PREVALENCE AND FACTORS ASSOCIATED WITH DEPRESSION AND ANXIETY AMONG HIV-INFECTED PREGNANT WOMEN IN KILIMANJARO REGION, TANZANIA

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Declaration

I, James Samwel Ngocho, hereby declare that the work on which this dissertation is based is my original work (except where acknowledgements indicate otherwise) and that neither the whole work nor any part of it has been, is being, or is to be submitted for another degree in this or any other university.

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Dedication

To Miah and Myla

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Abbreviations

Abbreviation	Meaning
AIDS	Acquired Immunodeficiency Syndrome
aOR	Adjusted odds ratio
ART	Antiretroviral therapy
ARV	Antiretroviral
BA	Behavioural activation
BDI	Beck Depression Inventory
CBT	Cognitive behavioural therapy
CES-D	Centre for Epidemiological Studies-Depression scale
CI	Confidence interval
cOR	Crude odds ratio
DALYs	Disability-Adjusted Life Years
DSM-5	Diagnostic and Statistical Manual of Mental Disorders 5
FDA	Food and drug authority
GAD	Generalised Anxiety Disorder
GBD	Global burden of disease
HADS	The Hospital Anxiety and Depression Scale
HIC	High-income country

HIV	Human Immunodeficiency Virus
HSCL-15	Hopkins Symptom Checklist-15
LIC	Low-income county
LLMIC	Low- and lower-middle-income country
LMIC	Low- and middle-income country
MINI	Mini International Neuropsychiatric Interview
MNS	Mental Neurological and Substance Use Disorders
MTCT	Mother-to-child transmission
PLHIV	People living with HIV
PMTCT	Prevention of mother-to-child transmission
RCT	Randomised Control Trial
SSQ	Short Symptoms Questionnaire
SSRI	Selective serotonin reuptake inhibitors
US	United States of America
YLDs	Years lived with disability
WHO	World Health Organization

Definitions

Depressive disorders are characterised by sadness, loss of interest or pleasure, feelings of guilt or low self-worth, disturbed sleep or appetite, feelings of tiredness, and poor concentration (1).

Anxiety disorders refer to a group of mental disorders characterised by feelings of anxiety and fear, including generalised anxiety disorder, panic disorder, phobias, social anxiety disorder, obsessive-compulsive disorder and post-traumatic stress disorder (2).

Abstract

Introduction: Antenatal depression and anxiety in women living with HIV are associated with a number of poor maternal and child outcomes, and undermine the world target of eliminating mother-to-child transmission (MTCT) of HIV. Despite the importance of antenatal mental health, the data on the factors associated with common mental illnesses in HIV-infected women are limited. Thus, the aim of the present study was to determine the prevalence and factors associated with depression and anxiety among pregnant women living with HIV and attending antenatal clinics in Kilimanjaro region, Tanzania.

Methods: We analysed the baseline data from an ongoing cohort study of 200 pregnant women living with HIV and attending antenatal care in two districts of the Kilimanjaro region. Women were eligible for inclusion in the parent cohort study if they were HIV-infected and in their second or third trimester of pregnancy. Antenatal depression and anxiety were assessed using the Edinburgh Postnatal Depression Scale and the Brief Symptom Scale, respectively. A multivariate logistic regression model was used to assess the factors that were independently associated with anxiety, depression and comorbidity of anxiety and depression. Variables with a p-value less than 0.15 in univariate analysis were included in the final multivariate model.

Results: Participants had a median (IQR) age of 30 years (26-35). About half were married (n=98, 49.0%) and knew their HIV status prior to the index pregnancy (n=105, 52.5%). When asked whether they had disclosed their status to anyone, 159 (79.5%) had disclosed to at least one person and more than half (n=119/170, 70.0%) had disclosed to their sexual partner. Fifty (25.0%) screened positive for possible depression and this was associated with being single (aOR=4.0, 95% CI=1.2–13.7), food insecurity (aOR=2.6, 95% CI=1.0–6.6), and HIV shame (aOR=1.2, 95% CI=1.1–1.3). Of the 197 women who completed the anxiety questionnaire, 47 (23.5%) screened positive for anxiety which was associated with being ashamed of having HIV (aOR=1.1, 95% CI=1.1 – 1.2). The prevalence of comorbid symptoms of depression and anxiety was 17.8% (n=35). HIV shame and lifetime experience of violence (aOR=3.4, 95% CI=1.2 – 9.6) were found to be independently associated with comorbid depression and anxiety.

Conclusion: One in every four pregnant women living with HIV screened positive for anxiety and/or depression. The majority of women with depressive symptoms also had anxiety symptoms. In this population, a number of factors were associated with depression and anxiety. These factors ranged from marital status and lifetime experience of violence, food insecurity to HIV-related shame. In order to successfully engage women in HIV care and support their well-

being, prevention of MTCT (PMTCT) programmes should have strategies to screen and support women with mental illnesses.

CHAPTER 1: INTRODUCTION

1.1 Background

The HIV epidemic remains a significant global health challenge. At the end of 2016, an estimated 36 million people were living with HIV globally, with approximately 1.8 million new infections during that year (3). About 70.1% of people living with HIV/AIDS (PLHIV) are living in Sub-Saharan Africa, with women accounting for more than 50% of all PLHIV in the region (4). In Tanzania, an estimated 1.4 to 1.6 million people were living with HIV in 2012, with higher rates found in women (6.2%) compared to men (3.8%) (2). Although HIV affects people of all ages, women of childbearing age are particularly vulnerable. The prevalence of HIV among women attending antenatal clinics in Tanzania was reported at 6.9% (3), with similar rates found in urban Moshi, Tanzania at 6.0% (4).

Not only are PLHIV more likely to have a number of physical diseases (5), they are also more likely to suffer from common mental disorders such as depression (6) and anxiety (7). A meta-analysis of ten studies found depression to be nearly twice as high in PLHIV compared to those who are HIV-negative (8). Although depression can affect everyone, it is 2 to 3 times more likely to affect women than men (9). Given this higher prevalence of depression among women in general, it is not surprising that the prevalence of depression is also high among pregnant and postpartum women.

Globally, around 15.6% of pregnant women are reported to suffer from common mental conditions, particularly depression (10). Linked with proverty and social disparity, antental mental disorders are common in low- and middle-income countries (LMICs) compared to higher-income countries. A number of studies have reported a high prevalence of mental disorders among pregnant women in LMICs. For example, one systematic review of studies conducted in LMICs reported a prevalence of 15.6% (11). More specific to pregnant women living in Africa, a review by Sawyer reported a prevalence of 11.3% on the continent (12).

The current evidence supports the association between HIV infection and mental illnesses in a vicious cycle (13). Because of the high prevalence of HIV in Africa, it is not surprising also to find a high prevalence of mental disorders among women. For example, in a systematic review of studies among HIV-infected African women, the prevalence of antenatal depression ranged between 23% and 44%, more than double the rates in the general population of pregnant women (14). Approximately 10% to 20% of these women reported suffering from postpartum

depression (15). Although there are a number of causes of depression, the available literature suggests that this particulary high prevalence of depression among pregnant women may be due to the changes in the level of estrogen and progesterone during pregnancy (10). These hormones exhibit neuroregulatory effects like mood and cognition. During pregnancy, the expected hormonal dysregulation in vulnerable HIV-positive pregnant women plays a role in the observed high prevalence of perinatal depression (16).

Antenatal depression and anxiety are associated with a number of poor maternal outcomes. For example, one study has reported poor adherence to antiretroviral therapy (ART) among women with depression (17), with increased risk of vertical transmission of HIV to the fetus (18). Maternal depression among HIV-positive women also has an impact on infant nutrition and development, as evidence suggests that these children are at increased risk of growth retardation (19). Pregnant women with depression progress faster to the advanced stages of HIV compared to those without depression (20) and they are two times more likely to die from AIDS-related deaths, especially in LMICs (20,21). There is evidence that antenatal anxiety among HIV-infected and uninfected women also has a negative impact on child development. For example, Talge and colleagues demonstrated that antenatal anxiety was associated with preterm delivery, low birth weight and the risk of neurodevelopment conditions such as attention deficit disorder (22).

Studies from LMICs have reported a higher prevalence of depression and anxiety among pregnant women compared with those who are not pregnant. However, the prevalence differs among studies and among countries. For example, in rural South Africa, almost half (47%, n=51/109) of pregnant women screened positive for depression (23). However, a low prevalence of antenatal depression (5.3%, n=23) was reported in Zimbabwean pregnant women (24). Despite compelling evidence of depression and anxiety among HIV-infected pregnant women from high-income countries (HICs), few studies have investigated the prevalence and factors associated with depression and anxiety among HIV-infected pregnant women living in LMICs. Of particular concern is the lack of studies from Sub-Saharan Africa, a region where 70% of the world's HIV-positive women live (4). A cross-sectional study in rural South Africa among HIV-positive pregnant women reported a 27.8% prevalence (27/109) of depression among this sample (23). Kaida and colleagues observed a similar prevalence rate for depression in a cohort of 447 HIV-positive pregnant women in Uganda (39%) (25). Protective factors against perinatal depression included viral suppression, longer time on ART, better physical health and never having been married (25).

Similar to other LMICs, in Tanzania, a high prevalence of depression has been reported among pregnant women. In Dar es Salaam, antenatal depression was reported in 39.5% of participants in one study (26). However, scant data exists on mental health among pregnant women who are living with HIV in Tanzania. Of the four manuscripts published to date, all of them were from a single cohort of 891 HIV-positive pregnant women enrolled in a randomised controlled trial in Dar es Salaam, the largest city in Tanzania. In these studies, 42.4% to 73.4% of women met the criteria for antenatal depression (27,28), and a much faster HIV disease progression among depressed pregnant women was found (20). Given that these studies were conducted with the same cohort, they did not include anxiety disorders and the results are not generalisable to other areas of Tanzania, meaning that further research is required. The present study allowed us to further explore depression and anxiety among HIV-positive pregnant women. Findings from the present study will add to the development, planning, and implementation of the depression and anxiety screening programme among HIV-infected pregnant women in Tanzania. Currently, the HIV care and treatment programme in the country focuses primarily on physical well-being, leaving women's mental health largely unaddressed. Additional data on the burden of mental health disorders among this population may facilitate a greater focus on these issues in HIV care and treatment.

1.2 Aims & Objectives

Aim

The aim of the present study is to determine the prevalence and factors associated with depression and anxiety among HIV-infected pregnant women attending antenatal clinics in Kilimanjaro region, Tanzania.

Specific objectives

1. To determine the prevalence of depression and anxiety among HIV-infected pregnant women attending antenatal clinics in Kilimanjaro region.
2. To determine the prevalence of comorbidity of depression and anxiety among HIV-infected pregnant women attending antenatal clinics in Kilimanjaro region.
3. To examine factors associated with depression, anxiety and comorbidity of depression and anxiety among HIV-infected pregnant women attending antenatal clinics in Kilimanjaro region.

CHAPTER 2: LITERATURE REVIEW

2.0 Introduction

In this chapter, I will begin by describing the global burden of mental disorders, and then discuss the prevalence of depression and anxiety, focusing on the general population and then specific subgroups at risk, such as women, PLHIV and pregnant women, where appropriate. The available literature investigating the prevalence of depression and anxiety among pregnant women who are living with HIV will be highlighted. I will also describe what is known about the factors associated with antenatal depression and anxiety among HIV-infected women. I will conclude the chapter by describing the implications of untreated depression and anxiety.

A systematic literature search of published and unpublished studies on depression and anxiety was conducted. The following electronic databases were searched for studies published between 2000 and 2017: PubMed, Scopus, Google Scholar and African Index Medicus (AIM). Additionally, the WHO website, UNAIDS website and institutional repositories were searched for gray literature. The final search results were limited to publications in English and full text. For depression, the following keywords were used: 'depression', 'prevalence', 'factors', and 'pregnant'. In addition, anxiety was also searched separately using the same keywords in addition to 'anxiety'. The full search strategy is available in Appendix II.

2.1 Global burden of depression and anxiety

Mental disorders contribute significantly to the global burden of disease (GBD). According to the 2010 GBD, the Mental Neurological and Substance Use Disorders (MNS) Disability-Adjusted Life Years (DALYs) between 1990 and 2010 increased by 41% (29). Further, the increase of major depressive disorder was 37% (Murray et al. 2012). In 1990, MNS DALYs was 182 million while in 2010 it increased to 258 million (27). MNS contributed 10.4% of the total DALYs in 2010, while of the total years lived with disability (YLDs), 18.9% were due to mental illness. The estimates have shown variations associated with gender, whereby, women were more affected compared to men. The DALYs associated with depression and anxiety were reported to be high in women (1,161.2) compared to men (689.9) in the same age group. Similarly, the absolute DALYs associated with anxiety was high among women (510.3) compared to men (273.0) (27). Furthermore, the relative proportion of MNS DALYs to overall disease burden was higher (15.5%) in HICs compared to LICs (9.4%). However, the absolute

MNS DALYs was higher in LICs compared to HICs. Vigo and colleagues contended that the MNS are underestimated with the current estimates of the GBD (30). Some of the reasons for the underestimation are the misclassification of chronic pain syndromes with musculoskeletal disorders, and exclusion of personality disorders from the calculations. Additionally, less consideration of the contribution of severe mental illness to mortality from other causes is under rated. These authors re-estimated the contribution of MNS into the GBD, with 32·4% of YLDs and 13·0% DALYs of the GBD accounted for by MNS (30). In 2015, depression and anxiety only accounted for 11.6% of the total YLD in Tanzania (31).

2.2 Prevalence of Depression and Anxiety

2.2.1 Depression

Globally, an estimated 322 million people are living with depression, making the disorder the leading mental health disorder in all age groups (31). The last world mental health survey (WMH) conducted in 28 countries, applying similar methodology across countries using the WHO Composite International Diagnostic Interview (CIDI), found that depression was the second most common condition after specific phobias. The lifetime prevalence of major depressive disorder ranged from 4% to 10%, whereas the 12-month prevalence ranged from 3% to 6% (32,33). Importantly, in this WMH, it was estimated that the prevalence of mental disorders was higher in HICs as compared to LMICs.

A few nationally representative studies have been conducted in African countries investigating the prevalence of depression. For example, as part of the World Mental Health Surveys, the South African Stress and Health (SASH) study reported a lifetime prevalence of 9.8%. Surprisingly, alcohol abuse was the most prevalent (11.4%) disorder, followed by depression and agoraphobia without panic (9.8%) (34). Furthermore, in this survey, it was reported that major depressive disorders were the leading condition in the 12-month prevalence of disorders, with a prevalence of 4.9% (34). Surprisingly, in Nigeria, a survey with the same methodology and same screening tool as the SASH study found a low prevalence of depression for both the lifetime (3.1%) and 12-months (1.1%) (35).

In Ethiopia, a national survey of 4925 adults aged 18 years and above reported a prevalence of 9.1% of depression (36). Surprisingly, a study in the urban outpatient department in Ethiopia reported a lower prevalence compared to the national survey – 6.7% of participants experienced the symptoms of depression within the 12 months preceding the survey (37). In this population, the lifelong prevalence of major depressive mood disorder was 18.0%. The WHO has recently

estimated the magnitude of common mental illnesses. In their estimates, there are about 2.1 million cases of depression in Tanzania, making a prevalence of 4.1% (31).

A diagnosis of depression is made using the DSM-V criteria. The DSM-V needs to be administered and interpreted by a physician, but in primary health facilities and in data collection (epidemiological studies), physicians are not typically available to make the diagnosis using the DSM-V. This situation limits the utilisation of DSM-V in most settings, with increased use of screening tools. The depression screening tools that are available are useful in identifying who is likely to have the disorder, although not in providing a definitive diagnosis. In screening for depression, there are several validated screening tools that are sensitive and easy to administer. These tools vary in sensitivity and specificity, which is among the reasons for the difference in prevalence across studies (38). In this literature review, few studies used DSM-IV or DSM-V in identifying participants with depression. Rather, most studies used screening tools, the most common being: Beck Depression Inventory (39), The Hospital Anxiety and Depression Scale (HADS) (40), Mini International Neuropsychiatric Review (41), Edinburgh Postnatal Depression Scale (42), Epidemiological Studies Depression Scale (43), and Hopkins Symptom Checklist (44).

The available literature suggests that certain subgroups are more at risk for depression. This includes 1) women, 2) PLHIV, and 3) pregnant women. Depressive signs and symptoms are more common in women than in men, while men have more externalising and substance disorders compared to women (32). The gender differences in the prevalence of depression are observed both in high income countries and LMICs. For example, a review by Patel in LMICs found that the unipolar depressive disorder was the second most common (10.6%) mental disorder among women, while in men it was the third most common disorder with a prevalence of 6.7% (45).

The prevalence of depression is higher among PLHIV as compared to those who are uninfected. In a meta-analysis of risk factors associated with depression, people living with HIV were at a higher risk of depression compared to people without HIV (8). Although this meta-analysis included only 10 articles, and six of them only included homosexuals, one major strength was the inclusion of participants with confirmed depression (8). In Zimbabwe, the prevalence of depression was 47.3% among HIV-uninfected people as compared with a prevalence of 68.7% among those living with HIV (46). Several studies from South Africa have reported a similarly high prevalence of depression among PLHIV as compared to those who are HIV-uninfected. For example, Peltzer and colleagues found that 2 in every 10 HIV-infected participants screened

positive for depressive symptoms, whereas 1 in every 10 HIV-uninfected participants had positive results (47). A further study in Johannesburg, found the prevalence of depression was higher among PLHIV (15.0%) compared to those who are HIV-uninfected (8.9%) (48).

As mentioned in the background section, reports have shown that depression is common among pregnant women. For example, one meta-analysis of 21 studies found a high prevalence of depression in the second (12.8%) and third (12.0%) trimesters. However, most of these studies were from HICs, with the exception of one Brazilian study. In addition, the included studies used screening tools (EPDS and BDI) with the risk of overestimating the prevalence (49). Antenatal depression in low-income countries (LICs), especially in Sub-Saharan Africa, have not been studied extensively. The available evidence suggests that the prevalence of antenatal depression in LMICs is comparable with that in HICs. For instance, a review by Fisher reported a prevalence of 15.6% in LMICs (50), while a review which involved African women found 11.3% of antenatal depression (51).

In the few studies conducted in South Africa, Ethiopia and Zimbabwe, there appears to be variation in the prevalence of depression reported (14). For example, among 1062 pregnant women in Cape Town, South Africa, 39% of women screened positive for depression using the Edinburgh Postnatal Depression Scale (EPDS) (52), while in rural South Africa, almost half (47%, n=51/109) of pregnant women screened positive for depression on a major depression section of the structured clinical interview for DSM-IV diagnoses, with 15.7% reporting prior history of depression (23). Among an urban population of pregnant women in Kwa-Zulu Natal province, South Africa, 38.3% of depressed women reported having thoughts of self-harm in the preceding 7 days (53). Similarly, in a population-based survey in Ethiopia, 29.5% of the 1311 pregnant women screened positive on PHQ9 (Bitew et al 2016). However, a low prevalence of antenatal depression (5.3%, n=23) was reported in Zimbabwe: 437 pregnant women completed the Shona Symptoms Questionnaire (SSQ), and only 73 (17%) met the criteria for psychological morbidity (24). The low prevalence might be due to the methodology that was applied. Clients were first screened using SSQ and those who screened positive were then referred to a psychiatrist for further evaluation. The Zimbabwean study is among the few studies in which clients were screened first then referred for clinical evaluation. Their prevalence is likely to reflect the true prevalence compared to studies in which the outcome measure was based on screening tools.

Given that women (54), PLHIV (8) and pregnant women (50) are all at increased risk for depression, it is not surprising that HIV-positive pregnant women are a particularly vulnerable

group.

2.2.1.1 Depression among HIV-positive pregnant women

There is some research available that has investigated the prevalence and factors associated with depression among HIV-positive pregnant women specifically. These findings suggest that pregnant women living with HIV are at greater risk of experiencing symptoms of depression compared to pregnant women without HIV (6). In a recent systematic review of perinatal depression among HIV-infected women in Africa, only 2 studies used a diagnostic tool, while 9 studies used screening tools in reporting the prevalence of depression. The mean prevalence of antenatal depression was reported to be 23.5% using a diagnostic tool, while the mean prevalence using screening tools was 43.5% (14). In KwaZulu-Natal, 99 (41%) of the total 224 HIV-positive pregnant women screened positive for depression using EPDS (55). In a prospective cohort study in rural Uganda, the overall prevalence of depression was 38.9% (173/447) with a slightly higher prevalence during the antenatal period (42.7%, n=44/104) compared to the postpartum period (36.8%, n=111/303). The mean depressive symptom score for pregnant women was 1.29 (s=0.38) with >1.75 considered as possible depression (25).

A few studies conducted in Africa reported conflicting results on the prevalence of antenatal depression in HIV-positive pregnant women compared with HIV-negative pregnant women. In the little available literature on antenatal depression, there are observed differences between studies. For example, in KwaZulu-Natal, South Africa, 38.5% (149/387) of women in the antenatal period had an EPDS score of ≥13 with a higher prevalence of depression among HIV-positive women (42%, 43/104) compared to HIV-negative women (33%, 66/201). However, the prevalence was much higher (45%, 3/73) among women with unknown HIV status compared with HIV-negative women (53). Another study from rural South Africa found no difference in the prevalence of antenatal depression in HIV-positive pregnant women (52.9%, n=27/51) compared to HIV-negative pregnant women (47.1%, n=24/51) (23). Notably, Rochat and colleagues (23) used DSM-IV diagnostic criteria, which are more accurate compared to the EPDS. These differences are probably due to the differences in the screening tool or diagnostic tool used, as discussed previously, as well as the timing of the depression screening.

The reason for the high prevalence of depression amongst HIV-positive pregnant women could be that receiving a positive HIV result is shocking, especially to women who consider themselves not at risk of being infected with HIV. Most of them are testing for the first time

as part of mandatory antenatal care. These women are worried about their own futures as well as the future of the unborn child (56). HIV-infected pregnant women in a Zambian study all believed that they were harming their unborn child (56). They were worried and anxious about what would happen to the unborn child, and expressed self-blame for exposing their unborn child to HIV. All of these reasons may compound the risk of developing depression during the antenatal period (57). Some HIV-infected pregnant women reported a loss of interest in life, and feeling guilty with recurring suicidal ideation (58). The majority (88.8%) of HIV-positive pregnant women in the Zambian study reported having thoughts of terminating their pregnancy (56).

Although men may be encouraged to accompany their spouse to her first antenatal appointment and therefore also test for HIV, this does not always happen and the burden gets placed on women to disclose their status to their partners. The whole process of when and who to disclose the status to is stressful, considering the foreseeable consequences attached with status disclosure, and the stress may put HIV-positive pregnant women at a higher risk of suffering from depression (59).

Furthermore, the pathogenesis of HIV itself can damage the brain, especially the subcortical area, and result in depression issues, and it can also predispose one to other medical conditions resulting in mood disturbances. Additionally, a number of HIV medications have side-effects that lead to depression (60). Although not common, some of the HIV/AIDS presenting symptoms may mimic depression symptoms, contributing to the high prevalence in this population (60).

In Tanzania, there are four studies that have investigated the prevalence of antenatal depression among HIV-infected women (20,27,28,61), and only one study among them evaluated anxiety (61). All studies were conducted in Dar es Salaam, with the same study population, either as a secondary analysis or one-point prevalence within a randomised control trial to evaluate the effect of multivitamin supplementation in health-related quality of life among women living with HIV. However, none of these studies looked at the factors associated with antenatal depression and anxiety in this population.

Although these studies were conducted using data from the same randomised control trial (RCT), the prevalence of depression varied widely in different sub-populations of this study followed-up on over different time-periods, ranging from 7.7% to 73.4%. Kaaya conducted a secondary analysis of 99 HIV-positive pregnant women enrolled under the multivitamin

supplementation RCT to validate Hopkins Symptom Checklist-15 (HSCL-15). Pregnant women below 27 weeks of gestation were eligible for participation, and 7.7% were diagnosed with antenatal depression using SCID (61). However, a much higher prevalence was observed in other studies in the same population. For instance, the prevalence (74.3%) reported in 2013 was almost double the prevalence (42.4%) reported in 2007 within a 5 year period, using the HSCL-15 (27,28). The difference in prevalence is probably due to the sample size and the tools which were used to diagnose or screen for depression. Three studies reported the prevalence of antenatal depression to be 42.4%, 42.7% and 73.4%, and enrolled 912, 891 and 188 participants respectively (20,27,28). In these studies, HSCL-8 was used to screen for probable depression with a cut-off score of >1.06. Kaaya and colleagues in 2002 used a diagnostic tool, not a screening tool, and also only 99 participants were included in the analysis (61), which might have contributed to the observed difference in the gestation of participants (7). Two of these studies included women with gestation below 27 weeks (27,61), one study enrolled only women between 20 to 40 weeks of gestation (28), and Antelman and colleagues did not specify the gestational age of their study participants (28). According to Sowa, of the 4 studies, none were judged as having good quality on a scale of 1 to 10; two of them had moderate quality, while the remaining two studies had poor quality. Therefore, it is important to investigate prevalence and factors associated with antenatal depression and anxiety in other parts of the country, with more focus on factors as none of the previous studies investigated factors. It is also important to investigate the prevalence of depression and anxiety outside clinical trial environments since all the previous studies in Tanzania were nested within an ongoing RCT.

2.2.2 Anxiety

Similar to depression, in clinical practice, the diagnosis of anxiety is also based on DSM-V criteria. However, in epidemiological studies, anxiety screening tools are more commonly used. Though validated and reliable, these screening tools differ in sensitivity and specificity. The screening tool used appears to influence the prevalence of anxiety reported in these studies. Some of the tools that were commonly used in the included studies are Depression Anxiety Stress Scale (62), Generalised Anxiety Disorders (63), and the HADS (40). More important to note is that the diagnosis of anxiety is challenging among people living with HIV. For example, if the timing of the diagnosis of anxiety is close to testing positive for HIV, it might just be a panic episode of the positive HIV test. Over the course of the HIV illness, it is difficult to tell whether anxiety is a side-effect of the medication, a HIV-related comorbid illness or a

psychological response to the stressors of the illness (64). All this should be taken into account when screening for anxiety among this population.

Compared to the available literature investigating the prevalence of depression among the general population, PLHIV and pregnant women, studies investigating anxiety are more limited. Of the available literature, there is a wider variation in the reported prevalence of anxiety across regions. A few surveys reported a high prevalence of anxiety in HICs as compared to LICs. For example, according to the WMH Surveys, the prevalence of lifetime anxiety ranges between 4.8% and 31.0% in China and the United States respectively. In the African region, where data was only available from Nigeria and South Africa, the prevalence was 6.5% in Nigeria and 15.8% in South Africa (33). In the US, among people aged 13 years and above, the 12-month prevalence of anxiety was reported to be 31.6%. In this survey, the diagnosis of anxiety was made using DSM-IV (65). In a community-based cross-sectional survey in Malaysia, adults aged 18 years and above were screened using Generalised Anxiety Disorders. Of 1455 who completed the interview, 8.2% (n=119) had a score equal or greater than 8 cut-off point score for anxiety disorder (66). A national survey in Iran in 2015 found a much higher prevalence compared to that of Malaysia, Nigeria and South Africa. The prevalence of anxiety among adults was estimated to be 29.5%, similar to that reported in the US (67).

The available literature suggests that certain groups are more at risk for anxiety. This includes 1) women, 2) PLHIV, 3) and pregnant women. One systematic review of studies from both HICs and LICs found that anxiety is twice as high in women than in men. Importantly, all studies included in the review were representative and community-based, however, most of them used the CIDI in screening for anxiety (68). Similary, Kessler found a much higher prevalence of anxiety among women (37.3%) compared with men (25.6%) (65). Similar findings were reported in another national survey in the US. Both the lifetime and 12-month prevalence of anxiety among women were high compared with men. The 12-month prevalence was 22.7% versus 13.0%, while the lifetime prevalence was 33.3% versus 22.0% in women and men respectively (69). In Malaysia, anxiety symptoms were reported to be common among women as compared with men; men had a prevalence of 7.7% compared with 8.4% among women (66). However, Iranian men were more affected compared to women, with a prevalence of 33.8% and 25.1% respectively (67).

PLHIV are at greater risk of anxiety compared to HIV-uninfected people. For example, of the 491,796 clients in Britain who were followed-up with for a period of 14 years, 172 (3.1%) HIV-

positive participants had anxiety symptoms while among the HIV-uninfected participants, 4161 (1.7%) screened positive for anxiety symptoms (70). Other studies have reported non-significant differences in the prevalence of anxiety between HIV-positive and negative participants. For example, in the USA, the adult prevalence of anxiety was reported to be around 7%, with no significant difference between those who are HIV-infected and HIV-uninfected (71). Although not different from what was reported by Wixson et al (66), and with no statistical significant difference, Morrison and colleagues found a prevalence range from 10.8% to 6.5% among women living with HIV and without HIV respectively (72).

The literature on antenatal anxiety is limited, and suggests a high prevalence of antenatal anxiety. In one particular study, pregnant women were worried about giving birth and about too much weight gain during pregnancy (73). Of the 357 Chinese pregnant women screened using the HADS, more than half (54.0%) had high anxiety scores (74). The same findings were reported among women in Iceland. Participants were screened for anxiety using the anxiety subscale of the Depression Anxiety Stress Scale. The prevalence was higher in the third trimester (50.9%) compared with the first trimester (47.4%) (75). Studies from Africa have suggested a much lower prevalence of antenatal anxiety compared with HICs. For example, in Egypt, of the 376 participants screened using HADS, 11.4% had symptoms suggestive of anxiety (76). A similar pattern of anxiety score was reported in Ivory Coast and Ghana. A total of 1030 Ivorian and Ghanaian pregnant women were screened using GAD-7, and of them 11.4% Ghanian and 17.4% Ivorian were positive for anxiety symptoms (77).

2.2.2.1 Anxiety among pregnant women living with HIV

Since the prevalence of anxiety is high among women and PLHIV, it is likely that pregnant women living with HIV are more likely to experience anxiety symptoms compared to those who are uninfected. Only a handful of studies have investigated the prevalence of anxiety among HIV-positive pregnant women specifically. These findings suggest that pregnant women living with HIV are at greater risk of experiencing symptoms of anxiety compared to pregnant women without HIV (6). A few studies have compared the prevalence rates of anxiety among pregnant women with and without HIV. For instance, in the USA, a study on perinatal anxiety among 258 women with and without HIV reported significantly higher anxiety scores among HIV-positive women than HIV-negative women. Women were screened for anxiety using the State-Trait Anxiety Inventory (78). The difference was significant with a mean score of 37.1 (SD±13.8) for HIV-infected and 31.8 (SD±11.3) in HIV-uninfected women (78).

Another study in the US, which involved 45 HIV-positive pregnant women who received care at University of Miami/Jackson Memorial Medical Centre, reported a prevalence of 71.1% (79).

2.2.3 Comorbidity of depression and anxiety in pregnant women living with HIV

As discussed earlier, current evidence suggests that anxiety and depression are the most common mental illnesses. Whereas in some individuals the two conditions occur in isolation, more people present with the comorbidity of the two (80). Even with their coexistence, data on the comorbidity is sparse. Studying the distributions and factors associated with these disorders separately may underestimate the prevalence of mental health disorders, because they mask each other and patients with the two conditions may present with atypical signs and symptoms (80). Additionally, depression is associated with anxiety, whereby depressed participants have 17 times higher odds of anxiety (56).

Generally, it is estimated that more than half (50%) of patients diagnosed with depression also have anxiety symptoms (81). Similarly, more than half of patients visiting primary health care with depression also screen positive for generalised anxiety disorder (82). In addition, 12% of pregnant women in Cape Town, South Africa, screened positive for comorbid mental illnesses. In that population of pregnant women, the prevalence of comorbid anxiety and depression was 52% (83). However, data on comorbid conditions among pregnant women living with HIV is scarce.

2.3 Factors associated with antenatal depression and anxiety

2.3.1 Factors associated with depression

A systematic review of the risk factors of antenatal depression identified several independent predictors of depression. Some of the factors were pregnancy-related, such as unplanned pregnancy and pregnancy complications. Social factors included a lack of partner support and a history of domestic violence (84). In addition to the mentioned factors, one review also reported relationship problems with a spouse and relationship problems with one's in-laws (85). A systematic review by Bitew in Ethiopia linked depression with migration and substance abuse (86). Surprisingly, in the Ethiopian systematic review, socio-economic factors had no link to depression. In Malaysia, they found that unmarried women with gestation below 20 weeks, and a history of mental illness and comorbid conditions were more likely to suffer from anxiety and depression. Women with a history of cesarean section had 3.14 higher odds of antenatal depression as compared to those without a history of cesarean section (7).

Rochat and colleagues in South Africa identified factors such as unplanned current pregnancy, low household income and stigma/discrimination as factors associated with high antenatal depression scores (55). One strength of this South African cross-sectional study was the use of validated EPDS. Nevertheless, only women who currently tested positive for HIV, which has been reported to be associated with mental illness, were enrolled. Factors such as less education, low couple income, being unmarried, a prior history of poor pregnancy outcomes and an increased number of abortions were also identified as risk factors for depression among pregnant women (7,87,88).

A number of factors have been found to be associated with perinatal depression among HIV-infected women, ranging from individual to system factors. First, a positive HIV test result is a shocking life event and the worry of transmitting the virus to one's unborn child is stressful, which adds to the risk of HIV-related depression among pregnant women (57). According to the new WHO recommendation of the PMTCT of HIV (Option B+) adopted by Tanzania in 2013, all pregnant women who test positive must initiate triple ARV immediately, regardless of their CD4 count or WHO clinical stage (89). There is therefore limited time to understand their condition and accept the situation, and some are in denial while they have to protect the unborn child (90).

Stigma and discrimination following HIV status disclosure remains of concern in many communities. For instance, in Tanzania, up to 32% of women are discriminated against and 12% get divorced following their HIV status disclosure (91). In Uganda, increased time on ARV, viral suppression and better physical health were found to be associated with a lower mean score of depression (25). In contrast to other studies in Uganda, never being married was found to be protective, while in other settings, not being in a relationship was found to be a risk factor for depression (79).

Studies have also found that pregnant women with a history of post-traumatic stress disorder had a higher depression score compared to those with no history of post-traumatic stress disorder (79). In the US, among 45 HIV-positive pregnant women who screened positive for depression, 10% reported abuse during pregnancy which was significantly associated with depression (79). Kapetanovic and colleagues in Los Angeles, found that substance abuse during pregnancy or preconception was significantly associated with antenatal depression (92,93). Of the 328 HIV-positive pregnant women who were screened, 33 (10.1%) had a history of substance abuse during pregnancy and 16 (48.5%) screened positive for depression (92).

In Thailand, participants with an undisclosed HIV status and those who believed that their family would be ashamed of their HIV status were more likely to be depressed. Of the 129 participants, 56% had disclosed their status to their partner only, 34% had disclosed to others, and 10% had not disclosed. Almost all participants (77%) reported that their families would be ashamed of their HIV-positive status (59). Of the 129 participants, 46% of women screened positive for perinatal depression and HIV-related worry, and an undisclosed HIV status was associated with higher odds of HIV-related worry (59). Women with a higher perceived life stress, food insecurity, or social isolation were more likely to be depressed. For instance, in the US, the mean perceived stress score on the CES-D scale among 307 women was 10.4 (SD±3.32). Women with higher levels of perceived stressors were more likely to be depressed (94), while a high CD4 count, good ARV adherence and higher perceived social support were reported to be protective factors (92). Positive partner support was also found to be associated with a low depressive symptoms score (94).

2.3.2 Factors associated with anxiety

As presented above, the prevalence of anxiety is high among the general population and many studies have identified factors contributing to this high prevalence. One global review of the risk factors of anxiety identified some of these factors as gender, age, culture, economic status, and urbanicity (95). In addition, job demand has been associatd with anxiety symptoms. In Dunedin, New Zealand, participants with excessive workload and time pressure had higher odds of anxiety compared to low job demands (96). In Malaysian adults, of the demographic characteristics, only marital status was significantly associated with anxiety symptoms. Depression was a significant factor associated with anxiety, whereby depressed participants had 17 times higher odds of anxiety. Other factors associated with anxiety were chronic illness such as cancer, domestic violence, a serious problem at work, an unhappy marriage, and intrinsic religiosity (66). Similarly, one cross-sectional study in Brazil found that anxiety was more common in participants with depression than those without depression (97). Interestingly, Marcus and colleague also reported that being female and having a low economic status were significant factors associated with anxiety (97). Witnessing traumatic events was also reported to be an independent predictor of anxiety. In South Africa, people who witnessed traumatic events had 78.0% increased odds of anxiety compared those who had not (98).

Although few studies have investigated the factors associated with anxiety among pregnant women, they have identified several factors which are associated with anxiety among pregnant women. Giving birth comes with a lot of concerns; one study has reported that pregnant women

are afraid about giving birth, especially for nulliparous women, and some are concerned about their body appearance post-delivery. Among Dutch pregnant women, anxiety symptoms were common among women who were pregnant for the first time, compared to those who had already been pregnant before (73), and women who were concerned about their body appearance post-delivery had high anxiety scores. In Vancouver, Canada, women who were classified as having moderate and high risk of medical complications had high anxiety scores compared to those with low to no medical complications (22). Among Egyptian pregnant women, the only independent social factor associated with anxiety was their partner's level of education; women married to illiterate men were more likely to experience anxiety (76). In addition, social support, self-esteem, and marital satisfaction were associated with anxiety symptoms among Chinese pregnant women (74).

Among HIV-positive pregnant women, several factors contribute to the high prevalence of anxiety. Although literature is limited, some independent risk factors of anxiety have been identified. To start with, the trait of anxiety on its own is significantly associated with antenatal anxiety, while factors such as HIV status, perceived family support and history of child abuse among pregnant women receiving care in a Philadelphia hospital were found to be associated with antenatal anxiety (78). The time period of HIV diagnosis, comorbidities, and using first-line ART medications were associated with anxiety symptoms. Women with depression also had higher levels of anxiety (99). HIV status disclosure and shame were strongly associated with anxiety symptoms. Not disclosing HIV status is associated with an increased risk of anxiety symptoms, as is having beliefs that your HIV status is a shame to your family (59).

Although depression and comorbid anxiety might present with different signs or symptoms, the two conditions share common risk factors. Furthermore, the factors associated with depression and anxiety are the same factors that predispose someone to comorbid depression and anxiety. Figure 1 below shows the vicious cycle of HIV and antenatal depression/anxiety.

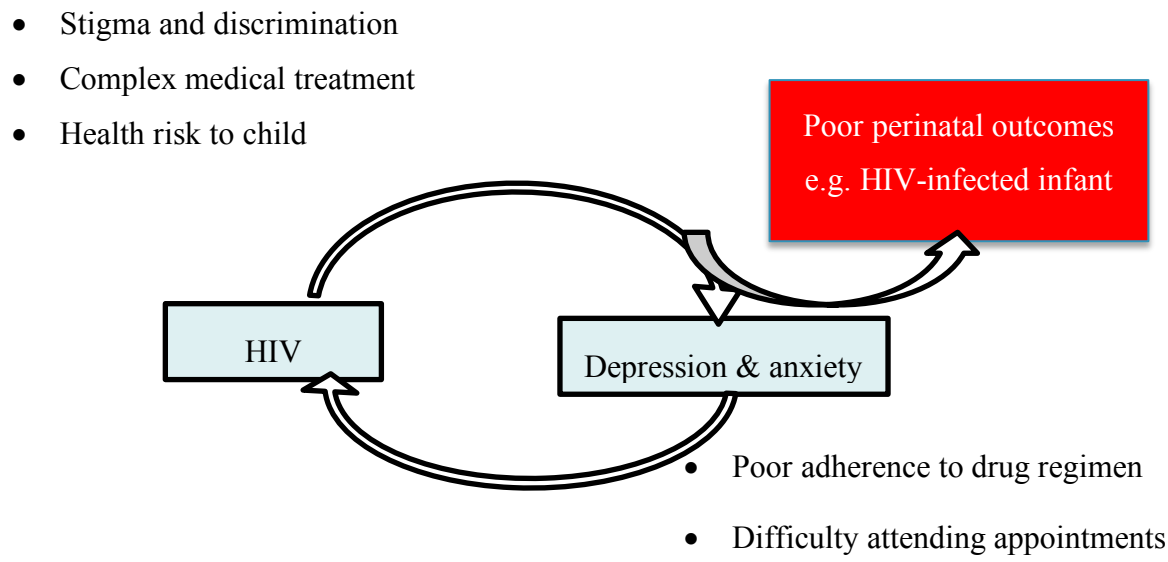

Figure 1: Modified Stringer vicious cycle between HIV and depressive symptoms (13).

2.4 Implications of Untreated Depression and Anxiety among Pregnant Women

Despite antenatal depression being common, current literature on its impact is limited. Studies have found that antenatal depression not only carries a risk to the unborn child, but also that the mother experiences some consequences such as postnatal depression (22). Higher levels of antenatal depression were associated with poor child neurobehavioural outcomes (attention deficit disorder/hyperactivity) and poor cognitive functions, which were more common in boys than girls (22). Antenatal depression has also been found to impact on the nutritional status of children born to mothers with antenatal depression. In a community cohort study of 160 women with antenatal depression versus 160 healthy pregnant women, children born to mothers with antenatal depression were more likely to present with malnutrition (19). More specifically, children born to mothers with antenatal depression were 4.0 times more at risk of being under-weight and 4.4 times more at risk of stunting as compared to those born to mothers without antenatal depression. Children born to mothers with antenatal depression were also at a higher risk of suffering from diarrhoea as compared to those born to mothers without antenatal depression (19).

Several studies have associated antenatal depression with the development of postpartum depression and other psychiatric disorders (100). For instance, in Thailand, screening positive for depression during pregnancy was significantly associated with postpartum depression; women with a history of depression during pregnancy had 2.5 higher odds of postpartum depression (101). Among Turkish women, those with antenatal depression had 10 times higher odds of postpartum depression (102). Similarly, Zambian women with antenatal depression

had 5.6 thime higher odds of postpartum depression as compared to those with no history of postpartum depression (103).

Gaining further understanding of antenatal depression and anxiety among HIV-infected women not only affects the lives of the mother and the unborn child, but also the community at large. While there is a paucity of published data on the impact of antenatal anxiety among HIV-infected women, the evidence on the impact of depression is compelling (13). Findings from a study in Tanzania showed that antenatal depression accelerates the rate of HIV disease progression to a more advanced HIV/AIDS WHO clinical stage, and is linked to a decline in CD4 count and increased risk of mortality (20). Two recent review articles reported poor ARV adherence among pregnant women with depression as compared to pregnant women without depression (13,104). In the US, depression was associated with poor ARV adherence, whereby, of the depressed women, none reported excellent (100%) ARV adherence as compared to 57% of non-depressed women in their third trimester. Only 22% (2/9) of the depressed women had achieved HIV RNA viral load <400 copies/mL at delivery compared with 71% (10/14) of non-depressed women (105), which is a risk of MTCT of HIV. The poor ARV adherence not only increases the risk for vertical transmission of HIV but also the risk of developing ARV drug resistance (106). The resistant virus can be transmitted to the unborn child by vertical transmission and also to other people through sexual intercourse, limiting their future ARV options, especially in LMICs where ARV options are limited (107). Furthermore, pregnant women with depression are less likely to attend regular clinic visits for drug refill and pregnancy monitoring, contributing to poor adherence and increasing risk of vertical transmission of HIV. For instance, in the US, among 131 HIV-infected women with 146 pregnancies during the follow-up period, 4 of the children were infected with HIV and all of them were born to mothers who had no adequate antenatal care (108). Pregnant women with depression are also less likely to negotiate condom use. This puts them at risk of forward transmission of HIV to sexual partners, as well as to acquiring sexually transmitted infections, which may increase the risk of MTCT of HIV (109). For these reasons, it is important to investigate the prevalence and factors associated with antenatal depression and anxiety among pregnant women in order to identify women at risk and intervene at early stages.

In Tanzania, to the best of our knowledge, there is no study that has investigated the factors associated with antenatal depression and anxiety among HIV-positive women. Thus, the objective of the present study is to determine the prevalence and factors associated with

depression and anxiety among HIV-infected pregnant women attending antenatal clinics in urban Moshi, Tanzania.

CHAPTER 3: METHODS

3.0 Introduction

This chapter covers the study design, study setting, sample size and sampling for the parent study, the data collection procedures for the parent study, the description of measurement tools used, data analysis, and ethical considerations.

3.1 Study design

In this study, we cross-sectionally analysed the baseline data from an ongoing hospital-based cohort study of HIV-positive pregnant women in the antenatal period.

3.2 Study setting

The parent cohort study was conducted in Moshi municipality and district council. These two districts are among the seven districts of the Kilimanjaro region (figure 2). According to the 2012 population census, the region had a population of 1,640,087 people, with 846,947 women and 793,947 men. The Moshi municipality population was 184,292, with 89,174 men and 95,118 women. The Moshi district council population was 466,737 of which 225,767 were men and 240,970 women (110). The HIV testing among pregnant women, excluding those with known status, is 100% in Kilimanjaro (111). However, the region is among the bottom three with the percentage of women who get couples HIV testing during pregnancy (40%, versus a national target of 60%) (111). As per the national PMTCT guidelines, all pregnant women who are identified as HIV-positive start drugs for lifetime use.

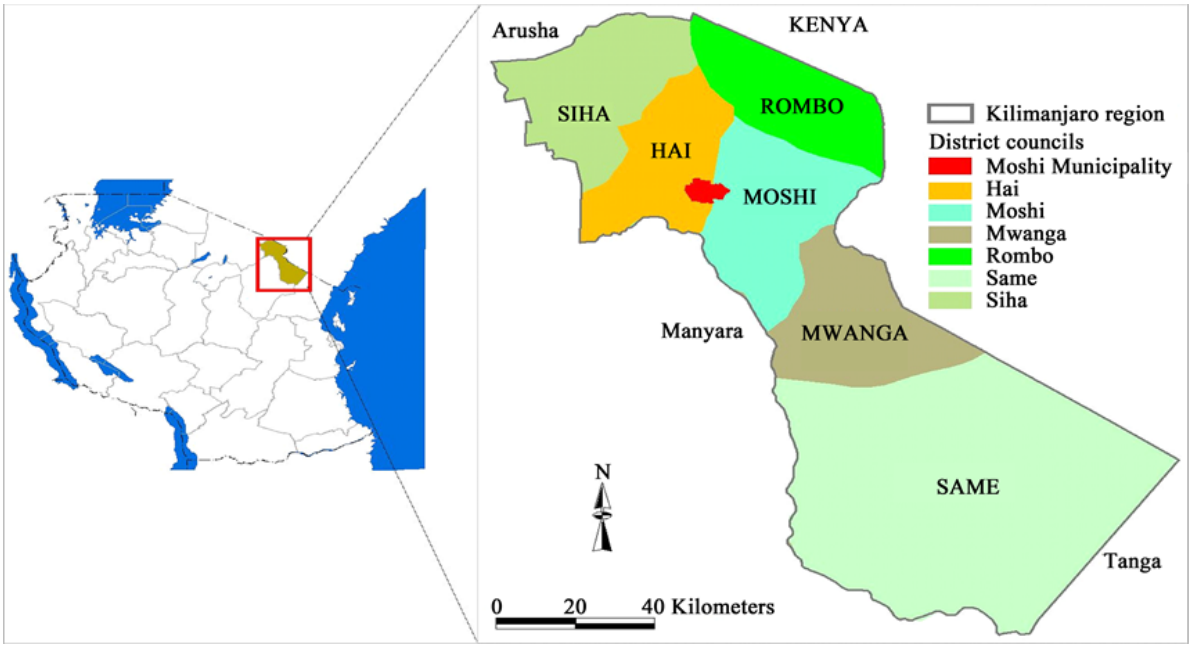

Figure 2: The map of Tanzania showing the Moshi municipality and Moshi district.

Source: *http://dx.doi.org/10.4236/ojss.2014.413044*

Subjects were recruited at nine clinics in Moshi, including six from the Moshi municipality (Majengo, Masaranga, Pasua, Bondeni, St. Joseph, and KCMC) and three from the Moshi district (Himo, Faraja, and Cogi). These clinics were selected because of their high density of PMTCT clients. Additionally, women were enrolled from different levels of the health facilities in order to represent the structure of the health system in Tanzania, which is pyramidal in shape (fig. 3), with over 7000 operating health facilities (available at http://opendata.go.tz/dataset/list-of-health-facilities-with-geographical-location).

KCMC is among the four consultant hospitals in Tanzania, serving the northern zone of the country. St. Joseph is a district hospital serving urban Moshi. At both KCMC and St. Joseph, there are trained medical doctors who are able to diagnose and manage clients who screen positive for depression and/or anxiety. Himo, Faraja, Pasua, Msaranga and Majengo are health centres, while Bondeni and Cogi are dispensaries (figure 3). At the health centre and dispensary, there are no medical doctors to care for people with mental illness; only trained, psychiatric nurses or counsellors are present. The nurses at these levels are allowed to diagnose and manage mild mental health conditions. The psychiatric nurses are supposed to refer serious cases to the facilities with expertise for further management. Stable clients are referred back to nurses to continue with monitoring.

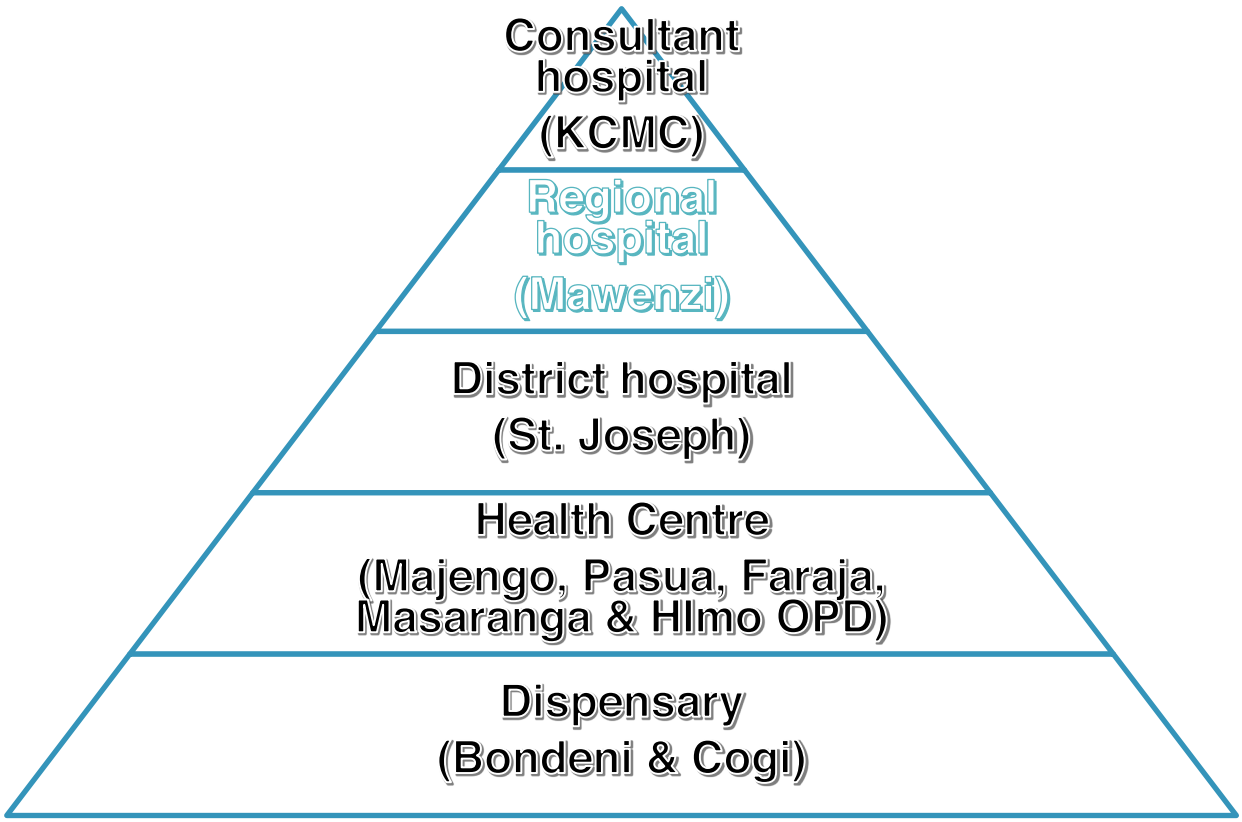

Figure 3: The health system structure in Tanzania

Tanzania is among the countries that are implementing WHO recommendations seeking to eliminate MTCT of HIV and keeping mothers alive (Option B+). Under Option B+ guidelines, all pregnant women who test positive for HIV are initiated on triple ARV medication regardless of their CD4 count. Women who initiate ARVs under Option B+ during pregnancy or breastfeeding are expected to continue with the drugs for life. PMTCT programmes are run by antenatal clinics in Tanzania and all health facilities in the country have an antenatal clinic. In addition to HIV testing and counselling, the clinics also provide a full package of maternal and child health services. The clinics are supposed to have a dedicated room for HIV pre- and post-test counselling, and a dedicated HIV counsellor to provide test results and counsel women during their first clinic visit.

3.3 Target Population

Women were eligible to enroll in the cohort if they were pregnant, HIV-positive, and attended one of the nine selected antenatal clinics. Additional eligibility criteria were:

- Age 18 years or above
- Able to provide informed consent

- Diagnosed with HIV, either during the current pregnancy or prior
- On ARV medication for at least four weeks prior to study entry
- Second trimester or later in pregnancy

3.4 Sample size estimation

A sample size calculation was conducted to estimate the prevalence (P) of depression and anxiety amongst HIV-positive pregnant women with an error margin of ± 0.05 and with a 73.4% previous prevalence of antenatal depression among HIV-infected pregnant women in Dar es Salaam (27).

$$\underline{n = Z^2_{1-\alpha/2} P(1-P)} = \underline{1.96^2*0.734\ (1-0.734)} = 300$$
$$e^2 \qquad\qquad 0.05*0.05$$

where:

n = number to sample

$Z^2 = (1.96)^2$ for 95% confidence (α= 0.05)

P = prevalence from previous study (73.4%)

e = maximum tolerable error for the prevalence estimate (0.05)

Although the minimum required sample size was 300, the parent study only enrolled 200 pregnant women living with HIV. As per the parent study project timelines and funding, the team decided to close enrollment at the end of August 2017. A total of 200 participants were enrolled by this time, a sample which was determined to be enough to answer the parent study objectives. Using a sample of 200 women, the precision of the population estimate is affected, with 0.06 margin of error.

3.5 Procedures

The following procedures were followed to identify and enroll clients in the parent Option B+ study. One research nurse was assigned to each selected antenatal/PMTCT clinic to collect data. At the initiation of the study, clinic registers were reviewed to determine the number of HIV-positive pregnant women currently enrolled at each clinic and the number of new clients from this group who enrolled each month. These reviews showed that there were about 10 to 30 HIV-positive pregnant women enrolled in PMTCT care at each clinic at the time of study initiation, and 3 to 6 new patients enrolled each month. Since pregnant women are given one-month supplies of ARVs, they were expected to return to the clinic within a period of one month to get their medication refilled.

The initial screening for potential clients was done by the clinic nurses. All pregnant women living with HIV were informed of the study and asked if they were interested in meeting with the research nurse. The clinic nurses referred interested clients to the research offices for further screening and possible enrollment (figure 4 below). Clinic providers were given a monthly or per-referral incentive (depending on their preference) to acknowledge the time and effort spent to identify and refer potential participants.

The research nurses welcomed all women visiting the research office and provided a detailed description of the study, including the objectives and procedures of the study. Those who met eligibility criteria and were willing to participate were asked to sign an informed consent before the interview. Those who did not wish to participate were released from any study follow-up and proceeded with their routine clinic visits. Clients who were not eligible because they had not yet met the criteria of being in the second trimester of their pregnancy or of having begun ART at least 4 weeks previously provided their contact information and were scheduled for enrollment in their next clinic visit.

The interviews were conducted in private study offices located within the study clinics. The assessments were conducted in Kiswahili using a structured paper questionnaire. The assessment took approximately 60 to 90 minutes. Participants were reimbursed for transportation costs with a flat rate of 5,000 Tanzania shillings (about $2.30) and were provided with soft drinks and light snacks during the interview.

The three nurses were all registered nurses in Tanzania. At the outset of the research, the nurses were trained by the investigators for five days on the basic principles of research, research ethics and data collection. Throughout the study, they received additional, ongoing training and supervision in study-related issues and general research topics.

The data collection tools were translated into Kiswahili and then back-translated into English by two independent translators. If there was a change in the context of some of the questions after back translation, a team of Swahili and English-speaking study staff sat together and reached consensus. When Swahili versions of the measures were already available from previous studies (e.g. the Edinburgh Postnatal Depression Scale as translated by Kumar and colleagues), these were reviewed and adapted (112). Before commencement of data collection, a pilot survey was conducted and the tool refined accordingly.

The study nurses were trained in patient risk assessment, counselling and managing emotional distress. The nurses were also trained in the creation of an individualised safety plan for clients

at risk of distress and self-harm. The nurses offered to counsel those with high emotional distress and/or referred clients back to the clinic counsellor for further support.

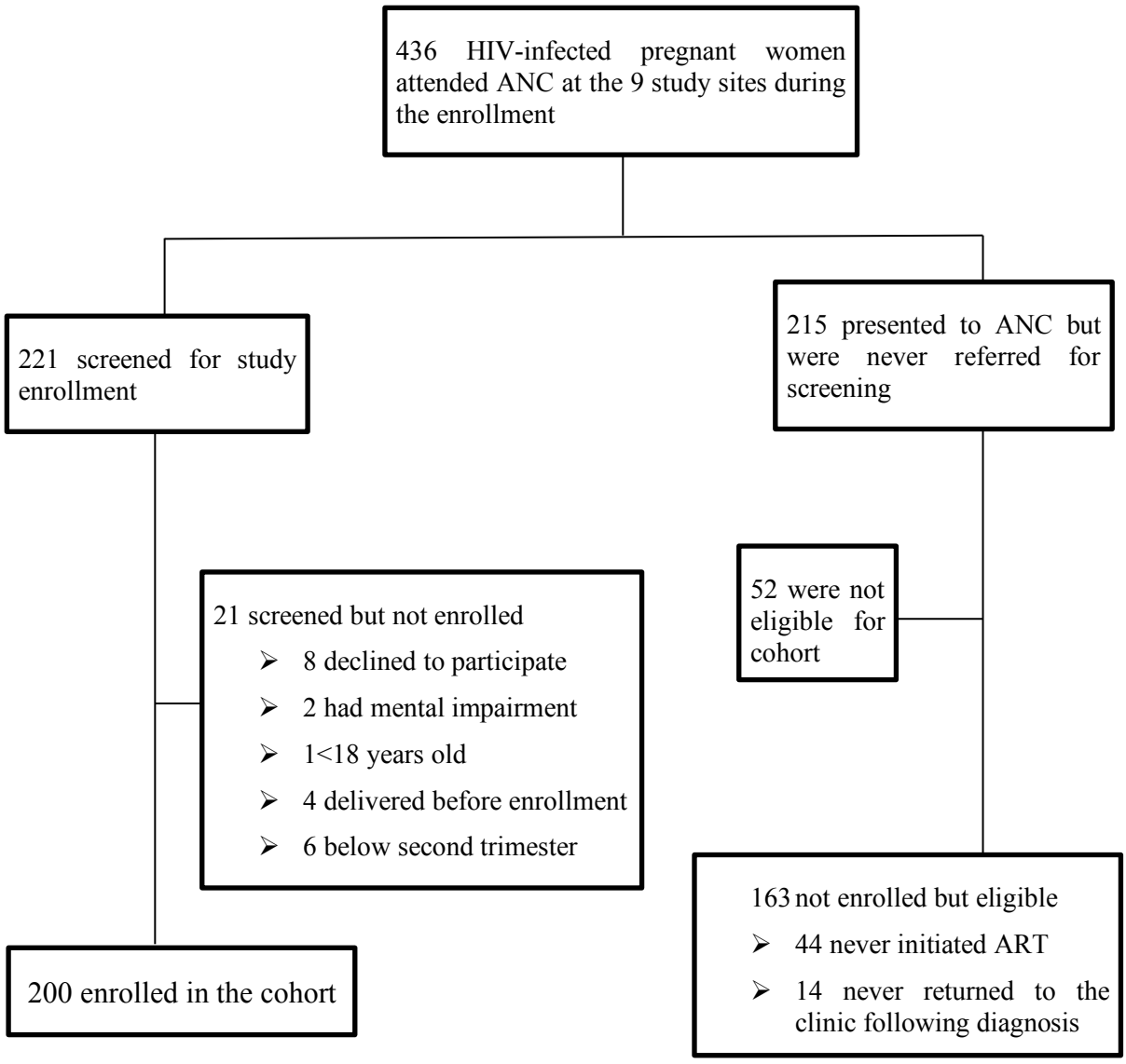

Figure 4: Parent study screening and enrollment flow chart

3.6 Measures

In addition to a number of socio-demographic questions (e.g. age, marital status, level of education, employment status, partner's HIV status) and history of physical illness in the past one month, the following measures were used to collect data in the parent Option B+ study.

Depression: Depression was measured using the Edinburgh Postnatal Depression Scale (EPDS) (42). The EPDS is a reliable and valid tool in measuring perinatal depression. Notably, the original EPDS had a sensitivity of 86% and specificity of 78% (42). It has been used frequently in measuring perinatal depression in Africa (113). The tool has not been validated in Tanzania, but there is a Swahili translated version previously used in Kenya, another Swahili speaking

country, which was modified for use (112). However, following Swahili translation, the local EPDS (92) was not validated which means its precision in measuring depression is unclear. Consistent with the need for validation, evidence from one systematic review suggested that the use of the locally available versions of EPDS in screening for depression is questionable. According to this review, of the 14 available native language EPDS versions, none met the recommended validity of over 80% (114).

The EPDS contains ten questions asking about feelings over the past 7 days. Each question has four possible responses, with a score of 0 to 3. For clarity, we modified question 7, 9 and 10 of the Swahili version of EPDS, then back-translated to English with content retained per the original English version. No question was deleted or added to the original version of EPDS; only unfamiliar terminology in the Tanzanian context was replaced. In addition to statements, we added alternative words to help participants understand the concept. The maximum summed score is 30, with a score of 10 or higher indicating possible depression and a score of 13 or higher indicating likely depression.

Different studies in low- and lower-middle-income countries (LLMICs) have used a different cut-off point for screening antenatal depression (114). The choice for the cut-off is a trade-off process between sensitivity and specificity. At a lower cut-off point, many women screen positive but with a significant number of false positives; however, in a clinical setting and with HIV-positive pregnant women who are at high risk of depression, the positive predictive value is expected to be high, justifying the study choice of 10 as cut-off point. In addition, a number of locally validated versions of EPDS in LLMICs used 10 points cut-off with quite reasonable sensitivity and specificity. The sensitivities and specificities in these studies ranged from 81.5 to 88.9% and 73.1 to 91.5% respectively (114). The sample alpha coefficient internal consistency score was 0.88.

Anxiety: Anxiety was measured using the anxiety subscale of the Brief Symptom Index (BSI) (115). Although not validated in Tanzania, the tool has been validated in Kenya (116). There is no Swahili translated version and therefore, before the commencement of data collection in the parent study, the tool was translated from English to Swahili and then back-translated to English. The six-item anxiety subscale from BSI-18 was administered: 1. Nervousness or shakiness inside, 2. Feeling tense or keyed up, 3. Suddenly scared for no reason, 4. Spells of terror or panic, 5. Feeling so restless you couldn't sit still, and 6. Feeling fearful. Items had a 5-point response: not at all=0, a little bit=1, moderately=2, quite a bit=3 and extremely=4. The final score is calculated by computing the average score of all items. Based on instrument norms

for a non-clinical, female population, the cut-off for evidence of signs or symptoms of anxiety is a mean score of 1.01 or higher (117).

Pregnancy-related variables: The questions included in the survey were about gestational age, prior adverse pregnancy outcomes (miscarriage/abortion, stillbirth), mode of delivery in the previous pregnancies (normal, caesarian section, forceps or other methods), pregnancy status (planned or unplanned pregnancy) and number of living children. These questions were adopted from the standard obstetric and gynecological history. Questions adapted from Guttmacher pregnancy attitude measure (GUTT) were used to assess the attitude about the current pregnancy. The questions include: Right before you become pregnant, did you plan to get pregnant? Right before you become pregnant, did you want to have a baby at any time? Would you say this pregnancy came too soon, at about the right time or later than you wanted? Right before you become pregnant, would you say that your partner wanted you to become pregnant? Are there times when you didn't or don't feel so good about being pregnant?

A modified version of GUTT was adapted from Speizer and colleagues (118). Each question is scored 0-3, with a maximum total score of 24. The variable was evaluated in a continuous scale, with a higher score indicating a planned or wanted pregnancy. The internal consistency of this measure in the present study was 0.91.

HIV-related variables: To assess HIV and mental health, women enrolled were asked about their HIV diagnosis, HIV care they are receiving, and if they had disclosed their HIV status. The questions asked included the following: the time of HIV diagnosis, their ART status, and their partner's HIV status. To establish if women had disclosed their status to anyone or to a sexual partner, they were asked the following: Have you told anyone about your HIV status? Who have you told? How soon after learning your HIV status did you disclose your status to these specific people? Has your HIV status ever been revealed without your consent?

Intimate partner violence variable: The modified WHO intimate partner violence tool was used to assess for history of intimate partner violence. The tool has been validated and frequently used in LMICs (119,120), including among pregnant women (121). Questions asked about emotional abuse ("Has a spouse/partner ever insulted you or called you bad names?"), physical abuse ("Has partner/husband ever hit, slapped or hurt you physically in any other way?"), and sexual abuse ("As an adult, has someone ever forced you to have sex when you didn't want to?"). Each question was assessed for both lifetime experience and recent experience in the past 3 months. In addition to these three types of abuse, a question was added to ascertain whether

the woman had experienced any sexual abuse in her childhood. The violence scores were dichotomised into yes or no, with a yes to any of the above questions being indicative of violence.

Stigma-related variables: The questions on enacted stigma were adapted from the Holzemer stigma tool (122). The eleven questions used to assess stigma were adapted from the HIV stigma questionnaire. The HIV-related stigma questionnaire is a validated questionnaire; the data used for its validation was gathered from five Sub-Saharan African countries, including Tanzania. Women were asked to rate how often they experienced the following forms of HIV stigma in the past three months: 1) asked to leave because of a cough, 2) someone stopped being a friend, 3) called bad names, 4) made to eat alone, 5) insulted, 6) people avoided her, 7) people stopped visiting her, 8) people ended their relationships with her, 9) blamed for her HIV status, 10) the ability to earn money was impacted, and 11) people gossiped about her. Each item has 4 levels of responses, from never=0 to most of the time=3. The items were summed, with a minimum score of 0 and the maximum score of 63, with higher scores indicating more experiences of stigma. The stigma score is rated by adding each item score and then dividing by the maximum expected score.

HIV shame: The HIV- and abuse-related shame inventory (HARSI) was used to measure shame. The original tool consists of three subscales: HIV-related shame, the impact of HIV-related shame on behaviour, and sexual abuse-related shame (123). The current study adapted 13 statements from the 14-item HIV-related shame subscale of the HARSI. The statements used were:

1. It is hard to tell other people about my infection.
2. I have failed to live up to my own expectations by getting HIV.
3. When I tell others I have HIV, I expect them to think less of me.
4. I put myself down for becoming HIV+.
5. Being HIV+ makes me feel defective like there is something wrong with me.
6. I am ashamed that I'm HIV+.
7. When others find out I am HIV+, I expect them to reject me.
8. I struggle with feeling worthless because I have HIV.
9. I am ashamed of my HIV symptoms.

10. I hide my infection from others.

11. I have an overpowering dread that my HIV status will be revealed to others.

12. I accept myself as an HIV+ person.

13. Having HIV makes me want to hide, disappear, or even die.

Women were asked to indicate how true the statements were to them in the past month on a 5-Likert scale. The Likert scale responses ranged from 0=not at all to 4=very much. The minimum score was 0 and the maximum score was 52. The sample alpha coefficient internal consistency score was 0.86.

Food insecurity: The household food insecurity access scale was used to assess household food availability. The tool has been validated in different countries including Tanzania and translated into different languages (124). The study adapted four questions from the nine-item household food insecurity scale. The questions were: 1) In the past month, how often could you not feed your family?, 2) In the past month, how often were you hungry, but did not eat because you could not afford enough food?, 3) In the past month, how often did you or other adults in your household not eat for a whole day because there was not enough money for food?, and 4) In the past month, how often did you or other adults in your household cut the size of your meals because there was not enough money for food? Each item had 4 response options: 0=never, 1=once or twice, 2=more than once or twice but not every day, and 3=every day. The scores were dichotomised into yes and no. 'Never experienced food insecurity' was no, while the rest were yes.

Alcohol use: The modified (AUDIT-C) version of the 10 item AUDIT instrument was used. It has been validated in Africa (125) and contains 3 items which are used to screen alcohol abuse. The questions are: 1. How often do you have a drink containing alcohol?, 2. How many standard drinks containing alcohol do you have on a typical day?, and 3. How often do you have six or more drinks on one occasion? Each question has 5 choices, ranging from 0 to 4 points. In this study, alcohol use was dichotomised into alcohol drinker and non-drinker.

Social support: The Duke-UNC Functional Social Support Questionnaire was used to measure social support (126). The tool has been validated in some LICs like Rwanda (127). It has not been validated in Tanzania, but has been used by some researchers in Tanzania to measure social support among HIV-positive clients (20). The tool contains 10 questions that participants were asked to respond to; 6 questions are about emotional (affectionate) support and 4 questions are about material support. The items are scored on a 4-point scale: 1=as much as I would like,

2=less than I would like, 3=much less than I would like, and 4=never. Items were summed using median with its respective interquartile ranging. The sample alpha coefficient internal consistency score was 0.82.

3.7 Data analysis

Immediately after the completion of each interview, the research assistant checked the questionnaires for completeness before the participant left the room. Data were double entered into a template in REDCap by two independent data entry volunteers. Disagreements between the two entries were automatically identified by the research software, then reviewed and reconciled by a research statistician who referenced the original questionnaire and, if needed, sought additional clarification from the study nurses. The final, reconciled data were then exported to SPSS version 24 for analysis.

The mental health outcomes were dichotomised to reflect elevated symptoms that reflect the disorder. Possible depression was defined as having a score on the EPDS of 10 and above. For incomplete EPDS, mean imputation was used to obtain total score if a participant answered at least 8 items. Probable anxiety was defined as having a score on the BSI of 1.01 and above. For BSI, no imputation was required for missing responses, with one women excluded because she had not responded to any BSI items. Women were identified as having comorbid conditions if they met the criteria for both probable anxiety and possible depression. Individuals who met criteria for any of the disorders were coded as Yes (1) and No (0) if the condition was absent.

Descriptive statistics were used to summarise the demographic and socio-economic characteristics of study participants. Logistic regression models were developed to determine the factors associated with possible depression, probable anxiety and comorbidity of anxiety and depression among HIV-positive pregnant women. Logistic regression is a statistical method of analysis in which one or more exposures determine a binary outcome. The result shows the independent contribution of each variable on the odds ratio of the outcome. The confounders are modeled together to demonstrate the independent contribution to the outcome of interest (128). Three multivariate logistic regression models were developed, one for factors associated with possible depression, another one for probable anxiety, and the final model for comorbidity of possible depression and anxiety. To control for confounder and reduce the residual confounding effects, factors with a p-value of 0.15 or less in bivariate analysis were considered eligible for inclusion in the multivariate analysis. A much higher p-value (of up to 0.2) than the conversional 0.05 performs better in selecting variables for inclusion in a multivariate logistic

regression (129). Results are presented with odds ratios and their 95% confidence intervals.

3.8 Ethical considerations

Ethical approval for the study was provided by the University of Cape Town Human Research Ethics Committee. The parent study was approved by the ethical review boards of the Tanzanian National Institute for Medical Research and Kilimanjaro Christian Medical University. The permission to use data from the Option B+ project was obtained from the study's principal investigators and co-investigators.

Informed consent process: Eligible participants were asked to sign a form providing informed consent before their participation. The research assistant also gave a brief verbal description of the study and provided a paper copy of the informed consent information sheet. Participants who could not read or write were asked to provide a thumbprint and their consent was verified by the signature of an impartial witness of the participant's choice. Participants were allowed and encouraged to ask any questions or seek clarification at any point in the research. Study staff reassured participants that their participation was entirely voluntary, that they were free to withdraw at any time, and that their withdrawal from participating would not affect their clinic standing or the care they receive.

Confidentiality: Even though this study involved minimal risk of breaking participant confidentiality, multiple precautions were taken throughout the research process to maintain confidentiality and minimise the risk of stigma or unintended disclosure of participants' HIV status. Interviews were typically held on the same day as participant's regular clinic appointments to minimise risk of being identified as HIV-positive based on their study participation. Study offices were intentionally located in areas with limited access or visibility to other clinic patients, and offices were not labeled nor otherwise associated with an HIV study.

Study questionnaires contained no participant identifiers. Documents containing identifying information, such as names or contact information (e.g. informed consent form), were securely stored separate from the study data and linked only by a unique identifier. All study data were kept in a locked cabinet at all times, except for when they were securely transported to the main study office. The participants' information was only accessible by the research team and regulatory authority when applicable.

To maintain confidentiality, in any data presentation, dissemination, and publications only the participants' unique numbers were used instead of their identifiers. The consent to share results in this manner was included in the informed consent.

Risk: This study involved minimal additive risk to the participants, given that secondary data analysis was used from the parent Option B+ study. For the parent study, the researchers anticipated some emotional discomfort at discussing challenging topics, especially those associated with their positive HIV status. The parent Option B+ study identified a trained counsellor at each clinic to help women who needed additional support.

Benefits: During the interview, participants were offered soft drinks and snacks. They also received 5,000 Tanzanian Shillings (equivalent to 2.5 US dollars) to compensate them for their travel. All participants were informed of the potential for the broader benefit to society by better understanding the challenges facing HIV-positive pregnant women and the likelihood that this information would inform future interventions in the region.

CHAPTER 4: RESULTS

4.0 Introduction

This chapter presents the study findings. The results are arranged by study objectives. The first part of the chapter covers the socio-demographic and clinical characteristics of study participants. This is followed by the prevalence of both possible depression and anxiety and the comorbidity of the two conditions. The last part of this chapter presents the factors associated with possible depression, anxiety and comorbid depression and anxiety.

4.1 General characteristics of study participants

A total of 208 pregnant women living with HIV were eligible for participation; 8 (3.8%) of them declined to participate. Of the 200 participants enrolled in this study, the median (IQR) age was 30 years (25-35). More than half of the participants had primary education only (n=113, 56.5%), and about half were married (n=98, 49.0%). More than a quarter had no income generating activity (n=60, 30.0%), and 111 (55.5%) were working in informal sectors. About half of the participants knew their HIV status prior to the index pregnancy (n=106, 53.0%), 88 (83.0%) of whom had initiated ARV prior to their current pregnancy. When asked whether they had disclosed their status to anyone, 159 (79.5%) had disclosed to at least one person and more than half (n=119, 70.0%) had disclosed specifically to their sexual partner. See Table 1 below for details on the general characteristics of participants.

Table 1: General characteristics of study participants (n=200)

Characteristics	n	%
Demographic characteristics		
Clinic		
KCMC referral hospital	51	25.5
Pasua health center	61	30.5
Majengo health center	31	15.5
St. Joseph district hospital	21	10.5
Himo OPD	18	9.0
Others	13	6.5
Median(IQR) age in years	30 (25 – 35)	
Education level attained		
No formal education	4	2.0
Any primary education	113	56.5
Any secondary education	70	35.0
Any college	13	6.5
Marital status		
Married	98	49.0
In a relationship	72	36.0
Single	21	10.5
Separated/Divorced	9	4.5

Polygamous relationship			
Yes	36		18.0
No	164		82.0
Income-earning activities			
None	60		30.0
Informal activities	111		55.5
Formal employment	29		14.5
Partner's income-earning activities			
None	2		1.4
Informal activities	88		62.0
Formal employment	29		20.4
Not in a relationship	22		15.5
Missing	1		0.7
Drinks alcohol			
Yes	54		27.0
No	146		73.0
Pregnancy characteristics			
First pregnancy			
Yes	44		22.0
No	156		78.0
Gestational age mean (±SD)		28.4 (±5.6)	
Prior pregnancy outcome (n=156)			
No problems	85		54.5
Negative outcomes	71		45.5
Negative outcomes (n=71)			
Abortion	7		9.9
Miscarriage	32		45.1
Still birth	12		16.9
HIV+ child	11		15.5
Death of a child	23		32.4
HIV-related characteristics			
HIV diagnosis			
New diagnosis	94		47.0
Established diagnosis	106		53.0
Used ARVs before this pregnancy (n=106)			
Yes	88		83.0
No	18		17.0
Partner HIV status			
HIV-negative	44		22.0
HIV-positive	61		30.5
Unknown	95		47.5
Any HIV status disclosure			
Yes	159		79.5
No	41		20.5
Disclosed to partner (n=170)			
No	51		30.0
Yes	119		70.0

4.2 Prevalence of possible depression and anxiety

Among the 200 women enrolled, 50 (25.0%) women met the cut-off score for possible depression. Twenty-eight (14.1%) participants reported thoughts of self-harm, 8 (4.0%) of whom had these thoughts quite often. Of the 200 women screened for anxiety, 49 (24.6%) met the cut-off score for probable anxiety disorder.

The prevalence of comorbid anxiety and depression was 18.1% (n=36). The majority (72%) of women who screened positive for possible depression also had anxiety. Table 2 below gives details on the comorbidity of anxiety and depression.

Table 2: Prevalence of Comorbidity of Anxiety and Depression (n=199)

	Depression status		
Anxiety status*	No possible depression	Possible depression	Total
No probable anxiety	136(90.7%)	14(9.3%)	150(75.5%)
Probable anxiety	13(26.5%)	36(73.5%)	49(24.5%)
Total	149(74.9%)	50(25.1%)	199

*One participant did not complete the anxiety screening instrument (BSI)

4.3 Factors associated with possible depression

In bivariate analysis (Table 3), being a single woman, food insecurity, violence, social support, HIV shame, enacted stigma and attitude about pregnancy were significantly associated with possible depression. Single women had 3.2 times higher odds of depression compared to married women (cOR=3.2, 95% CI=1.4 – 7.3). Women with a history of experiencing violence had 2.6 times higher odds of possible depression as compared to women who had never experienced violence in their life (cOR=2.6 95%CI=1.3 – 5.0). Women who reported food insecurity had 4.1 times higher odds of depression compared to those who had no food insecurity (cOR=4.1, 95% CI= 2.1 – 8.0). Furthermore, attitude about the current pregnancy was significantly associated with the odds of possible depression, where a unit increase in positive attitude about the current pregnancy was associated with a 10.0% decrease in possible depression (cOR= 0.9, 95% CI = 0.9 – 1.0). Women with perceived available social support had lower odds of possible depression; as perceived social support score increased, the odds of possible depression decreased by 10% (cOR=0.9 95% CI=0.9 – 1.0). Women who had higher scores of HIV-related shame had higher odds of possible depression, where a unit increase in the HIV-related shame score was associated with a 1.2 increase in the odds of possible

depression (cOR=1.2, 95% CI=1.1–1.3). Similarly, increases in enacted stigma score among women were associated with a 1.3 increase in the odds of possible depression. Table 3 below provides the details on the factors associated with depression.

In a multivariate logistic regression model (Table 3), three factors remained significantly associated with depression after controlling potential confounders. Women who were single had 4.1 times higher odds of possible depression compared with women who were married or in a relationship (aOR=4.1, 95% CI=1.2–14.6). Women who reported food insecurity had 2.6 times higher odds of possible depression compared with those without food insecurity (aOR=2.6, 95% CI=1.0 – 6.6). Women with a higher score on HIV shame also had higher odds of depression; with each unit increase in HIV shame score, the odds of depression increased by 1.2 (aOR=1.2, 95% CI=1.1 – 1.3).

Table 3: Bivariate and multivariate analysis of factors associated with possible depression among pregnant women living with HIV (n=200)

	Possible depression					
Variables	**No (n=150) n(%)**	**Yes (n=50) n(%)**	**cOR (95%CI)**	**p-value**	**aOR (95%CI)**	**p-value**
Education level attained						
Primary	83(70.9)	34 (29.1)	1.7(0.9-3.4)	0.118	1.6(0.6-4.1)	0.330
Secondary and above	67 (80.7)	16 (19.3)				
Marital status						
Married	134 (75.8)	36 (24.2)				
Single	16 (53.3)	14 (46.7)	3.2(1.4-7.3)	0.004	4.1(1.2-14.6)	0.028
Polygamous relationship (n=170)						
Yes	26 (72.2)	10 (27.8)	1.6(0.7-3.7)	0.278		
No	108 (80.6)	26 (19.4)				
Income-earning activities						
None	43 (71.7)	17 (23.8)	1.2(0.6-2.5)	0.477		
Informal/Formal	107 (76.4)	33 (23.6)				
First pregnancy						
Yes	34 (77.3)	10 (22.7)				
No	116 (74.4)	40 (25.6)	1.2(0.5-2.6)	0.694		
Prior pregnancy outcome (n=156)						
No problems	66 (77.6)	19 (22.4)				
Negative outcomes	50 (70.4)	21 (29.6)	1.5(0.7-3.0)	0.305		
HIV diagnosis						
New diagnosis	71 (75.5)	23 (24.5)				
Established diagnosis	79 (74.5)	27 (25.5)	1.0(0.5-2.0)	0.870		
Partner recent test						

HIV-negative/Unknown	102 (73.4)	37 (26.6)	1.3(0.6-2.7)	0.426		
HIV-positive	48 (78.7)	13 (21.3)				
Disclosure to anyone						
No	34 (82.9)	7 (17.1)	0.5(0.2-1.3)	0.193		
Yes	116 (73.0)	43 (27.0)				
Disclosure to partner (n=170)						
No	43 (84.3)	8 (15.7)	0.6(0.2-1.4)	0.255		
Yes	91 (76.5)	28 (23.5)				
Food Insecurity (FHI)						
Never	112 (84.2)	21 (15.8)				
Sometimes	38 (56.7)	29 (43.3)	4.1(2.1-8.0)	<0.001	2.5(1.0-6.6)	0.054
Ever experienced violence						
No	106 (81.5)	24 (18.5)				
Yes	44 (62.9)	26 (37.1)	2.6(1.3-5.0)	0.004	1.5(0.6-3.8)	0.354
Drink alcohol						
No	111 (76.0)	35 (24.0)				
Yes	39 (72.2)	15 (27.8)	1.2(0.6-2.5)	0.581		

Variables	**Median (IQR)**	**Median (IQR)**	**cOR (95%CI)**	**P value**	**aOR**	**P-value**
Age in years	30 (26-35)	30 (24-35)	1.0(0.9-1.0)	0.532	1.0(0.9-1.1)	0.892
Social support	30(24-36)	26.5(23-30)	0.9(0.9-1.0)	0.001	1.0(0.9-1.0)	0.312
HIV Shame	15(10.7-20)	29(22.7-35)	1.2(1.1-1.3)	<0.001	1.2(1.1-1.3)	<0.001
Enacted stigma	0 (0 – 0)	0 (0 – 2)	1.3(1.0-1.5)	0.014	1.0(0.9-1.2)	0.592
Attitude about pregnancy	16(13-19.5)	14(9.7 – 16)	0.9(0.9-1.0)	0.007	0.9(0.8-1.0)	0.119

cOR, crude odds ratio, aOR, adjusted odds ratio
Adjusted for social support, enacted stigma, attitude about pregnancy, HIV shame, level of education, marital status, food insecurity and violence

4.4 Factors associated with probable anxiety

In bivariate analysis (Table 4), factors that were significantly associated with probable anxiety were marital status, food insecurity, HIV shame, experience of violence, and enacted stigma. Women who reported food insecurity had 2.4 times higher odds of probable anxiety compared with those with no food insecurity (cOR=2.4, 95% CI=1.2 – 4.6). Women who reported lifetime violence of any kind had 3.0 times higher odds of probable anxiety compared to those who had never experienced violence (cOR=3.0, 95% CI=1.6 – 5.9). Furthermore, single women had 2.8 times higher odds of probable anxiety compared with women who were married (cOR=2.8, 95% CI=1.2 – 6.4). More enacted stigma was associated with higher odds of anxiety; a unit increase in stigma score was associated with 1.3 times increase in the odds of probable anxiety (cOR=1.3, 95% CI=1.1 – 1.6). Women who were ashamed of their HIV status had

higher odds of probable anxiety. Per unit increase in shame score was associated with 1.1 times higher odds of anxiety (cOR=1.1, 95% CI=1.1 – 1.2).

In a multivariate logistic regression model (Table 4), HIV shame and lifetime experience of violence of any kind remained significantly associated with probable anxiety after controlling for potential confounders. Women with a higher score of HIV shame had higher odds of probable anxiety; a unit increase in HIV shame score among women was associated with 1.1 times increased odds of probable anxiety (aOR=1.1, 95% CI=1.1 – 1.2). Women who reported a history of lifetime violence of any kind had 2.3 times higher odds of probable anxiety compared to those who had never experienced violence (cOR=2.3, 95% CI=1.0 – 5.1).

Table 4: Bivariate and multivariate analysis of factors associated with probable anxiety among pregnant women living with HIV (n=199)

Variables	**Probable anxiety**		**cOR (95%CI)**	**p-value**	**aOR(95% CI)**	**p-value**
	No(n=150) n(%)	**Yes(n=49) n(%)**				
Education level attained						
Primary/No formal	84 (71.8)	33 (28.2)	1.6 (0.8 – 3.2)	0.163	1.5(0.6-3.6)	0.323
Secondary and above	66 (80.5)	16 (19.5)				
Marital status						
Married	133 (78.7)	36 (21.3)				
Single	17 (56.7)	13 (43.3)	2.8 (1.2–6.4)	0.012	2.3(0.7-7.2)	0.139
Polygamous relationship						
Yes	30 (83.3)	6 (16.7)	0.7 (0.3 –1.8)	0.446		
No	103 (77.4)	30 (22.6)				
Income-earning activities						
None	43 (71.7)	17 (28.3)	1.3 (0.7 –2.6)	0.426		
Informal/Formal	107 (77.0)	32 (23.0)				
First pregnancy						
Yes	30 (69.8)	13 (30.2)	1.4 (0.7 –3.0)	0.336		
No	120 (76.9)	36 (23.1)				
Prior pregnancy outcome (n=156)						
No problems	68 (80.0)	17 (20.0)				
Negative outcomes	52 (73.2)	19 (26.8)	1.4 (0.7-3.1)	0.320		
HIV diagnosis						
New diagnosis	71 (76.3)	22 (23.7)				

Established diagnosis	79 (74.5)	27 (25.5)	1.1 (0.6 –2.1)	0.767		
Partner recent test						
HIV-negative/Unknown	101 (73.2)	37 (26.8)	1.5 (0.7-3.1)	0.283		
HIV-positive	49 (80.3)	12 (19.7)				
Disclosure to anyone						
No	32 (78.0)	9 (22.0)				
Yes	118(74.7)	40 (25.3)	1.2 (0.5 –2.7)	0.748		
Disclosure to partner (n=169)						
No	40 (78.4)	11 (21.6)	1.0 (0.5 –2.3)	0.956		
Yes	93 (78.8)	25 (21.2)				
Food Insecurity (FHI)						
Never	107 (81.1)	25 (18.9)				
Sometimes	43 (64.2)	24 (35.8)	2.4 (1.2 –4.6)	0.010	1.3(0.5-3.0)	0.599
Ever experienced violence						
No	107 (82.9)	22 (17.1)				
Yes	43 (61.4)	27 (38.6)	3.0 (1.6-5.9)	0.001	2.3(1.0-5.1)	0.047
Variables	**Median (IQR)**	**Median (IQR)**	**cOR (95%CI)**	**p-value**	**aOR(95%CI)**	**p-value**
Age in years	30.5 (26-35)	28(24-35)	1.0 (0.9-1.0)	0.153	1.0(0.9-1.0)	0.445
Social support(PAS)	29(24 - 34)	27(23-31.5)	1.0 (0.9-1.0)	0.104	1.0(1.0-1.1)	0.491
HIV Shame	15.5(11-21.2)	28(17-34.5)	1.1 (1.1 -1.2)	<0.001	1.1(1.1-1.2)	<0.001
Enacted stigma	0 (0 – 0)	0 (0 – 2)	1.3 (1.1 –1.6)	0.011	1.1(0.9-1.3)	0.195
Attitude about pregnancy	16 (12.4-19)	14(9.5-19)	0.9 (0.9 –1.0)	0.081	0.9 (0.9-1.0)	0.203

crude odds ratio, cOR; adjusted odds ratio, aOR
adjusted for level of education, marital status, perceived availability of social support, HIV shame, enacted stigma and attitude about current pregnancy
One participant did not complete anxiety screening instrument (BSI)

4.5 Factors associated with comorbid depression and anxiety

In bivariate analysis (Table 5), marital status, experience of violence, food insecurity, HIV shame, attitude about pregnancy, enacted stigma and social support were significantly associated with a participant having comorbid depression and anxiety. In this cohort of women living with HIV, single women had 3.3 times higher odds of comorbidity compared to married women (cOR=3.3, 05% CI=1.4 – 7.8). Participants with food insecurity had 3.6 times higher odds of comorbidity compared to those who never experienced food insecurity (cOR=3.6, 95% CI=1.7 – 7.5). Women with a history of experiencing violence of any kind had 4.4 times higher odds of comorbidity as compared to women with no history of experiencing violence (cOR=4.4, 95% CI=2.0 – 9.3). Women with perceived lower social support had higher odds of anxiety and

depression; for every one unit increase in social support score, the odds of comorbidity decreased by 10% (cOR=0.9, 95% CI= 0.9 – 1.0). Attitude about current pregnancy had a significant association with the odds of comorbidity. Each unit increase in the positive attitude about current pregnancy was associated with a 10% decrease in comorbidity (cOR= 0.9, 95% CI = 0.8 – 1.0). Women who reported experiencing stigma had higher odds of comorbidity; as stigma scores increased, the odds of comorbidity increased by 1.3 (cOR=1.3, 95%CI=1.1 – 1.6). Women who scored higher on HIV shame also had higher odds of comorbidity; for every one unit increase in HIV shame score, the odds of comorbidity increased by 1.2 (cOR=1.2, 95% CI=1.1 – 1.2).

In a multivariate logistic regression model (Table 5), the experience of violence and HIV shame were found to be significantly associated with comorbidity among pregnant women living with HIV. After adjusting for potential confounders, women who had ever experienced violence had 3.6 times higher odds of comorbidity compared with no history of experiencing violence (aOR=3.6, 95% CI=1.3 – 9.9). Women who had higher scores of HIV shame also had higher odds of comorbidity; for each unit increase in HIV shame score, the odds of comorbidity increased by 1.2 (aOR=1.2, 95% CI=1.1 - 1.3).

Table 5: Bivariate and multivariate analysis of factors associated with comorbidity of depression and anxiety (n=199)

	Probable Anxiety and possible Depression					
Variables	**No (n=163) n(%)**	**Yes (n=36) n(%)**	**cOR(95%CI)**	**p-value**	**aOR(95% CI)**	**p-value**
Education level attained						
Primary/No formal	92 (78.6)	25 (21.4)	1.7(0.8 – 3.8)	0.155	1.6(0.5-5.0)	0.365
Secondary/Higher education	73 (86.6)	11 (13.4)				
Marital status						
Married	144 (85.2)	25 (14.8)				
Single	19 (63.3)	11 (36.7)	3.3(1.4 – 7.8)	0.006	2.9(0.7-12.0)	0.140
Polygamous relationship						
Yes	114 (85.7)	19 (14.3)	1.1(0.4 – 2.9)	0.768		
No	30 (83.3)	6 (16.7)				
Income-earning activities						
None	46 (76.7)	14 (23.3)	1.6(0.8 – 3.4)	0.209		
Informal/Formal	117 (84.2)	22(15.8)				
First pregnancy						
No	129 (82.7)	27(17.3)				

Yes	34 (79.1)	9 (20.9)	1.3 (0.5-2.9)	0.585		
Prior pregnancy outcome (n=157)						
No problems	72 (84.7)	13 (15.3)				
Negative outcomes	57 (80.3)	14 (19.7)	1.4 (0.6-3.1)	0.468		
HIV diagnosis						
New diagnosis	78 (83.9)	15 (16.1)				
Established diagnosis	85 (80.2)	21 (19.8)	1.3(0.6 – 2.7)	0.501		
Partner recent test						
HIV-negative/Unknown	110 (79.7)	28 (20.3)	1.7(0.7-3.9)	0.229		
HIV-positive	53 (86.9)	8 (13.1)				
Disclosure to anyone						
No	36 (87.8)	5 (12.2)	0.6(0.2 – 1.6)	0.276		
Yes	127 (80.4)	31 (19.6)				
Disclosure to partner (n=169)						
No	44 (86.3)	7 (13.7)	0.9(0.3 – 2.3)	0.787		
Yes	100 (84.7)	18 (15.3)				
Food Insecurity (FHI)						
Never	117 (88.6)	15 (11.4)				
Sometimes	46 (68.7)	21 (31.3)	3.6 (1.7-7.5)	0.001	1.6(0.5-4.7)	0.395
Ever experienced violence						
No	116 (89.9)	13 (10.1)				
Yes	47 (67.1)	23 (32.9)	4.4(2.1 – 9.3)	<0.001	3.6(1.3-9.9)	0.015

Variables	**Median (IQR)**	**Median (IQR)**	**cOR (95%CI)**	**p-value**	**aOR (95%CI)**	**p-value**
Age	**30 (26-35)**	**28(23-35)**	**0.9(0.9 – 1.0)**		**1.0(0.9-1.1)**	**0.575**
Social support(PAS)	30 (24-35)	26(22.2-29)	0.9(0.9 – 1.0)	0.004	1.0(0.9-1.1)	0.574
HIV Shame (HARSIH)	16 (11-22)	30 (23 – 36)	1.1(1.1 – 1.2)	<0.001	1.2(1.1-1.3)	<0.001
Enacted stigma(HASI)	0 (0-0)	0(0 – 3)	1.3(1.1 – 1.6)	0.006	1.1(0.9-1.3)	0.179
Attitude about pregnancy(PREGAT)	16(12.6-19)	14(9 – 16.7)	0.9(0.8 – 1.0)	0.010	0.9(0.8-1.0)	0.077

cOR, crude odds ratio; aOR, adjusted odds ratio, CI, confidence interval
adjusted for marital status, violence, food insecurity, attitude about current pregnancy, enacted stigma, perceived availability of social support, and HIV shame

CHAPTER 5: DISCUSSION

5.0 Introduction

The purpose of this chapter is to discuss the findings that were presented in Chapter 4. It will start with a discussion of the study's main findings concerning the prevalence and factors associated with possible depression, probable anxiety disorder and the comorbidity of anxiety and depression. Thereafter, limitations will be addressed. The chapter will conclude with implications for practice, training and policy development, as well as offering recommendations for future studies.

5.1 General discussion

The main results of this study are that: 1) compared to previous studies, a low prevalence of possible depression was reported among participants (25%) and was associated with marital status, food insecurity, and HIV shame; 2) symptoms of anxiety were common (24.6%) and were associated with HIV shame and lifetime experience of violence; and 3) a high rate of comorbidity was reported by participants, with 18.1% meeting criteria for both possible depression and probable anxiety. HIV shame and lifetime experience of violence were found to be significantly associated with comorbid depression and anxiety.

Prevalence and risk factors associated with possible depression

In the present study, one out of every four pregnant women with HIV had possible depression. Although these findings are comparable to the US prevalence of 22% (92), compared to studies conducted in other African countries and other studies in Tanzania, this prevalence is low. For example, in Uganda and South Africa, depression rates of 42.7% and 41.0% have been reported, respectively (25,55). Similarly, in Dar es Salaam, the prevalence of antenatal depression among women living with HIV was reported to be about twice (42.4%) or three times (74.3%) that of the prevalence in Moshi (27,28).

There are a number of explanations that may account for the different rates of depression reported in the present study compared to the available literature in other African countries. Firstly, there are cultural and social-behavioural differences between Dar es Salaam and Moshi that might have contributed to the observed difference (130). For example, in Moshi, there is a cultural practice of travelling to visit the in-laws during pregnancy or after giving birth. At their in-laws, they are released from their duties and economic hardships. In Dar es Salaam, the opposite is the norm, where the in-laws travel from the village to visit with the new family, who

often is responsible for hosting their in-laws. Research suggests that the family, including in-law social support, has been shown to be associated with low risk of stress and fewer odds of depression in the antenatal and postnatal period (131).

A second possible explanation for the varying rates of depression is the difference in study designs. These might have contributed to the observed difference in mental health prevalence. The current study is cross-sectional, whereas in the previous studies women were recruited and then followed up on. They were followed up on from study entry, and information on their mental health was collected periodically. During the follow-up, some women may have started to face some HIV-related challenges as they were starting to adapt to their status, including the new reality of life and coping with life changes. In the present study, about half of the women were newly diagnosed and enrolled in this study four weeks post-diagnosis, and either mental health symptoms may not have developed or participants may not have felt comfortable admitting to the symptoms.

Finally, the screening tools used to detect depression vary across studies. In the previous studies conducted in Tanzania, HSCL was used to screen for depression, while this study used EPDS (28). Similarly, Kaida in Uganda also used the modified HSCL to screen for antenatal depression (25). Different depression screening tools might have contributed to the observed difference in the prevalence.

Although the prevalence of antenatal depression was lower than in previous studies, the reported prevalence of depression still warrants concern for the mental health of pregnant women living with HIV in Tanzania. The Tanzanian national PMTCT guidelines highlight the importance of managing mental health disorders among women living with HIV. However, there are no strategies in place to screen and manage those diagnosed with depressive symptoms (132). As a result, many of these women with possible depression will go undetected. The implications of not providing mental health treatment for pregnant women living with HIV in Tanzania are many. Untreated depression could progress to severe or chronic depression. In its early/less severe stages, depression may be easier to manage. More severe depression requires well-trained health professionals who are not readily available in most of the African settings (133). Additionally, without adequate support and help in dealing with their depression, women with HIV may be less likely to adhere to taking their medication and more likely to miss their clinic schedules (134). All of these pose challenges to the elimination of MTCT of HIV (132), and the UNAIDS targets set to help end the HIV epidemic by the year 2030 (the 90-90-90 target) (135).

The prevalence of possible depression reported here was associated with several health factors including food insecurity, HIV shame, and marital status. Similarly, in Uganda and the US, food insecurity was significantly associated with depression (94,136). Furthermore, one study in South Africa reported that 29% of participants at a primary level clinic did not have enough food for their families and this was associated with mental illnesses (137). A proportion of pregnant women enrolled in the current study had a low socio-economic status and did not have enough food to feed their families. Several studies have demonstrated the link between low socio-economic status among PLHIV and mental illnesses (25,137,138). The findings here which show a relationship between poverty and mental health are supported by a systematic review by Lund and colleague, which found an association between mental illnesses and poverty (138). Moreover, PLHIV are advised by their physicians, as per HIV/AIDS treatment guidelines, to eat a balanced diet, and some of the ARV medications increase appetite or are supposed to be taken with food (137,138,139). With this in mind, it is not surprising that pregnant women who experience food shortages have higher rates of depression. The findings raise concerns about social disparities among PLHIV, and show that interventions should not only focus on the physical health but should also address the social aspect of clients.

Women in the sample with high HIV shame scores had higher odds of depressive symptoms. Many PLHIV feel ashamed of their status and also feel that they have let their families down (142). Additionally, many believe that having HIV is a punishment for their behaviour or the behaviour of their partner (142,143). Such feelings and blame for their behaviour may increase the risk of depression. In some cases, the shame experienced among these women could be due to the stigma that still exists. Several other previous studies have reported a similar association (59,134). Shame is an important aspect to address, because it may lead women to avoid clinic appointments. To address the issue of HIV-related shame, the Tanzanian national HIV counselling guidelines have incorporated HIV-related shame. The guidelines advocate for identifying clients who are ashamed of their status, counselling them, and providing them with support on how to overcome the feeling (89). A major concern is the workload of staff at these clinics, which makes it difficult to implement the PMTCT guideline of addressing HIV-related shame, especially among newly diagnosed clients. More efforts are still needed to address HIV-related shame, which impacts women's well-being and potentially undermines the efforts of the health system.

Single women were at higher risk of depression compared to married women. The results are consistent with previous studies (79). Being single and pregnant might not be a women's

choice, but rather may be a result of unplanned pregnancies, divorce or being abandoned, among others. The circumstances resulting in a pregnant woman being single in the Tanzanian context might contribute to depression. Not having a partner to comfort them at the time needed undermines social support and contributes to the risk of depression. Contrary to our findings, in Uganda, being single was found to be protective (25). The Ugandan finding is in contrast to the current body of knowledge, which suggests that marriage offers protective benefit for mental illnesses. Kaida and colleagues acknowledged the inconsistency but offered no explanation as to why there was a difference.

Prevalence and risk factors associated with probable anxiety

Similar to prevalence rates of depression reported in the present study, 24.6% of women screened positive for anxiety symptoms. As mentioned in Chapter 2, there are limited studies that have investigated the prevalence of anxiety in this population. Of the few available studies in the literature, there are some variations in the prevalence of anxiety. For example, one study in the US reported a much higher prevalence (71.1%) compared to what we found (79). However, that study had a sample size of 45. The sample size, design, anxiety measure, and the difference in the cultural context of mental illness might have contributed to the observed difference. In Tanzania, there is a paucity of data on the prevalence of anxiety among pregnant women living with HIV. Nonetheless, our findings are cause for concern.

When not treated at its early stages, pregnant women with mild symptoms of anxiety may progress to severe symptoms. Women with a severe form of anxiety disorder are at increased risk of depression, substance abuse and suicidality (83). In the context of PMTCT, these women are less likely to adhere to their clinic appointments including taking their ARVs (132). In so doing, they are at greater risk for transmitting the virus to their unborn or breastfeeding infants. Maternal anxiety also introduces risks for poor perinatal outcomes such as intrauterine growth restriction, premature birth, and low birth weight, as well as impacts on the mental health of the baby (22). For example, one systematic review showed that anxious women tend to have children with mental health disorders, especially attention deficit disorder (22). Although the world has recorded a lot of advancements and achievements in the management of HIV, especially in the area of PMTCT, there is less focus on mental illnesses such as anxiety, especially in LIC. Even in the new WHO guidelines on PMTCT (Option B+), which advocate for keeping mothers alive (132), the focus is more on the physical health. The mental health of women is put aside, which is a drawback to achieving the target of keeping mothers alive.

Meeting this WHO target will require incorporating the mental health component, including anxiety, into routine PMTCT care.

In this population of pregnant women living with HIV, anxiety was associated with HIV-related shame and lifetime experience of violence. Pregnant women who had greater HIV shame had higher odds of anxiety. One of the strategies for coping with a shameful event in life is to avoid the related events and situations which bring back shameful memories (142). However, with HIV infection, this is not possible, which may contribute to anxiety. People living with a disease related to sexuality may feel ashamed (144). Faith also plays a pivotal role in HIV shame, making it more pronounced in this population as most people see HIV as punishment for wrongdoing (143). Furthermore, having to take ARVs for the rest of their life and thinking of the outcome of the pregnancy may be anxiety provoking for pregnant women. All of these are stressful life events which may contribute to women feeling ashamed of their situation.

Women who reported a lifetime experience of violence had higher odds of anxiety. This finding supports other previous publications (66,78,98). It is well-documented that long-term exposure to trauma, especially in childhood, may cause neurological changes. Such changes may lead to a malfunction of the brain, which in turn may lead to anxiety (145). On the other hand, individuals with mental illnesses like anxiety are at a higher risk of contracting HIV (146), resulting in the vicious cycle of HIV. Even with the existing evidence of prevalence and the consequences of violence against women, there is little attention in the PMTCT programme to address violence. The programme is structured around physical health while forgetting that mental health is a facilitator of physical health. Due to circumstances surrounding violence, the victims are unlikely to disclose such incidences. However, a close follow-up and rapport can enhance disclosing the violence. Furthermree, management of chronic infections such as HIV requires an holistic approach.

Prevalence and factors associated with comorbidity

Interestingly, in the present study, 18.1% of women met criteria for both possible depression and probable anxiety. Literature shows that the comorbidity of anxiety and depression is common among pregnant women, similar to the general population (10%) (81). However, the data in pregnant women living with HIV is limited. Nevertheless, the prevalence of comorbidity is consistent with previous studies (83,147). For example, one study in northern Tanzania found that anxiety and depression coexisted among pregnant women (148). Previous literature suggests that comorbidity is even more common compared to the presence of either depression

or anxiety alone, with up to 52% of patients diagnosed with depression also presenting symptoms of anxiety (83). Indeed, the overlap of the two mental illnesses was high in this population, with 72% of recruited women with possible depression also presenting with anxiety.

A challenge is that sometimes patients with comorbidity do not present with typical symptoms (80). Of interest is that these disorders tend to mask each other, potentially due to the overlap in symptoms. Considering the poor disease outcomes in patients with comorbidity, if these women with comorbidity are not able to manage these disorders, they are likely to have poor disease outcomes as well as a poor quality of life (149). Even with mental illness treatment, the recovery among clients with comorbidity is slow. On top of slow recovery among people with comorbidity, their risk of progressing to chronic conditions and the rate of recurrence are also high (81). Consequently, if these conditions are not addressed as comorbid and with a holistic approach to management, the rates of treatment failure are likely to remain high (81). Validated screening tools that can be used to assess both anxiety and depression do exist (81). These screening tools are simple, which make them feasible for primary health care. Even at the stage which requires medications, there are single drugs with proven effectiveness for the two conditions (81,150).

In the present study, HIV-related shame and lifetime experience of violence predicted comorbidity. Both the HIV-related shame and the lifetime experience of violence in these women were associated with possible depression and anxiety when considered separately. To begin with is the association between HIV-related shame and the comorbidity of possible depression and anxiety. As discussed previously, since HIV transmission is more related to sexuality, people infected feel that they have diverged from the norm. In addition, these women are coming from communities where people say bad things about infected people and expect the same to happen to them sooner or later (151). The findings are consistent with other studies (144). Women with a current or past history of experiencing violence were at increased risk of mental health disorders. Whereas the antenatal HIV testing is mandatory in women, in some parts, many men do not test during the same period (132). Commonly, women are blamed for introducing the disease into relationships because they tested first (152). Because of this, some marriages end in separation or divorce, and others may be the victims of violence (91). Because of these negative consequences, among others, some women choose to test alone while others opt not to disclose their status. All of these add up to the challenge of eliminating MTCT of

HIV and also the road toward ending the HIV epidemic. In order to achieve the world HIV/AIDS targets, more efforts are needed to overcome HIV-related shame and violence.

5.2 Limitations

Several limitations of this study must be considered when interpreting these findings. Firstly, the parent study enrolled only a subset of women attending the antenatal clinic who were referred to the study. While the parent study intended to screen all potential women, not all were referred from standard care to the research team. The characteristics of those not referred and not enrolled were not available for comparison, which makes it difficult to assess the selection bias. At the same time, there is a possibility of volunteer bias; women attending the clinic for PMTCT were informed of the ongoing study and only those who volunteered were referred for screening. Both these issues might have affected the reported prevalence and the measure of association. Therefore, the results of this study should be interpreted with some caution.

Secondly, secondary data analysis was conducted, and limited to the number of participants enrolled in the parent study. We had calculated a minimum sample size of 300; however, the parent study only enrolled 200 participants meeting the criteria for this sub-study. With an underpowered sample, we may have failed to identify the associations of probable anxiety and possible depression to some important health-associated factors.

Thirdly, pregnant women below 18 years were not eligible for participation, while adolescent pregnancy has been shown to be associated with mental health disorders. Excluding those below 18 years might have underestimated the prevalence of mental health disorders in this population.

Fourthly, some of the assessment tools used have not been validated in Tanzania or translated into the local language (Swahili), which might have impacted our findings. In addition, using EPDS to detect depression at a cut-off score of 10 has high sensitivity at the cost of specificity. Conversely, some women might have been misclassified as depressed just because of the low cut-off point (a score on the EPDS of 10 and above) used in this study. With the possibility of systematic non-differential misclassification in the study, we might have underestimated the true association with depression.

Fifthly, as mentioned earlier, depression and comorbid anxiety are common, even more than a single disorder. Most people with a comorbid condition present with atypical signs and symptoms. Because of this, screening for depression and anxiety independently is likely to

underestimate the prevalence. Instead, comorbidity screening tools such as the Primary Care Evaluation of Mental Disorder could have minimised this measurement bias.

Sixthly, some of the exposure concepts are known to overlap with depression assessment tools. For example, both EPDS and HIV shame items measure worthlessness. This might have resulted in the observed association between HIV shame and the possible depression.

Lastly, because of the nature of this study, it is difficult to rule out the reverse causality of mental illness and some factors. Of particular concern are the association between lifetime experience of violence and food insecurity, and mental health. While women with a history of experiencing violence are at risk of depression, depressed women are likely to experience violence. The same can happen with other factors, as mentioned in chapter 2. This study presents an opportunity for the ongoing cohort to assess whether the results from this baseline analysis are consistent with subsequent cohort data.

5.3 Implications for policy, training and practice

The chapter will conclude with implications for policy development, training, and practice, as well as offering recommendations for future studies.

To begin with are the implications of the findings of the present study for policy in Tanzania. This study has demonstrated that mental illness is common in pregnant women living with HIV. Although common in this population, there are no clear strategies and guidelines for practitioners on how to screen, diagnose and manage these conditions. Additionally, the medications to treat depression and anxiety are not readily available at primary health care facilities, even though, in Tanzania, the majority of pregnant women living with HIV are managed at primary health care facilities. This could be an entry point to detect and treat depression and anxiety among this vulnerable population. Therefore, the Ministry of Health and the PMTCT programme could integrate mental health services into the routine PMTCT care. Developing clear strategies and guidelines on how to screen, diagnose and treat mental health among pregnant women living with HIV would facilitate this integration. Furthermore, the mental health strategy should address the availability of medication to treat anxiety and depression in all facilities that provide PMTCT services. In addition to the pharmacological considerations, psychological interventions may be more acceptable and affordable among PLHIV in LMICs. Although there is limited robust evidence on the efficacy of cognitive behavioural therapy (CBT) among PLHIV in LMICs (153), CBT can improve HAART adherence and lower diseae progression (154). In this population of women presenting with

mild symptoms of common mental illness, they should be offered CBT before even considering pharmacological intervention. Nurses at the clinic can provide CBT for those screening positive and probably refer only clients who are severe or not responding.

The findings of the present study have a number of implications for training. Similar to other LICs, in Tanzania, the human resources available to address mental health are inadequate (155). Most of the mental health specialists are based in urban areas while the vast majority of the citizens are living in rural locations. This unmet need for mental health specialists, particularly in rural areas, is of concern, considering the presence of known risk factors for mental illness such as poverty and social disparities (138). Further efforts to train mental health specialists are urgently needed. However, training of more mental health specialists is a long-term plan and training alone is not expected to resolve the current gap in the mental health workforce.

To address this gap in the mental health workforce, WHO recommends a task sharing strategy (156). It is a process of delegation whereby tasks are moved, where appropriate, to less specialised health workers. Task sharing to non-specialist mental health providers can be in four levels: to the medical doctors, non-physician clinicians, nurses and community healthcare workers (157). Task sharing is not a new strategy. It was implemented successfully to address the HIV/AIDS epidemic. The WHO HIV "Treat, Train, Retain" plan not only offers task sharing recommendations, but also includes the implementation guidelines (158). For example, one review reported that in most African settings doctors delegated ART initiation and monitoring to nurses and other non-physician clinicians. As a result, more patients were being served and were receiving high-quality care. In addition, the review found that the delegation of ARV initiation and monitoring to nurses and non-physician clinicians was cost-effective (159). Additionally, in some countries, lay counsellors, including those living with HIV, have been instrumental in ART adherence counselling. They provide both pre- and post-test counselling, follow-ups and home visits when necessary to enhance retention (160).

Especially for mental health, task sharing non-specialist mental healthcare workers exclude psychiatrists, neurologists, psychologists, psychiatric nurses and mental health social workers. A recent review by Singla found that the common non-specialist mental health providers in primary health care facilities in LMICs were community healthcare workers (161). Furthermore, Petersen and colleagues in South Africa suggested that in a population of 100 000, to achieve a minimal (30 to 50%) mental health service coverage, the primary health care

staffing package should include one mental health counsellor and around seven community mental health workers (162).

Although the evidence from LMICs shows that the task sharing approach has potential in delivering mental health services in primary health care, the challenge has been how to implement the mental health task sharing within HIV/AIDS care. With a well-established HIV/AIDS programme, the mental health task sharing can be enhanced by training HIV/AIDS providers and then delegating them to provide mental health care. With routine support from mental health specialists, mental health task sharing to the well-established HIV care will be more effective (156).

A good model for both training and implementation of mental health care at primary care facilities is the one suggested by the WHO Mental Health Gap Action Programme (mhGAP) (163). The mhGAP was launched in 2008, aimed to scale up care for MNS disorders. The recommendations were later followed by the intervention guide in 2010, which suggests clinical steps for assessment and management of MNS disorders. Adequate and appropriate training is necessary for scaling up mhGAP MNS disorders, more importantly because care for these conditions depends more on providers' knowledge and skills than technology or equipment. The mhGAP follows the "cascade" model of training with two levels: at the first level, the master trainers train trainers/facilitators, provide them with supportive supervisors, and ensure that they have the ability to train and support health workers. At the second level, the trainer/facilitator trains non-specialist healthcare providers on the assessment and management guidelines for MNS disorders. In addition, they coordinate supervision and support to health workers. Then, the non-specialist providers (NSP) implement the mhGAP Intervention Guide (mhGAP-IG) (164).

Following the roll-out of mhGAP, there is vast evidence from LMICs of improvements in mental health case detection and management (165–167). For instance, in Nigeria, evidence shows that the case detection, reporting, and referrals of the four priority MNS disorders increased following training of NSP on the mhGAP-IG, whereas before the implementation, no cases were reported from primary healthcare providers in those facilities. There was an improvement in the general knowledge of mental illness among NSP, as well as an improvement in essential supplies of psychiatric drugs (166).

In East African countries, studies in Ethiopia and Kenya reported a significant increase in the detection of mental illnesses following the implementation of mhGAP-IG. Additionally,

Ethiopia noted a significant increase in the number of trained mental health professionals and in mental health institutions (165,168). Despite a number of reported challenges, the integration of mental health into primary health care in Ethiopia looks promising. Tanzania and other East African countries can learn from the Ethiopian model of mental health task sharing. The mental health task sharing can help address the current mental health care among women living with HIV. This is of particular use, especially in this population with high comorbidity of depression and anxiety, as mhGAP separates depression from other mental illnesses. A recommendation regarding this is to have a transdiagnostic approach discussed early.

Finally, the findings of the present study have a number of implications for practice. Firstly, in order to implement mhGAP at primary health care facilities, valid and reliable assessment tools are essential. However, as mentioned in the study limitations, the mhGAP outcome measures, such as depression measures, have not been validated in Tanzania. Furthermore, as presented in the results section, the comorbidity of mental illness was common, probably even more common compared with a single disorder. Although only a few, there are screening tools for comorbid anxiety and depression validated elsewhere for use in primary healthcare. Among the validated tools for primary health care are the Primary Care Evaluation of Mental Disorder, and the Symptom Driven Diagnostic System for Primary Care (81). However, these are just screening tools and they do not address the treatment of mental illnesses. A pragmatic feasible solution to the challenge of comorbidity and assessment tools is the transdiagnostic treatment approach (169). The transdiagnostic approach acknowledges the presence of comorbidity and that some of these disorders have some similarity in their pathophysiology.

To implement the transdiagnostic treatment approach effectively, Bolton and colleague suggested the adoption of the Common Element Treatment Approach (CETA). By CETA, NSPs are trained to identify common elements within each disorder treatment package and how to tailor them to an individual. For example, since these disorders have cognitive and behavioural factors attached, identifying cognitive and behavioural factors and helping patients to make the right choices has been shown to be effective in managing depression and anxiety (170). CBT is also effective in managing patients with depression and anxiety (171). The management of the comorbidity with CBT is challenging; therefore, a symptomatic approach is recommended (171) ,with the therapy targeting the most severe symptoms.

CBT can be used in addition to the pharmacological approaches (150). The results of one systematic review reported that nefazodone was effective in treating anxiety and depression (172). However, it is advisable to treat anxiety first, because patients with controlled anxiety

are more likely to adhere to antidepressants. In addition, selective serotonin reuptake inhibitors (SSRI) are considered the first line in treating comorbid depression and anxiety (81). Additionally, aripiprazole, quetiapine, and gabapentin, among others, are FDA-approved drugs for treating depression with comorbid anxiety. While some are effective alone, others such as gabapentin can be combined with SSRI to achieve maximum effectiveness (150).

5.4 Conclusion

In this population of women living with HIV, we found a high prevalence of possible depression and anxiety. Similarly, the prevalence of comorbidity of possible depression and probable anxiety was high. The majority of women who met the criteria for possible depression also screened positive for probable anxiety. In order to meet the target of elimination of MTCT of HIV, mental health-related issues need to be addressed with a similar emphasis to that of physical health. Unmarried women, women with a history of experiencing violence, women with food insecurity, and those who felt ashamed of their HIV had higher odds of mental illness. These factors are deeply rooted in the culture and beliefs, which emphasises the importance of interventions that provide psycho-social support and address the local context.

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Appendix I: Option B+ Study- baseline assessment tool

BASELINE ASSESSMENT

Study ID: ___ ___ ___ ___
Clinic Individual ID

Date of Survey: ___/ __ /___
dd mm yyyy

Interviewer: _____

If interview not held at clinic, indicate where: _____

Clinic:

1. Majengo
2. Pasua
3. KCMC
4. Bondeni
5. St. Joseph
6. Himo OPD
7. Faraja
8. Cogi
9. Msaranga

Interviewer:

1. Pilli
2. Monica

General Instructions

Before beginning, say to participant:

Nitakuuliza baadhi ya maswali juu yako mwenyewe. Hakuna majibu sahihi kwa maswali haya. Chagua jibu ambalo linaelezea nafsi yako vizuri zaidi. Tuko mahali faragha na hakunamtu atasikia majibu yako, na nitazitunza kwa siri. Unaweza kutokujibu swali lolote ambayo utaki kujibu, na unaweza kupumzika au kuacha kujibu maswali muda wowote. Usipo elewa swali, tafadahli niambie. Ni muhimu sana kujibu maswali yote kwa uaminifu.

Basic Demographics		
DEM1	How old are you? [Confirm with date of birth, if needed]	
DEM2	Do you live in Moshi town?	1. Yes 2. No
DEM3	*If living in Moshi*: What ward do you live in?	
DEM4	*If NOT living in Moshi*: Where do you live?	
DEM5	How long have you lived in this place?	_____ years _____ months
DEM6	How do you typically travel from your home to this clinic?	1. Walk (skip to DEM9) 2. Dala dala 3. Boda boda 4. Private car / Taxi 5. Other: _____
DEM7	How much does it cost you to travel from your home to this clinic?	_____ TSh
DEM8	Who pays for your transport cost from your home to the clinic?	1. Myself 2. My husband 3. Relative 4. Other, specify: _____
DEM9	How long does it take you to get from your home to this clinic?	_____ hours _____ minutes
DEM10	What is your religion?	1. Christian, denomination: _____ 2. Muslim 3. No religion 4. Other religion: _____
DEM11	What is the highest level of school that you completed?	1. No formal education 2. Primary education (specify level attained: _____) 3. Secondary education (Specify level attained: _____) 4. Higher education (Specify field: _____)

DEM12	What best describes your current relationship status?	1. Married 2. Single, not in a relationship 3. In a relationship, but not married 4. Separated from spouse/ Divorced 5. Widow
DEM13	*If currently married or in a relationship*: Is this person the father of the child you are pregnant with?	1. Yes 2. No 3. Don't know
DEM14	Do you currently live with your partner?	1. Yes, all the time 2. Yes, sometimes 3. No 4. Not in a relationship
DEM15	*If married*: Are you in a polygamous relationship?	1. Yes 2. No
DEM16	What is your partner/husband's highest level of education?	1. No formal education 2. Primary education (specify level attained: _____) 3. Secondary education (Specify level attained: _____) 4. Higher education (Specify field: _____)
Socio-Economic status		
SES1	Does the house where you live have electricity?	1. Yes 2. No
SES2	Does the house where you live have piped water inside?	1. Yes 2. No
SES3	Do you own a cell phone?	1. Yes 2. No
SES4	Are you currently working in any sector where you receive a regular monthly salary?	1. Yes 2. No
SES5	What type of work do you do?	_____

SES6	If you are not formally employed, what do you do to earn an income?	1. No income-earning activities 2. Big farmer 3. Peasant farmer 4. Business 5. Petty trader 6. Other, specify: _____
SES7	*If any work*: How much money do you earn per month from these activities? (on average)	_____ TSh.
SES8	*If in a relationship*: Does your husband/partner work in a sector where he receives a regular monthly salary?	1. Yes (Skip to SES10) 2. No 3. N/A, not in a relationship (Skip to SES11)
SES9	If he's not formally employed, what does he do to earn an income?	1. No income-earning activities (Skip to SES11) 2. Big farmer 3. Peasant farmer 4. Business 5. Petty trader 6. Other, specify: _____
SES10	How much money does your husband/partner earn per month, on average, from these activities?	_____
SES11	Who provides the primary financial support in your household?	1. Myself 2. Husband 3. Parents / In-laws 4. Others, specify _____
Pregnancy history		
PREG1	When was your last normal menstrual period?	_____ dd/mm/yy
PREG2	Is this the first time you have been pregnant?	1. Yes (Skip to HIV1) 2. No
PREG3	Before this, how many times have you been pregnant?	_____

PREG4	Mode of develivery in the previous pregnancy	1. SVD 2. Caesarian section 3. Forceps 4. Episiotomy 5. Other, specify ……..
If other times she's been pregnant: What was the outcome of those other pregnancies? (shaded boxes should add up to PREG3)		
PREG5	Number of children who are still alive. (If 0, skip to PREG7)	
PREG6	Are any of those children HIV-positive? (Write number who are HIV+; if none, write 0)	
PREG7	Number of (spontaneous) miscarriages (<20 weeks)	
PREG8	Number of still births (>20 weeks)	
PREG9	Number of (induced) abortions	
PREG10	Number of children who have died (in infancy, childhood, or adulthood) (If 0, skip to PLAN1)	
PREG111	Were any of those children who died HIV-positive? (Write number who are HIV+; if none, write 0)	
HIV history		
HIV1	When did you first learn that you were HIV-positive?	1. During this pregnancy (skip to HIV3) 2. Before this pregnancy
HIV2	*If before this pregnancy*: What motivated you to go for test?	1. Illness 2. VCT 3. Previous pregnancy 4. National campaign

		5. Others, specify _____
HIV3	What was the date when you learned that you were HIV-positive? (if she doesn't know exact date, give best estimate)	_____ month _____ year
HIV4	Has your partner / husband been tested for HIV?	1. Yes 2. No (skip to DEM6) 3. Don't know (skip to DEM6)
HIV5	*If tested:* What was the result of his most recent HIV test?	1. HIV-positive 2. HIV-negative 3. Don't know
For the next 5 items, ask to see the patient's HIV clinic card. (Only for clients who agreed for their cards to be reviewed)		
HIV6	What was your latest CD4 count count? (check patient card)	_____ cells/mL 8. Card not available 9. No CD4 test result recorded
HIV7	Nadir/lowest CD4 count (check patient card)	_____ cells/mL 7. Only one CD4 test result recorded 8. Card not available 9. No CD4 test result recorded
HIV8	Viral load (check patient card)	_____ 8. Card not available 9. No viral load test result recorded
ARV history		
ARV1	What ARV regimen are you currently using? (check patient card or pill bottle)	1. TLE (Tenofovir, Lamivudine and Efavirenz) 2. Other: _____ 8. Information not available
ARV2	When did you start taking ARVs? (check patient card, or provide patient's best estimate)	____ / ____ / ____ dd mm yy 8. Information not available
ARV3	Prior to this pregnancy, have you ever used any ARVs?	1. Yes 2. No (skip to next section)

ARV4	Have you used ARVs during a previous pregnancy?	1. Yes 2. No
ARV5	Have you ever received ARVs at a CTC clinic for your own health?	1. Yes 2. No

Modified Household Food Insecurity Access Scale (FHI)

Description: I am now going to ask you some questions about your household, and how easy or difficult it is to get the food you need.

FHI1	In the past month, how often could you not feed your family?	0. Never 1. Once or twice 2. More than once or twice but not every day 3. Every day
FHI2	In the past month, how often were you hungry, but did not eat because you could not afford enough food?	0. Never 1. Once or twice 2. More than once or twice but not every day 3. Every day
FHI3	In the past month, how often did you or other adults in your household not eat for a whole day because there was not enough money for food?	0. Never 1. Once or twice 2. More than once or twice but not every day 3. Every day
FHI4	In the past month, how often did you or other adults in your household cut the size of your meals because there was not enough money for food?	0. Never 1. Once or twice 2. More than once or twice but not every day 3. Every day

Depression: Edinburgh Postnatal Depression Scale (EPDS)

Description: As you are pregnant, we would like to know how you are feeling. Please listen to each statement. I will then read some answer choices. I'd like you to select the answer that comes closest to how you have felt in the past 7 days, not just how you feel today.

EPDS1	I have been able to laugh and see the funny side of things.*	0. As much as I always could 1. Not quite so much now 2. Definitely not so much now 3. Not at all
EPDS2	I have looked forward with enjoyment to things.*	0. As much as I ever did 1. Rather less than I used to 2. Definitely less than I used to

		3. Hardly at all
EPDS3	I have blamed myself unnecessarily when things went wrong.	0. Yes, most of the time 1. Yes, some of the time 2. Not very often 3. No, never
EPDS4	I have been anxious or worried for no good reason.	0. No, not at all 1. Hardly ever 2. Yes, sometimes 3. Yes, very often
EPDS5	I have felt scared or panicky for no very good reason.	0. Yes, quite a bit 1. Yes, sometimes 2. No, not much 3. No, not at all
EPDS6	Things have been getting on top of me.	0. Yes, most of the time I haven't been able to cope at all 1. Yes, sometimes I haven't been coping as well as usual 2. No, most of the time I have coped quite well 3. No, I have been coping as well as ever
EPDS7	I have been so unhappy that I have had difficulty sleeping.	0. Yes, most of the time 1. Yes, sometimes 2. Not very often 3. No, not at all
EPDS8	I have felt sad or miserable.	0. Yes, most of the time 1. Yes, quite often 2. Not very often 3. No, not at all
EPDS9	I have been so unhappy that I have been crying.	0. Yes, most of the time 1. Yes, quite often 2. Only occasionally 3. No, never
EPDS10	The thought of harming myself has occurred to me.	0. Yes, quite often 1. Sometimes 2. Hardly ever 3. Never

Anxiety: BSI Anxiety Subscale (BSI)
Description: I am going to read a list of problems people sometimes have. Please listen to each one carefully and tell me how much that problem has distressed or bothered you during the past 7 days, including today.

		Not at all	**A little bit**	**Moderately**	**Quite a bit**	**Extremely**

BSI1	Nervousness or shakiness inside.	0	1	2	3	4
BSI2	Feeling tense or keyed up.	0	1	2	3	4
BSI3	Suddenly scared for no reason.	0	1	2	3	4
BSI4	Spells of terror or panic.	0	1	2	3	4
BSI5	Feeling so restless you couldn't sit still.	0	1	2	3	4
BSI6	Feeling fearful.	0	1	2	3	4

History of mental illness (HXMI)

HXMI1	Have you ever been diagnosed with any mental illness?	1. Yes 2. No 3. Don't know
HXMI2	What is the name of the mental illness?	3. Don't know

Alcohol use: AUDIT-C (AUDIT)

Description: Now I am going to ask you some questions about your use of alcoholic beverages during the past 3 MONTHS. By alcohol, I am referring to any spirits, beer, wine or local brew.

AUDIT1	How often did you have a drink containing alcohol?	0. Never (skip to next section) 1. Monthly or less 2. 2-4 times a month 3. 2-3 times a week 4. 4 or more times a week
AUDIT2	How many standard drinks containing alcohol did you have on a typical day? NOTE: One drink is equal to 1 can or small bottle of beer, 1 glass of wine, 1 shot of spirits or liquor, or 1 serving of local brew.	0. 1 or 2 1. 3 or 4 2. 5 or 6 3. 7, 8, or 9 4. 10 or more
AUDIT3	How often did you have 6 or more drinks on one occasion?	0. Never 1. Less than monthly 2. Monthly 3. Weekly 4. Daily or almost daily

The HIV- and abuse-related shame inventory Shame Inventory (HARSIH)

Description: I am going to read a list of statements describing feelings that many people with HIV have. Please let me know how true each statement has been for you during the past MONTH.

		Not at all	A little bit	Somewhat	Quite a bit	Very much
HARSIH1	It is hard to tell other people about my infection.	0	1	2	3	4
HARSIH2	I have failed to live up to my own expectations by getting HIV.	0	1	2	3	4
HARSIH3	When I tell others I have HIV, I expect them to think less of me.	0	1	2	3	4
HARSIH4	I put myself down for becoming HIV+.	0	1	2	3	4
HARSIH5	Being HIV+ makes me feel defective, like there is something wrong with me.	0	1	2	3	4
HARSIH6	I am ashamed that I'm HIV+.	0	1	2	3	4
HARSIH7	When others find out I am HIV+, I expect them to reject me.	0	1	2	3	4
HARSIH8	I struggle with feeling worthless because I have HIV.	0	1	2	3	4
HARSIH9	I am ashamed by my HIV symptoms.	0	1	2	3	4
HARSIH10	I hide my infection from others.	0	1	2	3	4
HARSIH11	I have an overpowering dread that my HIV status will be revealed to others.	0	1	2	3	4
HARSIH12	I accept myself as an HIV+ person.	0	1	2	3	4
HARSIH13	Having HIV makes me want to hide, disappear, or even die.	0	1	2	3	4

Attitudes about pregnancy: Adapted from Guttmacher measure (PREGAT)

Description: I'm going to read you some statements about how you may feel about your pregnancy. Please listen to each statement and tell me how much you disagree or agree with each statement.

		Strongly Disagree	Disagree	Agree	Strongly Agree
PREGAT1	This pregnancy is a result of a plan I made to get pregnant.	0	1	2	3
PREGAT2	Before getting pregnant, I knew that I wanted to have a baby.	0	1	2	3

PREGAT3	When I learned I was pregnant, I felt happy.	0	1	2	3
PREGAT4	I looked forward to telling my friends that I was pregnant.	0	1	2	3
PREGAT5	This pregnancy came at the right time of my life.	0	1	2	3
PREGAT6	My partner wanted me to become pregnant.	0	1	2	3
PREGAT7	I feel happy about being pregnant.	0	1	2	3
PREGAT8	If I could do it all over again, I would still choose to be pregnant at this time.	0	1	2	3

Perceived Availability of Social Support (PAS)

Description: The following questions have to do with the support you get from people in your life. I'm going to read you a series of questions about the different types of help people might give you. Please tell me whether someone would be available to provide that kind of help or support if you needed it. Remember that I'm not asking whether or not you need this kind of help at this time, but whether someone could help you if you needed it.

		Definitely not	**Probably not**	**Possibly**	**Probably yes**	**Definitely yes**
PAS1	Would someone be available to talk to you if you were upset, nervous, or depressed?	1	2	3	4	5
PAS2	Is there someone you could contact if you wanted to talk about an important personal problem you were having?	1	2	3	4	5
PAS3	Is there someone who would help take care of you if you had to stay in bed for several weeks?	1	2	3	4	5
PAS4	Is there someone you could turn to if you needed to borrow 2,000 TSh, needed to get a ride to the doctor, or needed some other small immediate help?	1	2	3	4	5

PAS5	Is there someone you could turn to if you needed to borrow some money to help pay your rent for one month?	1	2	3	4	5
PAS6	Would the people in your personal life give you information, suggestions, or guidance if you needed it?	1	2	3	4	5
PAS7	Is there someone you could turn to if you needed advice to help make a decision?	1	2	3	4	5
PAS8	Is there someone who could take care of your children if you got sick?	1	2	3	4	5

HIV Disclosure (HIVD)

Description: I would now like to hear about your experience talking to people in your life about your HIV status. If you have not talked to anyone about your status, or don't have plans to talk to anyone about your status, that is completely understandable and it is fine to say so.

		No	**Yes**	
HIVD1	Have you ever told another person about your HIV status?	0 [go to next section]	1	
		No	**Yes**	**N/A**
HIVD2	Have you told your partner/husband?	0	1	2
HIVD3	Have you told any other sexual partners? [*If no other sexual partners, choose N/A*]	0	1	2
HIVD4	Have you told any family members?	0	1	2
HIVD5	Have you told any friends?	0	1	2
HIVD6	How soon after learning your HIV status did you first disclose your HIV status to someone outside of this clinic? [*If disclosed on same day, write 0 days.]*	_____ days _____ weeks _____ months		

HIVD7	In the last 3 months, has your HIV status ever been told to someone else without your consent?	1. Yes 2. No
HIVD8	In the last 3 months, have you experienced any negative reactions after you told someone your HIV status?	1. Yes 2. No 3. N/A

Enacted Stigma: HIV/AIDS Stigma Instrument (HASI)

Description: I'm going to read a list of events that may have happened to you because you are living with HIV. Please tell me in the past 3 months, how often each of these things happened to you because of your HIV status.

		Never	Once or Twice	Several Times	Most of the time
HASI1	I was asked to leave because I was coughing.	0	1	2	3
HASI2	Someone stopped being my friend.	0	1	2	3
HASI3	I was called bad names.	0	1	2	3
HASI4	I was made to eat alone.	0	1	2	3
HASI5	Someone insulted me.	0	1	2	3
HASI6	People avoided me.	0	1	2	3
HASI7	People cut down visiting me.	0	1	2	3
HASI8	People ended their relationships with me.	0	1	2	3
HASI9	I was blamed for my HIV status.	0	1	2	3
HASI10	My ability to earn money was impacted.	0	1	2	3
HASI11	People gossiped about me.	0	1	2	3

INTERPERSONAL VIOLENCE (VIOL)

Description: Here is a list of questions about how often you have experienced different types of violence, both when you were a child and now as an adult. Please listen to each question carefully and tell me whether you have ever had this experience.

		Yes	No
VIOL1	Has a spouse/partner ever insulted you or called you bad names?	1	2
VIOL2	*IF YES:* Has this happened in the last 3 months?	1	2

		Yes	No
VIOL3	Has partner/husband ever hit, slapped or hurt you physically in any other way?	1	2
VIOL4	*IF YES:* Has this happened in the last 3 months?	1	2
VIOL5	As an adult, has someone ever forced you to have sex when you didn't want to?	1	2
VIOL6	*IF YES:* Has this happened in the last 3 months?	1	2
VIOL7	As a child, were you ever forced to have some kind of sexual contact, touching, oral sex, or intercourse?	1	2

HIV care engagement

Description: For many people it is difficult to attend every medical appointment. The following questions ask you about your experiences going to HIV/wellness clinic appointments.

		No	Yes
VISIT1	In the PAST 3 MONTHS, have you attended any appointments in the HIV / PMTCT / antenatal care clinic?	0	1
VISIT2	In the PAST 3 MONTHS, how many of these appointments have you attended?		
VISIT3	In the PAST 3 MONTHS, how many times have you MISSED your originally scheduled clinic appointment?		
VISIT4	In the PAST 3 MONTHS, how many times have you RESCHEDULED and then COMPLETED your appointments?		

Appendix II: Literature search strategy

	Depression	
#1	burden OR Prevalence OR Prevalences OR Frequency OR Proportion OR Incidence OR epidemiology	3441956
#2	Depressions OR Depressive Symptoms OR Depressive Symptom OR Symptom Depressive OR Symptoms Depressive OR Emotional Depression OR Depression Emotional OR Depressions Emotional OR Emotional Depressions	355660
#3	factors OR factor OR risk factor OR risk factors OR determinants OR determinant OR predictor OR predictors OR population at risk OR risk population	5007254
#4	pregnant OR pregnant OR pregnancy OR pregnancies OR antenatal OR prenatal OR natal OR prenatal OR partum OR antepartum OR prepartum OR peripartum OR "mother-to-child transmission" OR "vertical transmission"	946007
#5	HIV AIDS OR HIV/AIDS OR HIV OR AIDS OR PMTCT OR people living with HIV OR human immunodeficiency virus OR acquired immunodeficiency syndrome	419490
#6	#1 OR #2	7105894
#7	#6 AND #3	106739
#8	#7 AND #4	5345
#9	#8 AND #5	153
Filters		
Human only		153
Full text available		153
languages		153

	Anxiety	
#1	burden OR Prevalence OR Prevalences OR Frequency OR Proportion OR Incidence OR epidemiology	3442201
#2	factors OR factor OR risk factor OR risk factors OR determinants OR determinant OR predictor OR predictors OR population at risk OR risk population	5007254

#3	anxiety OR Anxieties OR Hypervigilance OR Nervousness	190416
#4	pregnant OR pregnant OR pregnancy OR pregnancies OR antenatal OR prenatal OR natal OR prenatal OR partum OR antepartum OR prepartum OR peripartum OR "mother-to-child transmission" OR "vertical transmission"	9460048
#5	HIV AIDS OR HIV/AIDS OR HIV OR AIDS OR PMTCT OR people living with HIV OR human immunodeficiency virus OR acquired immunodeficiency syndrome	419490
#6	#1 OR #2	7105894
#7	#6 AND #3	87930
#8	#7 AND #4	4428
#9	#8 AND #5	101
Filters		
Languages-English		90
	Human	75
	Full text	62