this study demonstrate that multiple economic and structural barriers exist with HIV care in rural Uganda for both patients and healthcare providers. The findings further illustrate how these barriers could threaten the sustainability of HIV treatment programs and diminish the positive impact of the recent successes experienced with treatment roll-out in resource-limited settings. However, the data also point to the strength of several facilitators that serve as mediators to counteract the barriers. These facilitators may provide insights to possible interventions strategies to improve HIV care in rural settings.

Summary of Results

Similar to previous findings (31, 32, 48, 72, 102), the qualitative findings show that patients attending the Mbarara ISS Clinic in Uganda experience barriers to accessing care related to poverty. Participants consistently reported difficulty with accessing care because of the additional cost of routine transportation to the clinic for medication refill and clinician's visits. The added cost of waiting for long hours at the clinic, hunger and food insecurity were sited as added burdens to resources that were already fully maximized by competing demands. Although the level of motivation was high to adhere

to medications, financial constraints contributed to the patients' inability to access care and medications, which contributed to treatment interruptions. As previously described (29, 30, 63), treatment interruptions were mostly due to an inability to access medications rather than a function of missed doses of medications in the patients' possession. This finding is consistent with the notion that the Achilles' heel of HIV treatment in rural settings is the challenge of structural and economic barriers that make it difficult for patients to access care and retain in care (29).

The exception to this conclusion is the finding related to the prevalence of stigma as a barrier to patients. The high prevalence of stigma reported in the qualitative data was unexpected and the extreme measures taken by participants to hide their HIV status was even more astounding. Although the UARTO study findings suggest otherwise, both enacted and internalized stigma were cited in the qualitative study as reasons for withholding disclosure of HIV status. The process of serostatus disclosure was complicated and potentially enabled behaviors that influenced adherence to medications and/or clinic attendance. Disclosure also had the potential to ease the burden of asking for and accepting social support to mitigate barriers to care. Also consistent with previous studies (48), social support translated not only to emotional support from friends and family, but served as a resource that could be drawn from to mitigate financial constraints that prevented access to care as well as retention in care. Social support in this instance is a tangible material resource necessary for survival as opposed to an emotional phenomenon only. Disclosure did not always lead to increased social support and ease of emotional burden. For some participants, the potential consequences, including loss of employment, marital status and violence or abuse, were too grave to allow for disclosure.

These findings highlight the need to address stigma and HIV-related discrimination as a crucial step to engaging and keeping HIV patients in care and improving their quality of life in general.

A new finding from the qualitative data highlighted the difficulties patients' faced in navigating inflexible clinic schedules. The availability of no-cost ART in many sub-Sahara African clinics, coupled with expanded testing, led to a rapid and overwhelming increase in the number of patients at each treatment site. However, the increased demand in services did not necessarily translate into increased human and financial resources at the health centers and clinics. The Mbarara ISS Clinic was not an exception to this trend, and as with many other clinics, found it difficult to manage their rapidly increased patient population. The overwhelming volume of patients, coupled with inadequate staffing, forced the clinic to adhere to strict pre-determined schedules and remain inflexible in changing patient appointments.

From the perspective of the healthcare providers, patients who returned for clinic visits without appointments disrupted the flow of the clinic and only added to their already insurmountable workload. In turn, patients were disillusioned by the rigid requirements to justify their reasons for missing appointments or returning without appointments. They equally complained of the hostility of the clinic and negative treatment received when they returned without appointments, particularly from the non-clinician care givers. Some participants were so frightened of the reception and treatment they would receive at the clinic that they missed appointments or sought care elsewhere. Due to poor communication lines between all health centers providing HIV care throughout Uganda, this scenario presented multiple opportunities for patients to be lost

or for linkage in care to be broken. These findings were not evident in the UARTO data, in which age was the only significant predictor of loss to follow up from clinic. This finding was of particular interest because it still presented as a barrier to care despite the reported high levels of trust in healthcare providers at the clinic and general satisfaction with the quality of care received at the clinic. The hostility of the clinic described by patients was exclusively related to missed appointments or returning patients without appointment. It is possible, therefore, that the patients who experienced hostility in the clinic were more likely to have other concurrent challenges to accessing and retaining in care that caused them to miss their appointments in the first place and return to the clinic on days that were not assigned to them.

A main facilitator of care is that ART effectiveness and improved treatment outcomes serve as motivating factors for retention in care. Patients consistently reported the motivating force of the 'Lazarus effect' of ART and there was a strong unwillingness to revert to bed-ridden and dysfunctional disease states experienced prior to treatment. The UARTO analysis illustrates near-perfect adherence (94%) at the 3 –month follow-up visits, which improved to 100% at the 6-month mark. This trend suggests an additional motivation to adhere to treatment once treatment success was experienced. After the 6-month time point, however, this trend slowly begins to wane and by 12 months, mean adherence declines significantly in this population from close to 100% to 84%. Examining the proportion of participants achieving more than 90% MEMS adherence by quarter, however, illustrates that most participants (90%) remained highly adherent (above 90%) to their medications throughout 12 months. This finding suggests that the few (less than 10%) individuals who achieved less than 90% mean MEMS adherence

probably had complete treatment interruptions or very low levels of adherence, which significantly reduced the mean adherence at the 12 month time point. These data suggest that possible adherence interventions should be targeted at time points of 6 months and later from treatment initiation. Further study is needed to understand the reasons for declining adherence beyond 6 months of treatment initiation.

The patients described a high level of trust in their healthcare providers as a reason for continuing with their prescribed treatment regimen and returning to clinic. The quality of care was ranked equally high by all patients who were appreciative of the constant supply of ART. Although the healthcare providers noted the frequency of inconsistent drug supply, the clinic implemented alternative back-up systems with the help of collaborating partners to bridge these gaps and prevent treatment interruptions. Hence, patients did not experience gaps in their medication refills once they returned for their clinic visits. An evaluation of patients starting ART at Mbarara ISS Clinic in 2010 by Geng et al... found that between April, 2009 and May, 2010 contributions of PEPFAR-funded ART programs fell significantly and affected the supply of ART in many clinics in resource-limited settings. During this time, the diminished ART supply in the Mbarara ISS Clinic was largely covered by a small private donor funded foundation (103). Many healthcare providers questioned the sustainability of such efforts in long-term care. There was consensus among healthcare providers that the global response to HIV/AIDS made it possible for international partners to support HIV treatment programs and fill unmet needs, but questioned the sustainability of this approach in general. Some healthcare providers discussed the need for the Ugandan Ministry of Health to take on

more responsibility in proactively managing the epidemic in light of recent diminishing international funding and support.

Spirituality emerged as a strong coping mechanism for HIV positive patients in this setting. While other studies have cited facilitators described earlier, there are very few published studies that have explored in depth the relationship between spirituality and HIV treatment outcomes or retention in care in resource-limited settings. A few studies in the United States have found that increased spirituality as a coping mechanism for HIV positive individuals has a positive impact on improved health and emotional well being (104-106). In 2010 Trevino et al... examined the relationship between religious coping and spiritual struggle with biological, behavioral and emotional outcomes in a study of 429 HIV positive patients. The study found that greater religious coping and lower levels of struggle with spirituality were associated with small improvements over time, and that positive outcomes were correlated with higher levels of religious coping, while negative outcomes were correlated with spiritual struggles (105). Another US-based longitudinal study by Ironson et al... in 2006 assessed how changes in spirituality/religiousness after HIV diagnosis affected disease progression. The study found that almost half (45%) of the participants showed an increase in religiousness/spirituality after their HIV diagnosis and this group preserved their disease status (CD4 and VL) at a higher rate than other participants. The study concluded that there is an increase in spirituality and religiousness after HIV diagnosis, which is associated with slower disease progression. Some studies in sub-Saharan Africa have reported spirituality as a coping mechanism for dealing with the psychological stress that accompanies HIV/AIDS (107, 108). The qualitative findings in this study corroborates

previous research in both sub-Saharan Africa and the United States in describing spirituality as a resource that enabled participants to deal with their problems, including their HIV disease.

In addition to viewing spirituality as a coping mechanism, participants affirmed their belief in divine intervention with regards to the healing effect of a supreme being in their HIV treatment. This sub-set of participants expressed their strong faith in God's direct and indirect positive impact on their improved health status. The belief was that the healthcare providers and the effective medications were instruments of God's work. One participant attributed his behavior change in stopping alcohol use, to his faith, and described the uplifting emotional effects of belonging to a religious group. Beyond behavior change, it seemed that increased spirituality was linked to increased social support, and decreased levels of depression or greater optimism. Although this was not assessed in the quantitative analysis, Moskowitz (109) describes possible pathways by which positive affect predicts lower risk of AIDS mortality in a 2003 study looking at the relationship between depression and disease progression. Because spirituality as an independent variable only emerged with the qualitative study and was not included in my initial list of variables of interest, quantitative evaluation of the impact of spirituality on behavior change, disease progression and mortality went beyond the scope of this dissertation. It is possible that spirituality might have a positive effect on disease outcomes through behavior change and risk reduction, decreasing psychological burdens such as stress and depression, and increasing social support. The relationship between spirituality and stigma was not explored in this study and it could be that spirituality may modify the effect of stigma on outcomes such as treatment interruption. However, an

interesting finding was that all participants including those reporting increased spirituality after their HIV diagnosis, noted that their religious community was the last and most difficult to disclose their HIV status to. Most participants had yet to disclose their status to either their church members, religious leaders or both. It seemed that although HIV diagnosis was a catalyst for positive change as previously described in other studies (104, 110), the positive affects of this change did not include a decrease in internalized nor enacted stigma.

Both healthcare provider and patient participants described the main motivating factor that facilitates HIV care is the patients' placing a high premium on health and life. This was evident in patients' description of their need to stay alive for their families and children in particular. Maintaining relationships with community members, families and friends, especially for those who had disclosed their status, was extremely important. As previously described by Ware et al..., the relationships served as an important resource and social capital necessary for survival (48).

CHAPTER 6. CONCLUSION AND TRIANGULATION OF QUALITATIVE AND QUANTITATIVE DATA

Interpretation of the Qualitative and Quantitative findings

Through a two part, mixed-method approach, this study aimed at exploring the following questions:

1. What are the barriers to HIV care in rural Uganda?
2. How do these barriers affect treatment outcomes?
3. What are possible facilitators of HIV Care in rural Uganda that could guide interventions to optimize care, and subsequently improve the quality of lives of those living with HIV in resource-limited settings?

The hypothesis was that structural and economic barriers to HIV care in rural Uganda are associated with diminished health outcomes, increased treatment interruptions, increased AIDS-related morbidity and mortality.

The qualitative findings both corroborated and added to existing research findings and identified barriers and facilitators to care in a rural, resource-limited setting outlined in the table below. Many of the barriers to care reported by both patients and healthcare providers were related to issues of poverty, which supported our hypothesis that many of

the barriers are structural and economic as opposed to behavioral. The exception to this was the finding on stigma, which was cited as a major barrier to health-seeking behaviors, often contributing to increased emotional and psychological stress. However, stigma also provided motivation for those who had not disclosed their HIV status to maintain an image of good health. Therefore these individuals were highly motivated to stay in care to protect themselves from the consequences of enacted stigma and discrimination.

The quantitative findings however, did not support the above hypothesis completely. An unexpected finding was that increased travel time to clinic was associated with decreased odds of treatment failure. An explanation for this could lie in the fact that participants who travel greater distances to seek care had other compounding factors such interfered with their ability to thrive. More research is needed to understand this particular phenomenon. Consistent with previous studies, the quantitative analysis showed that adherence is high in this population with an average of 94% over 12 months, although the mean adherence begins to decline after 6 months of follow-up. Also as expected, increased travel time to clinic (greater than 45 minutes) was associated with mortality, as was being male. Increased age was consistently a predictor of improved treatment outcomes.

Table 11. Barriers and Facilitators of HIV Care in rural Uganda

	Barriers to Care		**Facilitators of Care**	
	Patients	**Healthcare Providers**	**Patients**	**Healthcare Providers**
1.	Stigma and issues of disclosure of HIV status	Stigma and issues of disclosure of HIV status among patients	Trust in healthcare providers	Social support of patients by family and community members
2.	Financial constraints and resource scarcity that affect transportation costs, food insecurity and competing demands	Poverty and financial constraints experienced by patients	Strong belief in a higher being, God, and high levels of spirituality as a coping mechanism and for inducing positive affect	Treatment (ART) success and high quality of care given to patients
3	Inflexible clinic schedules and long delays at clinic	Challenging work environment, work overload, and reduced quality of care	Treatment (ART) success and subsequent prioritizing of ART adherence and health	Global support of HIV as a disease
4.		Difficulties with healthcare delivery in a regional referral healthcare system with few treatment centers	Social support, use of social capital and maintaining relationships for survival	
5.		Limited drug supply and distribution		
6.		Challenges with poor ART adherence, routine monitoring and sub-optimal treatment outcomes		

Following the literature review, I further hypothesized that Internalized stigma and lack of disclosure of HIV status are associated with poor health outcomes and that social support could mitigate these poor outcomes. I expected that alcohol use, decreased socio-economic status, distance to clinic would be equally associated with poor health outcomes including treatment failure, adherence, treatment interruptions, loss to follow up and mortality. The data suggest that even though stigma was associated with lower levels of adherence, and adherence was a predictor of treatment failure, decreased stigma was not associated with treatment failure, nor any other poor health outcome. This finding was contrary to what was expected. One possible explanation for this finding is that individuals who have higher levels of internalized stigma have a greater motivation to adhere to their medications as a mechanism for hiding their HIV status. Another plausible explanation lies with the fact that the data on stigma were collected on only a subset of the cohort because they were collected at a later date (2 years later). Without, a complete dataset on this variable, it is difficult to extrapolate the findings to the entire cohort.

Similar to the findings on stigma, lack of disclosure was not associated with poor treatment outcomes, nor was it associated with positive or improved health outcomes. Because the question analyzed for this variable asked about any disclosure, it made it difficult to tease out the effects of disclosure on specific groups or individuals that could have impacted behavior or retention in care, thus treatment outcomes.

Contrary to the hypothesis, social support was not associated with improved health outcomes and therefore did not mitigate the barriers to care as expected. These data were also collected at a later date and were available on only a subset of individuals.

Because the data on stigma and social support were collected 2 years after the study began enrolment, it could also be the case that the characteristics of the study population changed so that those recruited two years later may have different experiences with stigma and social support. However, this is an assumption that is not supported by the analysis of other baseline characteristics of the cohort, which show limited variability within the study population. Another plausible explanation can be deduced from the findings of a recent study by Alamo et al. looking at reasons for loss to follow up in a community-based ART program in Uganda, which showed that people start to miss pills and clinic visits after they start to feel well and want to feel 'normal' again (16). In this retrospective cohort of patients lost to follow up between 2001 and 2012, the study further showed that wanting a ‘normal life’ was the commonest reason for loss to follow up(16) and that this finding most commonly occurred after 2 and 3 years of follow up in care(16). Given the quantitative analysis for this dissertation focused on only 12 months of follow up, the findings could have been limited for key outcomes of interest such as loss to follow up, treatment failure and mortality.

It is likely that the tangible support provided by the UARTO study, especially in the form of free transportation to clinic, complicates the interpretation of some of the obscure findings in the quantitative analysis. As the support was an indirect consequence of study retention procedures, and not included as an intervention, support rendered by the UARTO study was not measured nor studied as an independent variable, yet these data suggest that the impact of the this unintended intervention may have been significant enough to introduce bias in the relationships between predictor variables such as stigma and social support.

A mixed-method approach, combining quantitative data from a 500-person cohort collected independently, with qualitative data from both patients and their healthcare providers, provided an opportunity to triangulate information from multiple sources to gain a deeper understanding of the barriers associated with HIV care and treatment in rural Uganda. The amalgamation of the qualitative and quantitative data did not produce uniform findings, particularly in assessing the relationship between stigma and social support. Further study is needed to understand the factors that reduce stigma as a barrier to sustained HIV care in rural settings.

Limitations of the Study

Use of Secondary Data

The use of secondary data that were collected for purposes other than my study limited the ability to target my specific research questions. This limitation was partly overcome by the mixed-method approach where primary data collected using qualitative methods allowed for my specific research questions to be addressed, which filled the unanswered gaps from the quantitative analysis. However, the sampling methods for the qualitative study allowed for participants in care beyond 12 months, while data analysis in UARTO included only the first 12 months of follow-up. This difference may have accounted for some of the discrepancies in triangulating the qualitative and quantitative data. Given the complexities of the longitudinal data in UARTO, it was not feasible to conduct analysis beyond the first 12 months of follow-up for the purpose of this dissertation. The recent findings from the study in Uganda by Alamo et al.. suggest that

key outcome variables such as loss to follow up, could better be examined with longer follow times of two years and longer. This is explained through the observation that most losses to follow up in the ten-year study occurred after the 2nd and 3rd years of follow up when patients generally started to feel 'normal' post ART and changed their health-seeking behavior accordingly in ways that compromise their care(16).

Adherence Monitoring and Hawthorne Effects in UARTO

It is possible that intensive adherence monitoring as well as other follow up measures that are associated with being in the UARTO study may alter adherence as well as other outcomes (Hawthorne effect) in the quantitative analysis. While this cannot be excluded, I expect that this was a small effect was outweighed by the advantages of using data collected by objective measures, including less measurement error and bias to answer the specific questions.

Incomplete Data on Key Variables

Data on key variables of interest, such as social support, internalized stigma and disclosure were collected at a later date in the follow-up timeline in the UARTO study. The UARTO study started enrolment in 2005, however, questions on social support, stigma and disclosure were added to the study questionnaire two years later in 2007. As such, these data were not collected on more than half of the UARTO cohort. The analysis included both complete datasets and sub-sets of data restricted to only those with key

variables of interest. There was no systematic attempt to limit all analysis to only those with complete data. This important issue may have made it difficult to generalize the results of the data on internalized stigma, social support and disclosure.

Relevance of Disclosure Data

Disclosure of HIV serostatus was measured with questions that asked whether or not study participants had disclosed their HIV status to a neighbor or family members at their baseline study visit. Given the requirements of having a treatment supporter accompany patients to their HIV clinic visits, it was impossible to have a situation where a patient at the Mbarara ISS Clinic had not disclosed their status to a close friend or family member who would likely accompanied them to their clinic visits. Nearly all participants had disclosed to a family member at baseline. As such, this variable probably did not provide sufficient variation to assess correlation with the outcomes of interest. The relevance of the disclosure variable to the UARTO study analysis could have been strengthened if data were available on specific individuals or groups to whom the participants had disclosed their status; such as employees, religious groups or specific family members. The other question that could have been asked is whether the patients disclosed their HIV status to anyone other than the mandatory treatment supporters. The qualitative findings from this study indicate that the participants made conscious decisions about whom to disclose their HIV status to, and that these decisions were

linked to expected outcomes regarding their HIV care and treatment. However, data were not available to explore this phenomenon in the quantitative analysis.

Combining Results of Complete and Incomplete Datasets in the Quantitative Study

The UARTO analyses combined data that were complete for some variables and incomplete for other key variables of interest. As such, some of the analyses were restricted to only participants who had complete data e.g. internalized stigma, social support and distance to Clinic. Self-reported travel time was used as a variable in instances where data on GPS measured distance to clinic were not available. Travel time and distance to Clinic were interpreted interchangeably in the analysis, when they do not necessarily correlate as a proxy for patients' access to the clinic and measure of remoteness of the homes in proximity to the clinic. Analyses involving key variables that were incomplete probably contributed to the data not supporting the study hypothesis in the quantitative analysis, and not correlating with the qualitative findings particularly in the assessment of the associations between social support, stigma and disclosure on outcomes such as treatment failure and adherence. Even for the statistically significant findings, the associations were weak.

UARTO Study Procedures Probably Mitigated Barriers

Because the UARTO study provided transportation, meals and guidance through clinic visits for study visits that coincided with clinic visits, some of the barriers to care experience by patients were mitigated by these study incentives. Another limitation to studying the UARTO population is that the patients had been in care at the clinic for a relatively long period of time and probably received prescriptions longer than the standard 1-month dose. However, the effects of this would have been more notable beyond the first year of follow up. Standard Clinic procedures allow for longer times between prescription refills for patients who have been in the Clinic longer than 6 months with stable disease staging.

CHAPTER 7: POLICY IMPLICATIONS AND PLAN FOR CHANGE

Policy Implications

Significant progress has been made over the last decade in expanding HIV treatment access in resource-limited settings, but the global burden of disease remains high. The United States government between 2003 and 2008 spent $15 billion dollars combating HIV/AIDS in Africa PEPFAR and other initiatives. The initial goals of PEPFAR were to treat 2 million HIV infected individuals, prevent 7 million infections and support care for 10 million people in resource-limited settings(111). In July, 2008 the US government renewed PEPFAR as the "Tom Lantos and Henry J. Hyde United States Global Leadership Against HIV/AIDS, Tuberculosis, and Malaria Reauthorization Act of 2008" with an additional $48 billion commitment through 2013 for HIV/AIDS in resource-limited settings.

After meeting it first goal of treating 2 million people, the renewed PEPFAR goals were to treat 3 million people, prevent 12 million new infections and care for 12 million HIV-infected individuals, including 5 million orphans. This is the largest financial commitment to a single disease worldwide, though several other global multilateral partners including the Global Fund to Fight AIDS, Tuberculosis and Malaria and the United Nations program on AIDS (UNAIDS), as well as private foundations such

as the Bill and Melinda Gates Foundation and the Clinton Foundation, have also committed substantial funds to combat the pandemic. Between 2003 and 2010, the focus for HIV treatment programs was on care and increasing the number of people on ART.

In 2007, UNAIDS reported that although the global target to treat 3 million HIV-infected individuals in middle to low-income countries by 2005 was not met, significant progress had been made towards achieving universal access of HIV care and treatment. A key limitation to HIV program implementation in Uganda included an overreliance on external resources, capital and expertise, without sufficient integration with local systems and expertise. Lessons learned from evaluation of several PEPFAR funded programs and program implementation reports with UNAIDS point to the need to 'maximize results' by collaborating with in-country agencies and institutions to improve impact, build on existing platforms within countries, and use innovation to ensure positive outcomes (2, 33). A recurring challenge with multi-national programs in resource-limited settings is the bridging of both cultural and economic gaps, present with resource-rich and resource-poor setting partnerships that have sometimes resulted in one-directional approach to public health interventions that are not often sustainable. The current UNAIDS strategy for 'getting to zero' 2011-2015 aims at improving prevention efforts, increasing nutritional and social support and increasing human rights through gender equality. The platform for implementing these initiatives relies heavily on strengthening health systems so that programs are nationally owned and that the response to the epidemic within each country is sustainable.

The findings from this study support the current strategy proposed by the UNAIDS 'getting to zero' initiative. The following policy options are proposed to enable the achievement of the proposed goals. The table below represents seven plausible options considered to mitigate the barriers to HIV care in resource-limited settings:

Table 12. Analysis of Policy Options

OPTIONS	PROS	CONS	SUPPORT	RISKS
Build additional clinics and expand access to care in remote areas	-Increases access to healthcare -Limits transport challenge	-Expensive -Difficult staffing -Stigma an issue -Drug stock and supply a challenge	- Healthcare providers and patients would support this option	-Waste of resources if facilities are not utilized -Clinicians would be reluctant to relocated to these areas and staffing facilities would be challenging
Use of mobile clinics that bring testing and care to the homes of individuals	- Convenient for patients -Relatively inexpensive -Could reach a wide audience if combined with other clinics – diabetes, heart disease, malaria, etc.	- Assumes no stigma -Logistically challenging for providers	-Patients -Community and family members of patients -Patients who have disclosed their status	-Implementation is challenging -May not work in communities with high levels of stigma -Logistical challenges of fuel, maintenance of vehicles and transporting staff and supplies may be difficult to overcome

OPTIONS	PROS	CONS	SUPPORT	RISKS
Provision of vouchers or cash transfers to mitigate financial burden associated with accessing care	-May resolve transport burden - A straight-forward solution to transportation and food insecurity burdens	- Vouchers may be cashed and diverted -Difficulty with implementation -May not be accepted by all vendors -Stigma issues may reduce use -May not alleviated levels of poverty at the household level -Short term solution	- Patients -Community and family members of patients -Patients who have disclosed their status -Healthcare providers	-Funds may be diverted to other use with high competing demands -May be difficult to implement if distribution of cash in involved -Safety and security at points of distribution in resource-limited settings is in question -Flat rate distribution versus graduated depending on financial need? How is need determined?
Training of Non-physician clinicians to increase the clinician to patient ratios	- Can handle the patient load problem much faster -In line with public health approach to HIV care in RLS	-Quality of care may be reduced -Sustainable	-Political leadership -Patients -Providers with heavy work load and high patient burden	-Surplus of non-physician clinicians -Increased responsibility of staff without adequate training in cases where there is no physician within radius of operation

OPTIONS	PROS	CONS	SUPPORT	RISKS
Poverty reduction and empowerment of women	-Should have a positive impact on HIV risk reduction	-Extremely time intensive -Requires commitment from several sectors of society -Difficulty changing existing cultural norms	-Strong political support _Patients -Providers	-Very difficult to accomplish and may prove to be an unattainable goal in the short term. -Lack of immediate results may discourage momentum
Build local capacity and re-engage local leadership	- Sustainable - Culturally relevant solutions to public health problems.	-Requires political buy-in and collaborative effort -Time intensive	-Strong Political support -Providers -Local leaders	-Difficult to sustain if local capacity is lost through 'brain drain'
Reducing Stigma at both the individual and community levels by engaging religious and other community-based leaders	-Will enable sustainability of public programs -Improve the lives of people living with HIV/AIDS -Reduce the burden of emotional and psychological stress factors contributing to disease progression	-Requires a complete change in cultural perceptions and attitudes, which is difficult	-Patients -Providers	-Change may take a long time to occur and lack of short term results may discourage efforts

Table 13. Evaluation of Policy Options for Improving HIV Care in Rural Uganda

	#1	#2	#3	#4	#5	#6	#7
Public Health Protection	High	High	Moderate	High	High	High	High
Economic Cost	High	Moderate	High	Low	Low	High	Low
Implementation Feasibility	Low	Moderate	Low	High	Low	Moderate	Low
Political Feasibility	Low	Low	Low	Low	High	High	Low

Key for Table 13. Policy Options

#1 = Increase number of HIV clinics

#2 = Use of mobile clinics

#3 = Vouchers and cash transfers

#4 = Increase the number and use of non-physician clinicians

#5 = Poverty reduction and empowerment of women

#6 = Building local capacity

#7 = Reducing stigma and engaging religious leaders

Policy Recommendations

Based on the findings of this study, barriers to sustained HIV care in a rural resource limited setting include a combination of factors that are structural, economic, and psycho-social, which act independently or through complex interactions. It is logical to state that the characteristics listed above are all linked to poverty and it can be argued that alleviating poverty may provide sustainable solutions. Such a herculean task may be impossible to achieve in a century and can bring on its own set of complications as can be seen in wealthy societies with poor health indicators. However, it is safe to assume that strategies to improve HIV care in resource-limited settings should aim at targeting all three components of the barriers outlined, while strengthening health care systems and building local leadership remain the foundation for sustained success.

Policy Recommendation #1

Given feasibility, public health impact and economic cost, my first policy recommendation would prioritize building local capacity and re-engaging local leadership as a first step to mitigating barriers to HIV care in this setting. This recommendation is based on the assumption that building local capacity in resource-limited settings will result in the engagement of leaders who have the potential to develop and sustain all other viable policy options listed in the above table. In his 2004 *U.S. World and News Report* article "Does leadership really matter?", David Gergen concludes by stating that America's progress hinges on the "quality and number of those who lead" (112). Likewise, it is the quality and number of those who lead the health

systems in Uganda that will influence the progress of the state of health of its population. These leaders will inevitably guide the process of change by propelling their colleagues to change, by articulating the health problems as well as their solutions such that they are clearly understood and by setting the examples for others to follow, a difference will be made. Outlined below are three key legislative steps that could be taken to both build and sustain the capacity of local public health leadership.

1. **Implement a mandatory service corp as a component of the medical training that requires doctors and nurses to serve in their home country for a period of 2 years upon graduation.** This component of the medical training would be implemented at the national level via a joint effort between the Ministries of Health and Education. The mandate to provide paid community service within Uganda upon completion of training would allow the country to realize an immediate return on their investment in their citizen's medical education. The mandate could include at least 50% of the service to be carried out in the rural regions of the country.
2. **Create a national training and retention program for local health leaders under the Ministry of Health to both develop health leaders and increase incentives for the leaders to stay in their home country to lead efforts.** The majority of the health workers who depart from their countries do so in search of better opportunities for themselves and their families. Recognizing that developing countries cannot match the compensation and opportunities provided by the wealthier countries, it is critical to create other incentives that

would compete favorably with compensation. Such incentives include career advancement and health leadership training opportunities that would pave the way to leadership roles in the health sector within country. Such a program would be tagged on to the afore-mentioned service corp program that would create further incentive for medical graduates to complete the mandatory service corp.

3. **Require a component of capacity building of local health leaders for foreign institutional collaborations with local Ugandan institutions.** Uganda is one of the countries that have been worst hit by the HIV epidemic in the world. Since 2003, following global initiatives from the WHO and the PEPFAR program, there has been a surge of activities to combat the public health crisis. This influx of funding, resource, and people presents an opportunity to leverage resources and maximize the benefits of collaboration. Many foreign institutions conducting research and implementing public health programs in Uganda have access to more resources than their counterpart institutions in Uganda. The impact of these partnerships on capacity building of local health leaders could be multiplied if the foreign partner institutions were required to allocate a portion of their activities towards development of local health leadership. The specific activities could include exchange of ideas, training and mentorship opportunities in the health sciences.

Policy Recommendation #2

My second policy recommendation would prioritize reduction of stigma at the individual, community and institutional levels. Given the strength of the stigma finding as a barrier to care in the qualitative study, coupled with the quantitative finding that stigma is associated with reduced adherence levels, this barrier to care needs to be addressed with a sense of urgency that identifies it as a barrier to care with dire long-term consequences. For psychosocial issues such as stigma, it is important to get a better understanding of the underlying issues that are perpetuating the beliefs and drive actions. In the case of HIV/AIDS in rural Uganda, drivers that negatively influence stigma at the individual level can be broadly grouped under lack of awareness and fear, detailed in the following points:

- Lack of awareness on both issues of stigma being a barrier to successful HIV care and treatment, and HIV as a disease may drive individuals to make negative assumptions that may not be based on fact.

- Individual fears of acquiring HIV as an infection and having to live with it for life may drive individuals to act in discriminatory ways or induce feelings of shame for those already infected.

- Fear of rejection and social isolation following HIV infection may drive individuals to internalize these feelings when they are infected, and act them out when otherwise not infected.

- Fear of dealing with economic problems that may be compounded by infection.

Having outlined the possible drivers of stigma above, it is evident that raising awareness is key to resolving issues that are associated with lack of awareness and also alleviating fears about HIV as a disease. Raising awareness of negative underlying attitudes and beliefs has the potential to change them. Raising awareness begins with creating recognition of stigma and highlighting mutual benefits of reducing it. The forum for information dissemination should be broad, with audiences including patients, healthcare providers, religious group members, policy makers and academia. My specific plan for change with regards to reduction of stigma shall begin with the publication of findings from this dissertation for academic settings. Following this, I intend to disseminate the findings to clinic populations beginning with the Mbarara ISS Clinic.

In order for awareness issues to be fully effective, addressing stigma reduction at the institutional level through legislation must accompany awareness efforts. Clinicians at the Mbarara ISS clinic reported frustrations with their repeated attempts at helping individual patients deal with internalized stigma by encouraging them to disclose their status. Yet, once patients disclosed their status, they were not protected by enforced laws, and faced grave consequences as a result. A second step towards reduction of stigma would be to push for more strict enactment and enforcement of legislation that defines discrimination against HIV in countries like Uganda as a punishable criminal activity.

Policy Recommendation #3

HIV care in RLS should include a comprehensive care package to mitigate barriers to accessing and retaining in HIV care in addition to providing ART. Food

supplements, transport vouchers, cash transfers are proven strategies in RLS in both developed and developing countries for improving access to care as well as retention in care, and overall treatment outcomes. My plan for change would also include prompt dissemination of the findings in this study that show that resource constraints threaten the success of ART programs.

Policy Recommendation #4

My final policy recommendation prioritizes the implementation of programs aimed at poverty reduction, empowerment of women, and education. While there is no direct plan for change that addresses this, it is expected that information dissemination of findings from this dissertation could guide program development to target specific areas that would impact poverty, and the empowerment of women. One addition that could be immediately implemented is the recommendation for the use of HIV patients within the clinic as 'expert patients' involved in the information dissemination to peer patients.

Plan for Change

In July, 2012 the Uganda National Council for Science and Technology (UNCST) held its fourth annual National Research Ethics Conference in Kampala, Uganda. The conference was organized in collaboration with the World Health Organization (WHO), the Uganda National Drug Authority (NDA) and the Uganda National Health Research Organization (UNHRO) with the theme "Responsive Research to Community Needs: An

Ethical Dilemma", and had a goal of addressing the responsibility of researchers in Uganda to respond to community needs. Two main points were raised as areas requiring further action for researchers in Uganda:

1. There is a lack of involvement of community members in the research process, both prior to and during the implementation of studies, and also after data have been analyzed and findings disseminated.

2. Reporting of research findings has been limited to just positive results, but should include dissemination of negative research findings, which provide an opportunity for change.

The concluding message from the conference called for public health researchers to make their research findings more relevant to the communities they study and to have a 'plan to act' based on their findings beyond academic publications in media that are often inaccessible to the general public. In other words, there is an urgent need to include a plan for change following the research process that fulfills the responsibility of researchers and leaders to improve the public's health. This call to action serves as the impetus for my plan for change.

Target Points of Intervention

Based on the findings of my research there are several possible target points of intervention highlighted from both the qualitative and quantitative studies that could improve the public's health. These include:

1. Reducing the hostility felt by patients at the Mbarara ISS Clinic, with regards to the providers' rigidity and negative attitudes towards missed appointments, which in turn affects patient retention in care
2. Raising the incentive for providers to stay motivated in a challenging and overwhelming work environment
3. Reduction of stigma associated with HIV at individual, community and institutional levels
4. Increasing access to care for patients
5. Reduction of poverty and financial constraints that prevent patients from managing their HIV care and treatment
6. Increasing social support, spirituality, ART success and trust in healthcare providers as strong facilitators of HIV care
7. Improving ART adherence beyond 9 months of treatment initiation
8. Building local capacity and leadership to both drive and sustain solutions to identified problems and challenges with HIV care in rural Uganda

Proposed Plan of Action

Some of the target points outlined above have been addressed through my policy recommendations. The policy changes recommended above however, are more global and involve long-term strategies for implementation and evaluation. My 'plan for change'

therefore shall be focused on the first three target problems outlined above, for which I intend to act immediately. I propose a plan to communicate the findings of my research to both the healthcare providers and patients highlighting the challenges experienced by both groups. I intend to create a sense of urgency on the issues raised and build consensus among stakeholders to address the issues, and subsequently develop a guiding coalition to resolve them collaboratively. The end result of my plan for change therefore, is to improve the quality of care for patients and improve the conditions of service for providers at the Mbarara ISS Clinic in an attempt to mitigate key barriers to care highlighted in my research.

Key Steps in the Plan for Change

1. Build consensus and get buy-in of key individuals such as the director, administrators and clinicians at the Mbarara ISS Clinic, on the importance of disseminating my research findings to the clinic community and acting on the findings. This step will enable the creating of an integral vision to propel actions that are directed towards a common goal of improvement and development.
2. Proposal to clinic administration for inclusion of research findings in health education talks at the clinic to enable dissemination of research findings to patients. Brief documents highlighting research findings, which are translated into the local language would serve a useful purpose of creating awareness for patients who participate in research as well as those who do not. Brief

presentations could also be made for patients who may not be literate, highlighting key findings that are relevant to the Mbarara ISS Clinic population. I would recommend this change to the Director of the Mbarara ISS Clinic and the administrative bodies that determine clinic processes and policy.

3. Create a communication strategy in collaboration with key stakeholders at the clinic that will hone in on the target areas for intervention and create a sense of urgency with the healthcare providers in particular to address the issues of hostility experienced by patients. Likewise, a communication strategy for patients would highlight the volume of patients at the clinic and give the patients a better understanding of the reasons behind some of the rigid structures viewed in the clinic operations. The communication strategy should be clear, with an articulated vision of resolving specific issues identified.
4. Communication of research findings with healthcare providers via a formal presentation to create awareness on the barriers to care experienced by both healthcare providers and patients of the Mbarara ISS Clinic. There are several opportunities to present the findings of my research during weekly Mbarara ISS Clinic meetings and continuing education sessions.
5. Communication of research findings with patients via a formal presentation, disseminated in the local language by the study research assistants. There are two options for dissemination of these findings; the first would be through an organized symposium for patients of the Mbarara ISS clinic, and the second would be through the routine health education sessions that occur daily in the

Mbarara ISS clinic. While the latter forum is meant for health education talks including ways in which patients can prevent infection or live positively with HIV etc., brief sessions on research findings could be included in this routine process at the clinic.

6. Collaborate with key decision makers at the Clinic to come up with intervention strategies for change. During this process, I would recommend the creation of a concrete plan to meet the needs of patients who are unable to meet their prescribed clinic appointments as a routine process in the clinic and that this plan be communicated with the patients accordingly. For the challenges of working in an overwhelming environment, I would recommend a performance-based incentive structure for healthcare providers that could be tied to patient evaluations.
7. Assess the understanding of the research findings and elicit ideas for improvement through meetings and focus group discussions with providers and patients. This would enable the process of asking the appropriate questions and identifying the root of the issues at hand to lead changes to a more relevant direction. While this process could be achieved with the healthcare providers during routine clinician meetings, discussions with patients would need additional approvals for implementation.
8. Implement recommendations elicited from healthcare providers and possibly patients, through collaborative efforts.

9. Celebrate successes and create a reward system to acknowledge the contributions made by all involved in the change process to keep participants motivated to sustain the change efforts.
10. Evaluate change process and re-assess successes and challenges to guide continued improvement in the Clinic.

Timeframe for implementation

The proposed plan for change would be implemented over a one-year period. The first two months would be spent soliciting for support for the proposed plan at the local leadership level. The following six months would be spent strategizing and communicating research findings, plans and ideas. The impact of the proposed changes could be evident as early as 12 months after implementation. The expected outcome would be a change in attitudes of both healthcare providers and patients about clinic appointments and a reduction in the level of rigidity required by the clinic in accepting patients who miss appointments evidenced by a clear plan to handle patients who show up outside of their prescribed clinic appointment schedule. The number of patients lost to follow up could be measured following the change implementation and the changes could potentially impact this number.

Conclusion

This action-based approach to change management is described in detail by John P. Kotter in his 1996 book 'Leading Change'. Kotter outlines an eight-step process of

leading change with starts with ‘creating a sense of urgency’ to jump-start the change process and ends with ‘anchoring new approaches in the culture’ to sustain the change efforts and make them ‘stick’ within an organization or community (113). This framework guides the plan for change I outline above and incorporates a leadership process that is not linear but circular, involving constant movement between personal and global, providing an opportunity to implement change through collaboration but with a leader compelling and motivating others to act together towards a common goal.

APPENDIX I: SAMPLE KEY INFORMANT INTERVIEW GUIDE

Participant ID number:

Gender:

Date:

Introduction

Good afternoon _____. and thank you for accepting to participate in this study to better understand the barriers to HIV care faced by the patients in the Mbarara ISS clinic. As you know, my name is Nneka Emenyonu and I am a student in the Doctoral program in Public Health at the University of North Carolina Chapel Hill School of Public Health. I am conducting this study as a requirement for my thesis towards a DRPH degree.

The purpose of this study is to get your views on the barriers to HIV treatment and care here at the Mbarara HIV Clinic. You are being asked to participate because you are either a healthcare provider or a patient at Mbarara ISS Clinic. I appreciate your time and honest assessment of the questions I will be asking you in a few minutes. Your answers shall be kept confidential and you shall not be identified in the course of my publication of the data. Your answer will be pooled together with those of other participants to better understand the barriers to HIV treatment HIV care in this region.

I would like to spend the next hour or so asking you some questions about your affiliation with the Mbarara ISS clinic, followed by some questions regarding the barriers

to HIV care experienced by you or your patients and finally, I would like to ask you some questions on how these barriers have impacted your HIV treatment outcomes or those of patients in your clinic.

Question guide (for healthcare providers)

1. How do you feel your patients are doing with the management of their HIV disease?
2. Have any of your patients expressed difficulties with managing their HIV disease? What are they?
3. For you, what is most difficult about treating patients living with HIV/AIDS? How so?
4. What are some of the barriers that have been expressed by your patients? Please Feel free to give specific examples.
5. What do you feel are the most important challenges to delivering HIV care and treatment in your clinic?
6. What do you see as the biggest issue or problem the clinic is currently facing? Why is that a problem? Anything else?
7. How would you rate the services of the clinic on a scale of 1-10 with 10 being excellent?
8. Is there anything else you would like to share or add to what you have talked about during this session?

Interview Guide (for UARTO cohort participants)

1. How long have you been a patient at Mbarara ISS Clinic and for how long have you been on ART?
2. Have you disclosed your HIV status? To whom have you disclosed your status
    a. Immediate family
    b. Extended family
    c. Friends
    d. Co-workers
    e. Members of my community (church, school, etc.)
3. How often do you come to the clinic for a routine visit and/or to pick up your HIV medication?
4. How did you get to the clinic? [Probe about transport, costs, process for acquiring money, how long the distance is etc.]
5. How would you rate the services of the clinic on a scale of 1-10 with 10 being excellent?
6. Do you face any challenges in coming to the clinic for your care?
7. Which one of these do you think is the most difficult challenge to overcome:
    a. Having sufficient food to meet the demands of your treatment
    b. Having enough money for routine transportation to the clinic
    c. Having childcare available when you come for your clinic visits
    d. Issues of stigma in your community
    e. Your physical ability to travel to clinic
    f. Seasonal changes in weather – e.g. rainy season
    g. Time available in your schedule to go for your clinic visit

h. Amount of time spent at the clinic during your visit

i. The quality of care your get at the Mbarara ISS clinic

8. Is there anything else that you would like to talk about regarding barriers to your HIV care and treatment?

Conclusion

I want to sincerely thank you again for your time in participating in this study. Your input is invaluable and will guide efforts towards improving the HIV care status in rural settings such as Mbarara. I assure you that your answers will remain confidential. You shall receive a copy of my study results upon completion of my study.

APPENDIX II: CONSENT FORM FOR PATIENTS

Consent to be a Research Subject

Mbarara University of Science and Technology, Mbarara, Uganda

University of North Carolina Chapel Hill, USA

Barriers to HIV Care in Rural Uganda

Background/Purpose

Nneka Emenyonu of Mbarara University of Science and Technology and University of North Carolina Chapel Hill is conducting research to learn about barriers to HIV care in rural Uganda and to determine the impact of these barriers on HIV treatment outcomes that you experience.

I am being asked to participate in this study because I am an active UARTO cohort participant living in one of two selected communities in Mbarara within 10-20 kilometers of the Mbarara ISS Clinic.

Procedures

If I agree to participate in the study, the following will occur:

1. My participation in the study shall require a one time, one-on-one interview with the study investigator that should last about 1-2 hours in total. There will be no follow up visits after this interview.

2. I shall be interviewed one time by the study investigator. The interview will take place immediately following my consent to participate in the study and will last 1- 2 hours. Interviews will take place in a private room at the study offices in Mbarara or in another location that we will identify. Interviews will be conducted in my language of choice (English or Runyankole). The interviewers are not medical professionals and will not be able to answer questions about my health or my health care. However, I may consult health care practitioners at the Mbarara Regional Referral Hospital HIV Clinic for additional information about your HIV care at any time.

3. The interview is informal, like a conversation. We will talk about my perceptions regarding barriers to HIV care and treatment that I experience. The questions I am asked are not defined in advance. If I am asked any question that I do not want to answer, I can simply say, "I do not want to answer that."

4. With my permission, the interviewer will audiotape the interview. The recordings will be used for research purposes only. The recordings will be kept until the study is complete; then they will be erased. Declining to be audio-taped will not affect my eligibility to participate in this research study.

5. The researchers will not share any of the information from my interview with anyone outside the research team. I am completely free to choose not to take part in this research. My decision will have no impact on my care nor the services I receive at Mbarara ISS Clinic.

Risk/Discomforts

The risks of participating in this study are minimal. It is possible that I might get tired during the interview. I may find some of the questions uncomfortable or hard to answer. If this happens, we can (a) discuss the situation, (b) take a break, or (c) stop. If I choose to stop, we can either finish the interview another day or I can end my participation in the study. Though unlikely, there is always a chance of a breach in confidentiality when taking part in a research study. The researcher will make every effort to protect me from this risk.

There may be uncommon or previously unknown risks. I shall report any problems to the researcher.

Confidentiality

- My privacy is protected as a participant in this study. This means that my identity will never be released in a way that can be connected with me. There will be a number rather than my name on copies of my interviews. All of the interviews, research documents and audio recordings will be kept in a locked office of research study personnel in Mbarara. Computer files will be protected with a password.

- Only the people involved in the research will be able to get this information. None of the information I give you will be shared with my providers at the HIV/AIDS clinic, my family members or anyone else outside the research project. My name will not be used in any

written reports or articles that result from this project. Every effort will be made to ensure that descriptions of individual participants are not identifiable in any way.

- Participants will not be identified in any report or publication about this study. Although every effort will be made to keep research records private, there may be times when federal or state law requires the disclosure of such records, including personal information. This is very unlikely, but if disclosure is ever required, UNC-Chapel Hill and Mbarara University of Science and Technology will take steps allowable by law to protect the privacy of personal information. In some cases, my information in this research study could be reviewed by representatives of the University, research sponsors, or government agencies for purposes such as quality control or safety.

- At any time point during the interview, I may request that the audio recorder be turned off.

_____ OK to record me during the study

_____ Not OK to record me during the study

If there is need to have an interpreter during the interview, the person shall be a member of the research team and shall keep all the information regarding my study participation private.

Benefits

Research is designed to benefit society by gaining new knowledge. You may not benefit personally from being in this research study.

Alternatives

I may choose to not participate without the risk of losing my current healthcare or medicines.

Cost

There shall be no monetary costs to me for being in the study. However, I will need to devote 1-2 hours of my time to participate in the study, for which I shall not be compensated with cash per Mbarara University of Science and Technology guidelines on research.

Reimbursement

I shall be provided with transportation home in the form of a free ride home or transport cost reimbursement after completing the interview if I decline the free ride home.

Questions

This study has been explained to me and my questions have been answered. If I have any additional questions, I can call the Study Principal Investigator, Ms. Nneka Emenyonu at 0782027158. If I have questions for the Institutional Ethical Review Committee at Mbarara University of Science and Technology, I can call 048520851.

Consent

I have been given a copy of this consent form.

PARTICIPATION IN THIS RESEARCH IS VOLUNTARY. I have the right to participate or withdraw at any point in this study without the risk of losing my medical care.

If I wish to participate I should sign below.

_____ _____

Subject's Signature Date

_____ _____

Staff person obtaining consent Date

APPENDIX III: CONSENT FORM FOR HEALTHCARE PROVIDERS

Consent to be a Research Subject

Adult participants (health care provider)

Mbarara University of Science and Technology, Mbarara, Uganda

University of North Carolina Chapel Hill, USA

Barriers to HIV Care in Rural Uganda

Background/Purpose

Nneka Emenyonu of Mbarara University of Science and Technology and University of North Carolina Chapel Hill is conducting research to learn about barriers to HIV care in rural Uganda and to determine the impact of these barriers on HIV treatment outcomes that you experience.

I am being asked to participate in this study because I am a health care provider at Mbarara ISS Clinic)

How many people will take part in this study?

If you decide to be in this study, you will be one of the approximately 40 people in this research study

How long will your participation in this study last?

Your participation in this study shall require a one –on-one interview with the study investigator that should be about 1-2 hours in total. There will be no follow up visits.

Procedures

If I agree to participate in the study, the following will occur:

6. My participation in the study shall require a one time, one-on-one interview with the study investigator that should last about 1-2 hours in total. There will be no follow up visits after this interview.

7. I shall be interviewed one time by the study investigator. The interview will take place immediately following my consent to participate in the study and will last 1- 2 hours. Interviews will take place in a private room at the study offices in Mbarara or in another location that we will identify. Interviews will be conducted in my language of choice (English or Runyankole)..

8. The interview is informal, like a conversation. We will talk about my perceptions regarding barriers to HIV care and treatment that I experience. The questions I am asked are not defined in advance. If I am asked any question that I do not want to answer, I can simply say, "I do not want to answer that."

9. With my permission, the interviewer will audiotape the interview. The recordings will be used for research purposes only. The recordings will be kept until the study is complete; then they will be erased. Declining to be audio-taped will not affect my eligibility to participate in this research study.

10. The researchers will not share any of the information from my interview with anyone outside the research team. I am completely free to choose not to take part in this research. My decision will have no impact on my employment at Mbarara ISS Clinic.

Risk/Discomforts

The risks of participating in this study are minimal. It is possible that I might get tired during the interview. I may find some of the questions uncomfortable or hard to answer. If this happens, we can (a) discuss the situation, (b) take a break, or (c) stop. If I choose to stop, we can either finish the interview another day or I can end my participation in the study. Though unlikely, there is always a chance of a breach in confidentiality when taking part in a research study. The researcher will make every effort to protect me from this risk.

There may be uncommon or previously unknown risks. I shall report any problems to the researcher.

Confidentiality

- My privacy is protected as a participant in this study. This means that my identity will never be released in a way that can be connected with me. There will be a number rather than my name on copies of my interviews. All of the interviews, research documents and audio recordings will be kept in a locked office of research study personnel in Mbarara. Computer files will be protected with a password.

- Only the people involved in the research will be able to get this information. None of the information I give you will be shared with other providers at the HIV/AIDS clinic, my family members or anyone else outside the research project. My name will not be used in any written reports or articles that result from this project. Every effort will be made to ensure that descriptions of individual participants are not identifiable in any way.

- Participants will not be identified in any report or publication about this study. Although every effort will be made to keep research records private, there may be times when federal or state law requires the disclosure of such records, including personal information. This is very unlikely, but if disclosure is ever required, UNC-Chapel Hill and Mbarara University of Science and Technology will take steps allowable by law to protect the privacy of personal information. In some cases, my information in this research study could be reviewed by representatives of the University, research sponsors, or government agencies for purposes such as quality control or safety.

- At any time point during the interview, I may request that the audio recorder be turned off.

_____ OK to record me during the study

_____ Not OK to record me during the study

If there is need to have an interpreter during the interview, the person shall be a member of the research team and shall keep all the information regarding my study participation private.

Benefits

Research is designed to benefit society by gaining new knowledge. You may not benefit personally from being in this research study.

Alternatives

I may choose to not participate without the risk of losing my current healthcare or medicines.

Cost

There shall be no monetary costs to me for being in the study. However, I will need to devote 1-2 hours of my time to participate in the study, for which I shall not be compensated with cash per Mbarara University of Science and Technology guidelines on research.

Reimbursement

I shall be provided with transportation home in the form of a free ride home or transport cost reimbursement after completing the interview if I decline the free ride home.

Questions

This study has been explained to me and my questions have been answered. If I have any additional questions, I can call the Study Principal Investigator, Ms. Nneka Emenyonu at 0782027158. If I have questions for the Institutional Ethical Review Committee at Mbarara University of Science and Technology, I can call 048520851.

Consent

I have been given a copy of this consent form.

PARTICIPATION IN THIS RESEARCH IS VOLUNTARY. I have the right to participate or withdraw at any point in this study without the risk of losing my medical care.

If I wish to participate I should sign below.

_____ _____

Subject's Signature Date

_____ _____

Staff person obtaining consent Date

APPENDIX IV: DATA DICTIONARY FOR QUANTITATIVE ANALYSIS

No	Variable	Description	Variable type	Values	Location
		Demographic Information			UARTO study Demo-graphic question-naire
1	Gender	Gender	Dichoto-mous	Male = 1 Female = 2	Pg1
2	Height	Record Height (centimeters)	Continuous	Range 0-99	Pg1
3	Age	What is your age?	Continuous	Range 18-77	Pg1
3a	Date of Birth	Date of birth day?	Nominal	DD/MM/YR	Pg1
4	Tribe	What is your tribe?	Nominal	1-5	Pg1
5	Religion	What is your religion?	Nominal	1-7	Pg1
6	Education	Highest Level of school completed	Ordinal	1-p1-p6 2-p7 3-s1-s3 4-s4 5-s5 6-s6 7- Vocational 8-University 9-Postgraduate 0-No school	Pg2
7	Job training	Any other type of job training	Categorical	Yes =1, No =0	Pg2
8	Literacy	Can you read this sentence?	Ordinal	1-Cannot read at all	Pg2

8 cont.	Literacy	Can you read this sentence	Ordinal	2-Able to read only parts of the sentence 3-Able to read whole sentence 4-No card with required language	
9	Source of income	What is the main activity or Job you do to provide for family/ household?	Ordinal	1-Teacher 2-Student 3-Technician/ artisan 4-Military/ Police/ Security 5-Business person (other than selling goods) 6-Construction worker 7-Housekeeper 8-Farmer (agro, animal husbandry, etc) 9-None/ Unemployed 10-Local brew seller/bar or restaurant attendant. 11-Selling goods (direct interaction with customers) 12- Trucker/ Driver/ Conductor 13- Government/Clerical / Secretarial 14-Mechanic 15-Health care worker 16-Sex worker 17 Trader 18-Other	Pg2

18	Income	What is your income?	Continuous		Pg5
	Socio-economic status	Summary of socio-economic measures	Categorical	Scale of 1-10 1 – lowest status 10 – highest status	Entire socio-economic section
22a	Marital status	Are you currently married, widowed, divorced or separated?	Categorical	1-4	Pg6
22b	Spouse HIV status	Is your spouse or partner infected with HIV/AIDS?	Categorical	1-Yes 0-No 8-Do not know status	Pg6
22c	Spouse ARV status	Is your spouse or partner currently using antiretroviral therapy?	Categorical	1-Yes 0-No 8-Do not know status	Pg6
40	Travel time to clinic	How long it takes to travel from house to clinic in minutes	Ordinal	1- Less than 30 minutes 2- Between 30 and 60 minutes 3- Between 1 and 2 hrs 4- More than 2 hrs	Pg11
42	Cost of travel to clinic	Cost of traveling from house to clinic and back	Continuous		Pg11
44	Means of transport to clinic	Primary means of transport to clinic	Categorical	1-walking 2-bicycle 3-public bus 4-motobike 7-public taxi 6-special hire taxi 5-car own by you or member of household	Pg11

1-23		Alcohol/ Drug use			UARTO Alcohol/ Drug Use Question-naire
1	Alcohol use	Alcohol use calculated via AUDIT score	Ordinal	0-Non drinker 1-Light drinker 2-Moderate drinker 3-Heavy drinker	Standard-ized AUDIT question-naire
17	Current drinking status	Last date of alcohol use		DD/MM/YR	Pg 3
27	Drug Use	Recreational drug use	Dichoto-mous	Yes = 1, No = 0	Pg 6
		Distance to clinic			UARTO GPS data
	Distance, route and mode of travel to clinic	Distance, route and mode of travel to clinic mapped on a GPS	Continuous		
		Biological variables			Lab data
	CD4 cell count	Laboratory results at Baseline and quarterly thereafter on CD4 cell count	Continuous	Range – 0 - >1000	
	Viral load	Laboratory results at Baseline and quarterly thereafter on viral load	Continuous	<400 copies - >10,000 copies	

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