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Adherence to ART among HIV Infected Female Sex Workers in Nigeria

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Abstract

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MPH, University College Cork, 2010

BSc (Hons), Kingston University, 2006

Dissertation Submitted in Fulfillment

of the Requirements for the Degree of

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Abstract

A lack of adherence to antiretroviral therapy (ART) increases the risk of onward human immunodeficiency virus (HIV) transmission and mortality. The purpose of this cross-sectional study based on Andersen's conceptual framework was to test the associations between age, marital status, job/occupational status, education, membership in a peer support group, community and facility ARV drug refill and alcohol and substance use, and adherence to ART among female sex workers (FSWs) who are 15 years and older in Rivers and Cross Rivers states Nigeria. Data were abstracted from existing program data collected between January 2015 and December 2017 by Heartland Alliance International, Nigeria. Results from chi-square statistics showed that age, job/employment, and marital status were not associated with adherence to ART. Binary logistic regression analyses showed that respondents with senior secondary education were 1.385 times more likely to adhere to ART than other education levels (*OR* = 1.385, 95% *CI* = 1.203, 1.593). Respondents who had ARV refill in the facility were 1.737 times more likely to adhere to ART than respondents who had community ARV refill (*OR*= 1.737, 95% *CI*: 1.297, 2.326). Also, respondents who were a member of a support group were 6.430 times more likely to adhere to ART compared to those not in a support group (*OR*= 6.430, 95% *CI*: 4.682, 8.831). Lastly, respondents who did not abuse alcohol or substance were 1.820 times likely to adhere to ART compared to those who did (*OR*= 1.820, 95%: *CI:* 1.356, 2.444). All-inclusive key population policies could aid in lessening the barriers the FSWs face in receiving comprehensive health services as well as endorsing interventions such as alcohol and drug rehabilitation, counseling, and incentives to join peer support groups that could benefit FSWs, their clients, and families.

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Dedication

This is dedicated to almighty God for giving me the strength to complete this study, my beautiful wife, Ifeyinwa Yusuf, and to my lovely daughter, Damilola Yusuf, who understood time that I spent writing papers and who provided a great deal of support, laughter, and happiness.

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Chapter 1: Introduction to the study

Introduction

Female sex workers (FSWs) are prone to HIV infection (Shannon, Goldenberg, Deering, & Strathdee, 2014). FSWs in Sub-Saharan Africa have the highest HIV prevalence with about 40% living with the virus (Mountain et al., 2014). Most of the new infections (10-32%) were as a result of sex work in West African counties (Bekker et al., 2014). In Nigeria, the Integrated Biological and Behavioral Surveillance Survey (IBBSS, 2015) reported a high prevalence of HIV (19.4%) among brothel-based female sex workers (BBFSW) and 8.6% among non-brothel-based female sex workers.

Providing high-level uptake of antiretroviral therapy (ART), adherence, and retention for FSWs would not only benefit the HIV-infected FSWs individually but will also ensure that there is a reduction of HIV transmission in the population (Ugbena, Iwuagwu, Okekearu, Wole, & Ioytim, 2018). Adhering poorly to ART increases drug resistance to the virus, limits the efficacy of treatment, brings about disease progression, and reduces therapeutic options in the future, the Joint United Nations Programme on HIV and AIDS (UNAIDS, 2016). In addition, poor adherence to ART also brings about an increased risk of transmission due to viral replication not being suppressed (Bock et al., 2016).

Addressing the comprehensive HIV needs of FSWs remains a priority and strategic step towards reversing the spread of the epidemic in Nigeria (Njab et al., 2018). However, there is limited literature on HIV care and treatment experiences for FSW living with HIV in sub-Saharan Africa (Lancaster, Cernigliaro, Zulliger, & Fleming,

2016). It is, therefore, essential to understand the barriers that may prevent an FSW from adhering to ART (Azia, Mukumbang, & Van Wyk, 2016).

In this study, I examined the association between the factors of age, education, marital status, job/occupational status, alcohol and substance use, and membership of a peer support group and community versus facility drug refills related to ART adherence among FSWs in Nigeria. The findings of this study can lead to a positive social change by allowing public health professionals in the field of HIV/AIDS to have a better understanding of the barriers to adherence to ART. This will ensure they tailor their interventions to the needs of the HIV-infected FSWs. This could be crucial in supporting FSWs to adhere to ART and reduce HIV transmission (Ugbena et al., 2018). The social change implication informs the implementation of all-inclusive key population (KP) policy that could aid in reducing the barriers the FSWs face in receiving comprehensive health services as well as endorsing a range of interventions that are specific to this population (Njab et al., 2018; Ugbena et al., 2018). If tailored interventions are created, the lives of FSWs, their families, communities, and customers will be improved.

The major sections of this chapter are the background, problem statement, purpose, research questions, theoretical framework, the nature of the study, definitions, assumptions, scope, limitations, and significance.

Background

Adherence to ART is described as a dynamic and complex process (Azia et al., 2016). Lack of adherence to ART has led to a lack of follow-up and retention in care (Zulliger, Barrigton & Donastorg, 2015). Zulliger, Maulsby, Barrigton et al (2015)

determined factors associated with retention in HIV care among a highly vulnerable group including FSWs in the Dominican Republic, using multiple retention measures. They used a baseline, biobehavioral, quantitative survey from Abriendo Puertas (AP) that was a multilevel intervention for FSWs. Zulliger, Maulsby & Barrigton (2015) found that the odds of being retained in HIV care were higher among FSWs with more positive perceptions of HIV service providers. The authors stated that surveys with key populations should include questions on participants' engagement with HIV care. They also stated that retention in HIV care among FSWs was associated with not drinking alcohol and possessing lower self-stigma. In addition, they stated that these factors represent important, mutable targets for future public health policy and programming to improve retention in HIV care among FSWs. This is within the scope of my study, which had community versus facility drug refill and alcohol intake as variables in the research questions.

Goldenberg et al. (2016) researched the structural determinants of ART use in a prospective cohort of FSWs living with HIV over time. They used longitudinal data drawn from an open prospective cohort, the Evaluation of Sex Workers Health Access (AESHA), and confidential linkages to provincial health administrative databases on ART pharmacy dispensation. They concluded that structural barriers, including migration/mobility and incarceration, continue to impede engagement with ART for sex workers living with HIV. This is related to this study which examined the nature of drug refills through facility and community ARV refill. The community refill involves less mobility as ARVs are taken to the FSWs. When appropriate supports from peers are

provided, sex workers can effectively engage in HIV care and achieve high levels of ART adherence (Goldenberg et al., 2016). This often depends on the provision of supports, including follow-up with outreach teams and peer educators (Goldenberg et al., 2015).

Duff et al. (2016) examined the relationships between individual biological, interpersonal structural, and workplace factors and undetectable viral load (VL) among FSWs. Duff et al. concluded that their findings point to the need of more research on the social and structural context that shape access and adherence to HIV treatment and prevention among FSWs, including gender-sensitive, community-based research on barriers and facilitators to HIV care for FSWs. The is within the scope of my study, in which I tested social support measured by membership in a peer support group and community versus facility-based antiretroviral (ARVs) drugs refill.

Lancaster, Cernigliaro, Zulliger & Fleming (2017) examined the relationships between alcohol and marijuana use with suboptimal HIV treatment adherence among HIV-infected FSWs. Lancaster et al. used cross-sectional, venue-based sampling as their methodology and found that both alcohol and marijuana affected engagement to ART treatment required to reduce viral suppression, improve health, and reduce transmission. This outcome was consistent with other studies on factors associated with retention (Zulliger Maulsby & Barrigton ., 2015) and effect of sex work on virologic outcomes among drug users who have universal health care (Til et al., 2014).

Mtetwa Busza, Chidiya, Mungofa & Cowan (2013) explored why women were not retained in care following assisted referral from a sex work program. Mtetwa et al.

used a qualitative study using a focus group design and found that a variety of barriers, both structural and health-systems-related, led to loss to follow-up in FSWs who are positive for HIV. Mtetwa et al. concluded that improving access to care for these women is critical for their health and for decreasing the incidence rate of HIV. This is consistent with another study on coverage among men who have sex with men (MSM) and FSWs in Cameroon to evaluate retention in the continuum of HIV care (Billong, Billong, Tamoufe ,Lebreton, Kamla & Baral (2015). This is within the scope of my study which looked at health system factors such as community versus facility ARV drug refill.

Ugbena et al. (2018) assessed ART outcomes among key populations (KPs) after 6 months of initiation in Nigeria. Ugbena et al. conducted a longitudinal study of all HIV positive KPs initiated on ART in 7 One-Stop-Shops (OSS) at two separate times and found that FSWs had the lowest retention rate (65.4%) but higher transfer out rate (4.9%) than MSM (4.7%). Ugbena et al. further stated that factors positively associated with retention at 6 months included being a male, higher education, been employed, and living with sex partner.

Ugbena et al.(2018) study was consistent with another study on adherence to ART among HIV and AIDS patients in South Africa (Eyassu Mothiba & Mbambo-Kekana , 2015). The authors used a quantitative cross-sectional descriptive design and a non-probability systematic sampling methodology. Eyassu et al. concluded that adherence to ART at the Kwa-Thema clinic was suboptimal (less than 95%) at 77%, but comparable with the adherence levels in other developing countries.

Prah et al., (2018) examined factors affecting adherence to ART among

HIV/AIDS patients in Cape Coast Metropolis, Ghana. Prah et al. used an analytical cross-sectional study to determine factors that influence adherence to ART among HIV/AIDS patients using three hospitals that provide full ART services. Prah et al. concluded that patients on ART in the Cape Coast metropolis, Ghana, were found to have a suboptimal lifetime adherence to their medications as well as a high rate of missed clinic visits.

Njab et al., (2018) examined HIV Treatment Cascade Assessment of a Community-Based Test and Start Model for KPs in Lagos State Nigeria to identify the gaps. Njab et al. stated that major gaps in achieving retention in care and viral load suppression existed. Distance and cost of transportation to the health facility called the OSS appeared to constitute a barrier to retention in care for these underserved populations (Njab et al., 2018). In this study, I examined community versus facility ARV refills as a barrier to FSW adhering to ART.

Azia et al. (2018) examined the barriers to adherence to ART treatment in a regional hospital in South Africa. Azia et al. used a qualitative research design to examine nonadhering patients. Azia et al. showed that various factors were responsible for lack of adherence including unemployment, inadequate feeding, lack of transport, disclosure, and disability.

Various scholars have highlighted several barriers to adherence to ART both in developed and developing countries (Azia et al., 2016). Many of these researchers focused on the general population (Bijker et al., 2018, Eyassu, Mothiba, & Mbambo-Kekana, 2016; Prah et al., 2018). The few scholars who focused on FSWs used data from research settings that had specific interventions (Mountain et al., 2014).

Although there have been various studies on barriers to adherence, there is limited information on the barriers to ART among FSWs in Nigeria (Ugbena et al., 2018). There is a gap in the existing literature with respect to HIV treatment outcomes of FSWs (Ugbena et al., 2018). This makes this study of adherence barriers to ART among FSWs in Nigeria relevant to the field.

Problem Statement

HIV/AIDS has remained a significant public health concern for over 3 decades (Ugbena et al., 2018). The prevalence of HIV among brothel-based FSWs in Nigeria is 19.4% (Federal Ministry of Health, 2014). A key concern for optimizing treatment of HIV is the adherence to ART (Quintana, Gonzalez Martorell, Fahy, & Safran, 2018). High levels of adherence to ART are required to prevent the selection of resistance mutations and subsequent virologic failure (Ugbena et al., 2018). Adhering poorly to ART can result in an increase in viral load of HIV-infected individuals, thus increasing the risk of onward HIV transmission (Bock et al., 2016.

In this study, I used program data from the Integrated MARPS HIV Prevention Program (IMHIPP) project being implemented by Heartland Alliance International, Nigeria and funded by the President's Emergency Plan for AIDS Relief (PEPFAR) through the United States Agency for International Development (USIAD; NGO Aid Map, 2019) to examine barriers to adherence among FSWs.

There is limited literature and lack of evidence on HIV care and treatment experiences for FSW living with HIV in sub-Saharan Africa (Lancaster et al., 2016). Addressing the comprehensive HIV needs of FSWs remains a priority and strategic step

towards reversing the spread of the epidemic in Nigeria (Njab et al., 2018). However, KPs' data on ART outcomes are lacking in Nigeria (Ugbena et al., 2018). In this study, I addressed this gap in the literature.

Purpose

The purpose of this quantitative, cross-sectional study was to test the associations between age, education, job/employment status, community versus facility ARV refill, alcohol and substance use and membership in a peer support group, and adherence to ART among FSWs who are 15 years and older in Nigeria.

Research Questions and Hypotheses

Research Question 1 (RQ1): What is the association between social-demographic factors of age, education, marital status, job/occupational status, and adherence to ART among FSWs in Nigeria?

$H_0$1: There is no significant association between age, education, marital status, job/occupational status, and adherence to ART among FSWs in Nigeria.

H_a1: There is a significant association between age, education, marital status, job/occupational status, and adherence to ART among FSWs in Nigeria.

Research Question 2 (RQ2): What is the association between social support measured by membership in a peer support group and adherence to ART among FSWs in Nigeria?

$H_0$2: There is no significant association between social support measured by membership in a peer support group and adherence to ART among FSWs in Nigeria.

H_a2: There is a significant association between social support measured by

membership in a peer support group and adherence to ART among FSWs in Nigeria.

Research Question 3 (RQ3): What is the association between community and facility ARV drug refill and adherence to ART among FSWs in Nigeria?

$H_0$3: There is no significant association between community and facility ARV drug refill and adherence to ART among FSWs in Nigeria.

H_a3: There is a significant association between community and facility ARV drug refill and adherence to ART among FSWs in Nigeria.

Research Question 4 (RQ4): What is the association between patient-related factors of alcohol and substance abuse and adherence to ART among FSWs in Nigeria?

$H_0$4: There is no significant association between alcohol and substance abuse and adherence to ART among FSWs in Nigeria.

H_a4: There is a significant association between alcohol and substance abuse and adherence to ART among FSWs in Nigeria.

Conceptual Framework

The framework for this study was based on Andersen's behavioral model. The behavioral model is used to explore conditions that prevents or facilitates health use (Meade, Mahmoudi, & Lee, 2015). It explores the factors that guide the use of healthcare services (Meade et al., 2015). The likelihood of people living with HIV (PLHIV) being retained in HIV care is influenced by a variety of factors (Azia et al., 2016; Njab et al., 2018; Ugbena et al., 2018). According to Andersen's behavioral model for vulnerable populations, health care access may be influenced by predisposing characteristics, existence of enabling resources, and the health need of individuals (Zulliger, Maulsby &

Barrigton, 2015).

These characteristics are both influenced by and have influence upon membership in vulnerable groups such as FSWs (Gelberg, Anderson, & Leake., 2000). Andersen's behavioral model for vulnerable populations included participants' predisposing characteristics (e.g., age, household composition), enabling factors (e.g., perceived quality of services, experience of discrimination in the clinic, cost of transportation to clinic), perceived and evaluated health needs, and vulnerability (e.g., duration of sex work [SW]) and self-stigmatizing beliefs (Zulliger, Maulsby & Barrigton, 2015). This would be an ideal framework to use as the dependent variable to be explained by the various independent variables.

Anthony et al., 2007) examined the factors associated with using HIV primary care among persons diagnosed with HIV and used several variables from Anderson's behavioral model to predict the likelihood that participants had seen an HIV care provider 6 months after enrolment. Anthony et al. showed that people with higher retention and those who saw a provider by 6 months did not use injection drugs. Anthony et al. concluded that findings support the behavioral model of Anderson as it relates to health service use of persons recently diagnosed with HIV.

Nature of the Study

The nature of this study was quantitative, and the research method used was an analytical cross-sectional study (see Johnston., 2017). This research method was consistent with recent studies on how to approach barriers to adherence (Eyassu et al., 2016; Prah et al., 2018). This quantitative analysis allowed the four research questions

above to be answered, which could bring about a better understanding of factors that hinder adherence to ART.

Quantitative research methodology was used for various reasons. First, the data were secondary, and I accessed, abstracted, and organized the data. Its administration and evaluation can be done quickly (Yauch & Syeudel, 2003). In addition, the data retrieved through quantitative research encourages comparisons between groups as well as the determination of the extent in which respondents agree (Yauch & Syeudel, 2003). The advantages of quantitative methods include relatively quick data collection, precise, quantitative and numerical data provided, analysis of data is done in less time, the results of the research are not dependent on the researcher, and statistical significance and findings from the study can be generalized among a population (Choy, 2014).

The method for data collection was through data abstraction (see Ugbena et al., 2018). Data were abstracted from already existing medical records in the facility. Each facility maintained ART care cards and a national patient register that captured all the variables for analysis in this study. The following data were abstracted: sociodemographics of patients (age, education, marital status, job/occupational status), alcohol and substance use, facility and community-based ARV refill) and social support measured by membership in a peer support group.

Data were extracted based on respondents who met the eligibility criteria, and these included dates of HIV test, date of enrolment in to care, date of ART initiation, date of drug pickups, duration on ART, and date of viral load analysis that showed a minimum 6 months after ART initiation. A line listing of the patients using unique identifiers was

developed on an Excel template to capture all the variables required for analysis on the study.

The abstracted data addressed independent variables of interest, such as those similar to the Andersen's behavioral model for vulnerable populations that included participants' predisposing characteristics (e.g., age, employment status) and enabling factors (e.g., perceived quality of services; see Zulliger, Maulsby & Barrigton., 2015).

Definitions

Age: The length of time that a person has lived in years (Oxford, 2018)

Antiretroviral (ARVs): A drug used to prevent a retrovirus, such as HIV, from replicating. The term primarily refers to ARV HIV drugs (AIDSinfo, 2018)

Adherence: Taking medications (or other treatment) exactly as instructed by a health care provider. (AIDSinfo, 2018)

Educational level: Educational attainment is defined as the highest grade completed within the most advanced level attended in the educational system of the country where the education was received (United Nations, 1998).

HIV continuum of care: The steps or stages of medical treatment for HIV. The continuum of care begins when someone receives an HIV diagnosis, and includes finding the right health care, starting ART, adhering to treatment, and staying in care. The ultimate goal of the continuum of care is virological suppression. The continuum of care can also refer to a model used by epidemiologists and other (AIDSinfo, 2018).

Integrated MARPS HIV Prevention Program: A PEPFAR/USAID funded comprehensive HIV program providing services to KPs in Nigeria (NGO Aid Map,

2019).

Key population (KP): KPs include MSM, people who inject drugs (PWID), SWs, people in prisons and closed settings, and transgender people (Limaki, Farhoudi, Rasoolinejad, & Safari, 2017)

Loss to follow-up (LTFU): LTFU if the patient had been followed up at least once after ART initiation, but had not had contact with the clinic for 180 days or more since his or her last recorded expected return date, or if there were 180 days or more between the expected date of return and the next clinic visit (Mberi et al., 2015)

Marital status: A person's situation with regard to whether a person is single, married, separated, divorced, or widowed (Oxford, 2018)

Occupational status: Occupational status is one component of socioeconomic status (SES), summarizing the power, income, and educational requirements associated with various positions in the occupational structure (Burgard & Stewart, 2003)

One Stop Shop (OSSs): A model of integrated delivery, where a range of needs are met in one place through a bespoke, person-centered service that works across organizational and sectoral boundaries (Hardwick, 2013).

Peer navigator: A trained professional who helps people and their families access and understand medical and social services. Navigators can include social workers, case managers, community health workers, or patient navigators (AIDSinfo, 2018)

HIV navigation: The process of helping someone with HIV access essential HIV-related medical and social services across the continuum of care (AIDSinfo, 2018)

Quality of care: Under the Ryan White HIV/AIDS Program, quality management

is a series of activities that focus on enhancing the quality of HIV care provided and increasing access to services. These efforts focus on how health and social services meet established professional standards and user expectations (HRSA, 2018)

Social support: Social support can take the form of esteem support (the expression of respect for others or confidence in them), network support (the concept of belonging to a group with similar concerns or experiences), or instrumental support (providing tangible assistance, such as performing a task or willingness to help others in a practical way; Flickinger et al., 2017).

Substance abuse: Refers to the harmful or hazardous use of psychoactive substances, including alcohol and illicit drugs (World Health Organization [WHO], 2016).

Treatment failure: When an ARV regimen is unable to control HIV infection. Factors that can contribute to HIV treatment failure include drug resistance, drug toxicity, or poor adherence to ART (AIDSinfo, 2018)

Undetectable viral load: When the amount of HIV in the blood is too low to be detected with a viral load (HIV RNA) test. A person's viral load is considered "durably undetectable" when it remains undetectable for at least 6 months after a first undetectable test result. ARV drugs may reduce a person's viral load to an undetectable level; however, that does not mean the person is cured (AIDSinfo, 2018)

Viral load (VL): The amount of HIV in a sample of blood. VL is reported as the number of HIV RNA copies per milliliter of blood. A goal of ART is to suppress a person’s VL to an undetectable level—a level too low for the virus to be detected by a

VL test (AIDSinfo, 2018)

Virologic failure: When an ARV regimen is unable to control HIV infection. Factors that can contribute to HIV treatment failure include drug resistance, drug toxicity, or poor adherence to ART (AIDSinfo, 2018)

Viral load test: A laboratory test that measures the amount of HIV in a blood sample. Results are reported as the number of copies of HIV RNA per milliliter of blood. Examples of viral load tests include quantitative branched DNA (bDNA), reverse transcriptase-polymerase chain reaction (RT-PCR), and qualitative transcription-mediated amplification. Viral load tests are used to diagnose acute HIV infection, guide (AIDSinfo, 2018)

Viral suppression: When ART reduces a person's viral load (HIV RNA) to an undetectable level. Viral suppression does not mean a person is cured; HIV remains in the body. If ART is discontinued, the person's viral load will likely return to a detectable level (AIDSinfo, 2018)

Assumptions

An important assumption made in this study was that the data that were extracted were of high quality even though they were self-reported data about age, marital status, job/occupational status, and alcohol and substance use. It was assumed that they were accurately reported by the patients; therefore, the data in the study on these variables were as accurate as possible. It is possible that individuals may have provided answers that were not true to these questions because of the fear of stigmatization. An example is the shame of not been wanted to be identified as low income; therefore, a key assumption

was that the response to data used had been honestly reported by patients. These assumptions are necessary to the context of the study because they may affect the associations between the independent variables and adherence to ART.

Scope and Delimitation

The aim of this study was to address the problem of suboptimal care to HIV treatment among FSWs. In addition, there is limited literature on knowledge of HIV care and treatment experiences for FSW living with HIV in sub-Saharan Africa (Lancaster et al., 2016). Data on treatment outcomes among FSWs in Nigeria are lacking (Ugbena et al., 2018). In this study, I examined the barriers to ART among FSWs in Nigeria.

The boundary of this study was FSWs who had accessed HIV services within Heartland Alliance One Stop Shops, in River and Cross Rivers state. The study population was chosen as they have shown to have a high HIV prevalence and have poorer treatment outcomes when compared to other KPs (Ugbena et al., 2018). I did not take into consideration other FSWs who may be accessing services in similar One Stop Shops in other states. In addition, the population that was selected were those from the Porthacourt and Calabar OSS, which are in the urban areas of the state. It is possible that the FSWs who were selected were more educated and had higher incomes than those who were in the OSS in the rural areas. This investigation could provide further literature in the gaps in barriers among FSWs accessing ART in Nigeria.

A theoretical framework related to this area of study that was not investigated was the social cognitive theory. This theory was not used in any of the articles reviewed for adherence to ART in the FSW population. This theory has been used outside of this

population and is worth mentioning (Brown, Littlewood, & Vanable., 2013). The social cognitive theory has an interrelated web of themes that revolve around self-efficacy: personal characteristics, social interactions, and behavioral factors (Brown et al., 2013). Self-efficacy, the belief that someone can achieve some result, is the central theme of this theory (Brown et al., 2013). Many scholars have shown that those patients with greater self-efficacy levels tend to more consistent taking their ART medications and present with better control of their HIV/AIDS outcomes (Brown et al., 2013). Lastly, generalizability was limited to FSW populations in Rivers and Cross Rivers states. Generalizations for FSWs other than those in these states was not considered.

Limitations

The first limitation of this study was that the data were limited to two geographical regions of Nigeria: Rivers and Cross Rivers states. This may not be representative of other states in Nigeria (Gourlay et al., 2013). Secondly, data for this study came from the OSS, which are in urban areas. This could suggest results in urban areas that may also not be as representative of rural areas (Gourlay et al., 2013).

Additionally, there may be other confounding variables such as stigma and discrimination that may be unknown to my research. Measures to address these limitations were taken by addressing the most prominent covariates and by collecting as large a sample size of FSWs that was available (see Gourlay et al., 2013). Finally, there were no known biases that influenced the study's outcomes, as the information was obtained from the database and abstracted by independent data abstractors.

Significance

This research filled a gap by identifying the various factors that may influence adherence by FSWs to ART in Nigeria. This project was significant as it addressed an under researched KP and adherence to ART that is vital in ensuring a reduction in HIV prevalence (Njab et al., 2018; Ugbena et al., 2018). The results of this study could provide the government of Nigeria, that do not provide any KP specific HIV prevention, treatment, care, and support health services (Ugbena et al.,, 2018) and donor agencies with data on factors that could either hinder or support an FSW in adhering to ART and bring about the development of various interventions that have been shown to improve adherence to ART (Kanters et al., 2016; Spaan, van Luenen, Garnefski, & Kraaij, 2018, Ugbena et al., 2018).

By carrying out this research, I ascertained the association between various factors that influence adherence to ART among FSWs. This research could be of benefit to FSWs because adherence to ART reduces morbidity and mortality (Kim et al., 2017, Lundgren et al., 2015; Mbuagbaw et al., 2015; Risher, Mayer, & Beyrer, 2015). The social change implications could lead to the implementation of all-inclusive KP policy that could aid in lessening the barriers the FSWs face in receiving comprehensive health services as well as endorsing a range of interventions that are specific to these populations.

Summary

Adherence to ART is a dynamic and complex process (Azia et al., 2016). Lack of adherence to ART has led to a loss in retention in care (Zulliger, Maulsby & Barrigton,

2015). In this study, I examined the barriers to ART among FSWs in Nigeria using social demographic factors, community versus facility ARV drug refill, social support factors measured by membership in a peer support group, and patient-related factors such as alcohol and substance abuse.

I used a conceptual framework to lay a foundation to the research questions and variables of interest. The study was quantitative in nature and used an analytical cross-sectional design to analyze the research data. Data were retrieved from two OSS run by Heartland Alliance International that implemented the PEPFAR/USIAD IMHIPP project in Nigeria. This study findings can lead to social change that may inform the implementation of all-inclusive KP policy that could aid in reducing the barriers the FSWs face in receiving comprehensive health services as well as endorsing a range of interventions that are specific to these populations.

In Chapter 2 of the study, I will elaborate on the discussions in this chapter and will include the following topics: literature search strategy, a detailed description of the study, the conceptual framework used, the literature review related to key variables, and concluding with the summary of the chapter.

Chapter 2: Literature Review

Introduction

There is a lack of adherence to ART among HIV-infected females sex workers in Nigeria (Oku, Owoaje , Oku, & Monjok , 2014). Statistics have been presented on the low level of adherence to ART due to different factors such as socioeconomic factors and substance use (Safren et al., 2015), which were some of the variables in the current study. The main purpose of reviewing the literature was to offer a foundation of knowledge on the topic, identify inconsistencies, and demonstrate the need for additional research. The literature review was used to also help to make a case why there as a need for further study.

FSWs in Nigeria are one of the groups of individuals most affected by HIV/AIDS (FMoH, 2015). FSWs in Nigeria form a higher percentage of people with HIV/AIDS due to the nature of their job (Risher et al.,, 2015). The HIV epidemic has attracted intervention by the U.S. government that, in the recent past, have spent about $456.5 million dollars to help control the epidemic in Nigeria (Bashorun et al., 2014). Provision of ART has been a way to suppress HIV/AIDS virus among those infected by the virus (Shannon et al., 2014). Adherence to ART among HIV-infected individuals, especially SWs, has been known to help suppress the HIV viral load (Beyrer et al., 2015).

This chapter includes an explanation of the strategy used for searching the databases and access to the literature. The literature review contains the major conceptual propositions and hypotheses vital to the literature, inclusive of any assumption of delineation that is essential to the application of the stated theory. It was vital to explore

the background of the application of the theory by looking at the previous literature that may be similar to the current study. The review also includes a rationale for the choice of theory that has been applied and a description of the relationship between the theory and the present study.

This review of literature was exhaustive and entailed studies and methodological explanations related to scope of study, the way the problem has been approached, strengths and weaknesses, justification of the rationale for variable selection, and synthesis and review of all variables and studies linked to the research questions. Finally, the chapter is summarized and concluded into major themes within the literature, knowledge of the discipline, gaps in the literature linked to the present study, and a link of the gaps identified to the methodology in the subsequent chapter.

Literature Search Strategy

While focusing on the databases and sources used, the criteria for selection and inclusion of the sources was based on factors that included timeliness, academic-level appropriateness, and focus on the main variables of the research. The research materials used in this study were published within the last 5 years. A majority of the materials were developed from 2013 onwards. Every effort was made to include only scholarly literature that was appropriate to doctorate level research. The elements discussed in this review are focused principally on all of the variables of the topic of study. Other sources were included if they only addressed the overall context of the research topic or if they laid a foundation for auxiliary research in any of the variables.

Key search terms included *adherence to ART, antiretroviral therapy, HIV infection,* and *female sex workers.* Most of the databases that were searched used controlled word stock to establish common searches for keywords. Another strategy was to combine keywords that was crucial in exploring the literature related to the research topic and in the design of the search process.

The sources used in the literature review consisted of recent studies describing the components of the research topic. The search of the key terms was conducted on PubMed with sources from January 2014 up to the current year. The search identified various articles, some were excluded because they failed to provide empirical evidence on the details of the research topic. This left about 40 articles. One major database that was mostly searched through the Walden library was the PubMed Central (PMC) that has over 5 million articles archived in it and divided into full participation NIH portfolio and selective deposit journals. Other databases included MEDLINE and SAGE. Google scholar was also searched to obtain the published literature for this review.

Conceptual Framework

I used the Andersen framework as the conceptual framework. The framework is used to explore conditions that impedes or facilitates health use (Meade et al., 2015). The framework was developed in the early 1960s in different phases (Meade et al., 2015). It is meant to demonstrate the factors that influence the use of healthcare services, which is defined by various dynamics such as enabling, predisposing, and need factors. Predisposing elements can entail factors like health beliefs and race (Meade et al., 2015). For example, any person who believes that health services can effectively treat a disease

will probably seek care (Meade et al., 2015). It also involves social factors such as education, culture, and demographics such as gender and age (Meade et al., 2015). Enabling factors entail logistical elements for care provision and encompass aspects such as family aspects, community, and possible additions like psychological traits as shown in figure 1 (Meade et al., 2015).

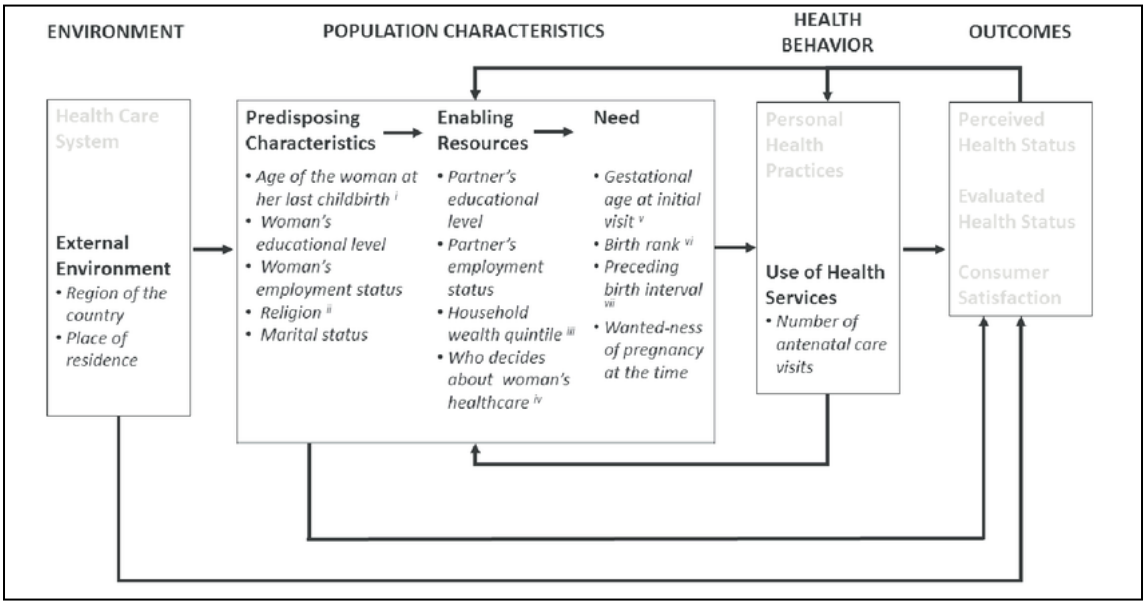

Figure 1. Illustration of Andersen's framework. Adapted from Health-specific information and communication technology use and its relationship to obesity in high-poverty, urban communities: analysis of a population-based biosocial survey by Gopalan et al., 2016. Journal of Medical Internet Research 18(6).

Major elements that define this framework include the individual and health outcomes (Babitsch, Gohl, & Von Lengerke, 2012). The individual is the unit of analysis, while the health outcomes is the endpoint of interest (Babitsch et al., 2012). By understanding and using the relationships within this framework, it is easy to determine the directionality of effects that accompany an individual's environment or characteristics (Babitsch et al., 2012). For example, if there is a rise in need due to an infection, the

framework can be used to predict that the use of services will increase (Babitsch et al., 2012).

The Andersen framework has previously been applied in a number of studies that focused on adherence to ART and HIV-related treatments for HIV-infected individuals (Holtzman et al., 2015). One such study was qualitative research conducted to map barriers and facilitators of patient adherence to ART and HIV care using Andersen's framework (Holtzman et al., 2015). In this study, the Andersen behavioral model provided a framework for understanding health outcomes and how behaviors were influenced by different factors (Holtzman et al., 2015). Holtzman et al. (2015) brought together 51 adults infected with HIV within Philadelphia. The data backed the application of Andersen's framework in the classification of factors that influence health behaviors that are HIV specific (Holtzman et al., 2015). The Anderson framework has the potential to enhance the formulation of interventions that would improve ART adherence (Holtzman et al., 2015).

Brady, Yehia, and Holtzman (2015) identified Andersen's framework as being useful in informing intervention strategies in ART adherence. The aim of the study was to find current challenges that impact the success of ART (Brady et al., 2015). The framework was vital in analyzing the factors that influence adherence among HIV-infected persons with the focus being on the major predisposing factors, such as social support from families and friends who have the knowledge of the status of the patient (Brady et al., 2015). Brady et al. revealed factors that affect HIV care and treatment and were all mapped to Andersen's framework. Brady et al. explained the vitality in

developing new intervention strategies. The application of the framework in the study is as shown in the Figure 2 below.

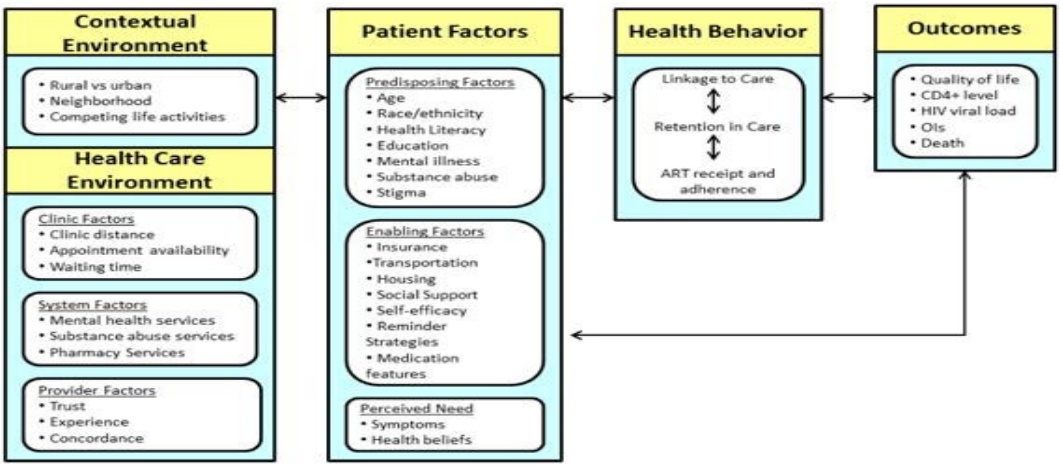

Figure 2. Application of Andersen's conceptual model in intervention strategies. Adapted from Retention in care and medication adherence: Current challenges to antiretroviral therapy success by Brady et al., 2015. Drugs, 75(5), 445-454

Medication Adherence to ART

Adherence, in the context of medicine, means compliance with medical prescriptions and requirements (Yap, Thirumoorthy, & Kwan, 2016). It implies the degree to which a patient properly follows medical advice (Yap et al., 2016). In most cases, it is related to compliance with medication or drug use requirements (Yap et al., 2016). The procedure is a critical element of treatment for chronic illnesses and varies according to age (Yap et al., 2016). Standards of adherence are based on the level at which a given intervention or medication is effective (Brown et al., 2016). In most cases, all medications are effective when stuck to 100% (Brown et al., 2016). However, the standards can be based on total adherence, partial adherence, and nonadherence (Brown

et al., 2016). The latter is where the patient avoids medication completely (Brown et al., 2016). Partial adherence is when the patient adheres but not fully (Brown et al., 2016).

The success of HIV/AIDS treatment is dependent on adherence to ART (Fonsah et al., 2017). The ability of ART to suppress replication of viruses depends totally on adherence to medication (Safren et al., 2015). A lack of counselling, substance use, and socioeconomic factors have been found to result in low adherence (Safren et al., 2015). Poor adherence limits the benefits of ART, which can result in the failure of treatment, viral strains that are resistant, and higher rates of mortality (Mbuagbaw et al., 2015). Poor adherence also has implications in public health due to the transmission of resistant viral strains (Mbuagbaw et al., 2015). From an individual and public perspective, it is important to describe effective strategies in adherence to ART (Mbuagbaw et al., 2015). Some of the interventions that improve adherence include weekly reminders, motivational interviewing, and treatment supporters (Mbuagbaw et al., 2015).

Eyassu et al., (2016) determined adherence to ART at the Kwa-Thema clinic in the Gauteng Province, South Africa. Eyassu et al. adopted a quantitative research approach and used a cross-sectional descriptive design to establish factors that influence the adherence to ART among HIV and AIDS patients. Eyassu et al. indicated that the adherence to ART was 77.0%, and factors that were significantly associated with adherence were gender, level of education, cotreatment of HIV and other infections, ability to follow ART, and types of antiretroviral drugs. Eyassu et al. concluded that adherence to ART at the Kwa-Thema clinic was suboptimal (less than 95%) at 77%, but comparable with the adherence levels in other developing countries. There is a limitation

to their study because only one clinic in a province out of many clinics was used and as such the result may make generalization difficult. In my study, I used special health facilities called OSS that provide services for KPs only. There are only two of such facilities in each state. I also compared the results of two facilities in the two states of Cross Rivers and Rivers states.

Bijker et al. (2018) compared the levels and determinants of adherence over time between HIV-positive persons receiving ART who were enrolled in a bi-regional cohort in sub-Saharan Africa and Asia. Bijker et al. conducted a multicenter prospective study and assessed adults starting first-line ART and patient-reported adherence at follow-up clinic visits using a 30-day visual analogue scale. Determinants of suboptimal adherence (<95%) were assessed for 6-month intervals, using generalized estimating equations multivariable logistic regression with multiple imputations (Bijker et al., 2018). Bijker et al. showed that adherence assessments during the first 24 months of ART were suboptimal in the African cohort versus the Asian cohort. Bijker et al. also showed that determinants of suboptimal adherence in the African cohort were male sex, younger age, use of concomitant medication, and attending a public facility. In the Asian cohort, adherence was higher in MSM and lower in injecting drug users when to compared to heterosexuals (Bijker et al., 2018). Suboptimal adherence risk decreased with longer ART duration in both regions (Bijker et al., 2018). Participants in low- and lower-middle-income countries had a higher risk of suboptimal adherence, compared to those in upper-middle or high-income countries (Bijker et al., 2018). Suboptimal adherence was strongly associated with virological failure in Africa and Asia (Bijker et al., 2018). Adherence

barriers that were patient reported among African participants included scheduling demands, drug stockouts, forgetfulness, sickness or adverse events, stigma or depression, regimen complexity, and pill burden. However, Bijker et al.'s study had incomplete data ascertainment for a number of factors that could affect adherence both in terms of patient attributes such as substance abuse and health-care relate factors such as differences in health care models. My study improved on this as there were no incomplete data and factors that could affect adherence will be examined. I examined substance abuse and health care model through facility and community ART refill.

Fonsah et al. (2017) conducted a cross sectional study through the use of both patient self-reported questionnaires and pharmacy medication refill data to examine adherence to ART and determined the factors associated with increased risk of nonadherence. Fonsah et al. showed that drug side-effects, low CD4 cell counts, and higher viral loads were associated with increased risk of nonadherence, and compared to females, males were more likely to forego ART because of side effects. Fonsah et al. also showed that participants with opportunistic infections (on antibiotics) had 2.42-times higher odds of having been nonadherent. Fonsah et al. further showed that compared to younger subjects, older participants were less likely to be nonadherent and had shorter nonadherent periods. Fonsah et al. concluded by stating that finding solutions to these risk factors could improve ART adherence, retention in care, and treatment outcomes for HIV/AIDS patients in Cameroon. A weakness to Fonsah et al's study was the use of a small sample size. The small sample size of participants makes the findings harder to generalize across the population (Kuhns et al., 2016).

These articles were included in my literature review because they provided the findings of the published literature regarding adherence to ART. A strength of these studies is that they were all conducted recently and as such the findings are useful to today's society and population. However, a major limitation is that they used participants from the general population in their studies. The small sample size also makes the findings harder to generalize across the population (Kuhns et al., 2016). The findings of these studies were important to my research topic because adherence was a variable that was examined in relation to other independent variables. My study added to the literature by quantifying adherence to ART and also determined the factors that are associated with nonadherence among FSWs in Nigeria.

Demographic Factors and Adherence to ART

Job/Occupational Status and Adherence to ART

ART adherence may be influenced by social economic factors that are based on employment or occupational status (Nachega et al., 2014). Nachega et al. (2014) determined the association between adherence to ART and employment status. Nachega et al. used both a meta-analysis and systematic review using 28 publications and found that the overall odds ratio for linking employment and ART adherence was 1.27 with a 95% confidence level. A stronger significance was evident for publications obtained from low-income countries (Nachega et al., 2014). Nachega et al. revealed that HIV-infected individuals who were employed were more likely to adhere to ART than the unemployed ones. Employment enhances adherence because it is linked to factors such as psychosocial wellbeing and better time structuring (Nachega et al., 2014). Employment

promotes adherence to ART because it increases access to healthcare services through programs that are sponsored by the employer (Nachega et al., 2014). However, a weakness in this study was that 85% of the studies used in the metanalysis had a cross-sectional design, and this may have limited the ability to draw causal inferences (Nachega et al., 2014). In addition, the findings may be affected by reverse causation bias or by other unknown confounding factors that were not adjusted for (Nachega et al., 2014).

Okoronkwo, Okeke, Chinweuba, & Iheanacho (2013) investigated factors affecting nonadherence to ART among adult HIV-infected patients attending the ARV clinic of a hospital in Southeast Nigeria and related these to their sociodemographic characteristics. Okoronkwo et al. used a sample size of 221 participants and results showed a nonadherence rate of 85.1%. Okoronkwo et al. also stated that respondents who were employed 92 (48.9%) seemed more likely to miss their drugs compared to the unemployed artisans 95 (29.3%). Okoronkwo et al. also stated that their analysis showed a significant difference in nonadherence factors and respondents employment status. A limitation to this study in terms of the employment variable was that the authors classified artisans as employed. Another limitation to this study was that the employment variable captured only employed and unemployed. My study defined occupational status by student, employed, unemployed, and retired. I also used FSWs rather than the respondents from the general population.

Similar to the study of Okoronkwo et al. (2013), Saha et al. (2014) also investigated adherence to highly active antiretroviral therapy in a tertiary care hospital in West Bengal, India. They conducted an analytical cross-sectional epidemiological study

using 370 adult HIV-positive patients registered in the Antiretroviral Therapy Centre of Burdwan Medical College and Hospital, West Bengal, India and defined Nonadherence as missing at least a single dose of medicine within the last four days (Saha et al, 2014.). They stated that that those who were employed were more nonadherent to HAART than those who were unemployed (Saha et al., 2014). The probable causes of nonadherence among employed PLWHA were busy duty schedules in the workplace and/or forgetfulness (Saha, et al., 2104).

This study had a limitation because the respondents were only patients who attended the ART center on a regular basis (Saha et al., 2014). It is possible that a different outcome may exist with those who do not visit the ART center less frequently. My study improved on this as the respondents were those who visited the ART facility for their ARVs and those who received their ARVs in the community. In addition, the respondents were a combination of the general population and a small sample of commercial sex workers.

These articles were included in my literature review because they provided the findings of the published literature regarding employment and adherence to ART. A strength of these studies is that they were all conducted recently and as such the findings are useful to today's society. However, a major limitation is that they used participants from the general population and in the study where commercial sex workers were used, the sample size was small. The small sample size of female sex workers makes the findings harder to generalize across the population for female sex workers (Kuhns et al,

2016). A small sample size makes the power of the study smaller and increases the margin of error within the study (Kuhns et al., 2016).

The findings of these studies will be important to one of my study's research question because employment was examined to determine its association with adherence to ART. Only one of the published literatures tested employment and adherence among commercial sex workers, but this was not defined to be either male or female sex workers and also had a small sample size. My study added to the literature by testing the association between job/occupational status among female sex workers in Nigeria.

Age and Adherence to ART

Lall, Lim, Khairuddin & Kamarulzaman . (2015) conducted a study on factors impacting adherence to and retention in care among HIV-positive youth and adolescents from key populations. Lall et al. stated that age was an important factor of influence on adherence to ART and in control of HIV/AIDS. Adherence to ART is a fundamental part of HIV control among the youths and adolescent, as Lall et al. observed. The researchers conducted a comprehensive literature review on adherence to ART and retention among young key population (Lall et al., 2015). The empirical study was focused on adolescents and adults aged between 10 and 24 years and their adherence to HIV care (Lall et al., 2015).

Regarding link to the research question, the study findings from the comprehensive literature review revealed that among the youths/adolescents and adults who were FSWs, the adults adhered more compared to the youths or adolescents (Lall et

al., 2015). Lall et al., (2015) did not address unique needs of the young KP but did suggest the need for further research especially on how to handle co-morbidities related to HIV/AIDS. Lall et al, (2015) linked adherence to ART to age which is a demographic factor plus other factors such as access to healthcare, mental health and the pressure of many vulnerabilities. Adherence to ART is negatively affected by two or more of these factors (Lall et al., 2015). This made their study relevant for answering one of my study research questions of the association between age and ART . It was crucial to identify those elements that acts as drivers or promoters of adherence to ART among youths and adolescents living with HIV/AIDS (Lall et al., 2015). Lall et al (2015) used an age range of 18-24 years for the study participants which was a limitation to their study. My study improved on this and used ages 15 years and older. Secondly FSWs were not one of the KPs in the study population (Lall et al., 2015). My study improved on this and used FSWs as participants.

Denison et al. (2015) investigated the adherence to ART from the perspective of HIV infected adolescents. Denison et al. (2015) revealed that lack of adherence to ART among adolescents led to increased HIV related mortality. The authors stated that more than a quarter of the adolescents living with HIV were not adherent to taking their drugs for one day or more especially due to anticipated stigma and fear of disclosure (Denison, et al., 2015). Only a few of the youths adhered to the drugs outside their homes which resulted in missed doses of ART (Denison et al., 2015). The only source of support both emotionally and instrumentally were the caregivers (Denison et al., 2015). Denison et al

(2015) study had a limitation with the age group used for the study. My study improved on this and used ages 15 years and older.

Shaw & Amico (2016) conducted a study on antiretroviral therapy adherence enhancing interventions for adolescents and young Adults 13–24 years. According to Shaw and Amico (2016), the rate of suboptimal adherence in adolescents and young people produced poor outcomes compared to the adults. HIV infected adolescents face unique barriers in the maintenance of high levels of adherence because they progress through major milestones as they transit to adulthood (Shaw & Amico , 2016). The rate of adherence was also poor among the adolescents compared to the adults because of the reactivity to feeling different from their peers (Shaw & Amico , 2016).

Okoronkwo et al., (2013) investigated factors affecting non-adherence to ART among adult HIV-infected patients attending the ARV clinic of a hospital in southeast Nigeria and related these to their sociodemographic characteristics. They used a sample size of 221 participants and results showed a non-adherence rate of 85.1% (Okoronkwo et al., 2013). The authors stated that forgetfulness (58.2%) and busy schedule (52.7%) were most frequent response among respondents aged 40–49 years (Okoronkwo et al., 2013). They also stated that respondents aged 30–39 were nonadherent due to institutional factors of long waiting periods (44.7%) and poor communication (38.1%) (Okoronkwo, et al., 2013). Respondents aged 20–29 years (33.9%) were the highest in non-adherence because they simply “do not feel like taking drugs” and are “ignorant of the consequences” (23.7%) (Okoronkwo et al., 2013). Lastly, results also showed no significant difference in non-adherence factors among the groups (Okoronkwo et al.,

2013)). A limitation to this study is that the age groups do not capture young teenagers and adults of age 50 years and above. My study improved on this and captured respondents of age 15 years and older.

These articles were included in my literature review because they provided the findings of the published literature regarding age and adherence to ART. A strength of these studies was that they were all conducted recently and as such the findings are useful to today's society and population. However, a major limitation is that they used participants from the general population and in the study where commercial sex workers were used, the sample size was small. The findings of these studies were important to one of my study's research question because age was a variable examined to determine its association with adherence to ART. None of the published literature tested age and adherence among FSWs. My study therefore added to the literature by testing the association between age among FSWs in Nigeria.

Education and Adherence to ART

Regarding the effect of education on adherence to ART, the type of education being addressed was that which involve levels such as primary, secondary, and tertiary education (Eyassu et al., 2016). In a quantitative cross-sectional study to determine the adherence to ART among patients in Gauteng province, it was found out that level of education was significantly associated with adherence (Eyassu et al., 2016). In their study, majority of the respondents had completed secondary education (Eyassu et al., 2016). Adherence to ART increased with increases in the level of education (Eyassu et al., 2016). Those at the tertiary level adhered to ART more than those at the primary level

(Eyassu et al., 2016). A lack of education is associated with nonadherence (Eyassu et al., 2016). The main underlying reasons was the level of understanding and knowledge among the patients (Eyassu et al., 2016). Although the authors used respondents who had primary education, secondary school, tertiary education and no formal education, my study used the context in Nigeria and went further to split secondary school respondents in to junior and senior secondary education.

Adeniyi et al. (2018) observed that there were different context-specific factors that affect adherence to ART among HIV infected pregnant women and education was one of the factors. More education was associated with low adherence to ART (Adeniyi et al., 2018). In a mixed-methods study that involved 1709 women who were about to give birth from South Africa, it was determined through a binary logistic regression that Grade 1-6 education level among other factors was an independent predictor of non-adherence (Adeniyi et al., 2018). They also stated that when compared to women who had tertiary level of education, women who had grade 1–6 level of education were less likely to be non-adherence to ART.(Adeniyi et al., 2018). The explanation given for this was that greater education comes with tight work schedule (Adeniyi et al., 2018). The researchers implied that more educated women were likely to adhere less due to busy work schedule because their probability of getting employed was higher than the less educated which include Grade 1-6, Grade 7-12, and the ones with no formal education (Adeniy et al., 2018). These findings were supported by Bam, Rajbhandari, Karmacharya, and Dixit (2015) who reported that those with lower level education showed better adherence. A limitation to this study was that the partcipants were

pregnant women who were classifed as KPs (Adeniyi et al., 2018). However, pregnant women are not classified as KPs (Ugbena at al., 2018). My study improved on this study by using FSWs who are are KPs.

Okoronkwo et al. (2013) investigated factors affecting non-adherence to ART among adult HIV-infected patients attending the ARV clinic of a hospital in southeast Nigeria and related these to their sociodemographic characteristics. They used a sample size of 221 participants and results showed a non-adherence rate of 85.1% (Okoronkwo et al., 2013). They stated that most of the respondents had some formal education of which 77, 52, and 28 had secondary, higher and primary education, respectively, while 31 had none (Okoronkwo et al., 2013). In addition, they also stated that all categories of the respondent attributed their non-adherence to forgetfulness (Okoronkwo et al., 2013). In addition, those that had higher education (55.8%) and those with no formal education (51.6%) stated busy schedule (Okoronkwo et al., 2013). Also, those with no formal education failed to adhere to their ART due to poor communication (61.3%), side effects of drugs (58.1%), stigma (54.8%), and lack of trust and confidentiality (38.7%) (Okoronkwo et al., 2013). They also stated that there was a significant difference in non-adherence factors and respondents' educational status. (Okoronkwo et al., 2013).These articles were included in my literature review because they provided the findings of the published literature regarding education and adherence to ART. A strength of these studies was that they were all conducted recently and as such the findings are useful to today's society and population. However, a major limitation is that they used participants from the general population. The findings of these studies were important to one of my

study's research question because education was a variable that was examined to determine its association with adherence to ART. None of the published literature tested education and adherence among FSWs. My study therefore added to the literature by testing the association between education among female sex workers in Nigeria.

Marital Status and Adherence to ART

Besides education, Adeniyi et al. (2018) found out that marital status was a significant factor that affected adherence to ART. Their result showed that marital status was an independent predictor of adherence (Adeniyi et al., 2018). Based on their study findings, pregnant women who were married adhered more to ART than the single, divorced/separated and cohabiting ones (Adeniyi et al., 2018). The divorced had the lowest rate of adherence compared to other marital statuses as lesser number of women who were adherent was reported (Adeniyi et al., 2018). The major reason for high adherence among married women who were investigated was because most of them had already disclosed their HIV status to their sexual partner (Adeniyi et al., 2018). However, the other few who were nonadherent to ART termed HIV related stigma as the reason for not adhering (Adeniyi et al., 2018). Adeniyi et al. (2018) classified marital status as single, married, cohabiting and divorce/separated. My study improved on this and been a widow was also explored.

Bam, Rajbhandari, Karmacharya & Dixit. (2015) also shared their results on the effect of marital status on adherence to ART. In a descriptive cross-sectional study to identify barriers and facilitators of ART adherence, Bam et al (2015) found out that

married people formed the highest percentage of those who adhered to ART with 83.3% compared to the divorced, separated, unmarried, and other marital statuses. Bam et al. (2015) only reported reasons for nonadherence in the context of marital status. One of the main reasons for nonadherence in this context was the absence of husband or spouse resulting from death (Bam et al., 2015). It implied that husbands or spouses played a critical role in enhancing adherence among the HIV infected women (Bam et al., 2015).

According to other researchers' studies, marital status does not seem to significantly affect adherence to ART based on the insignficance of the association between them (Shigdel, Klouman, Bhandari, & Ahmed, 2014). The authors constructed a study using 316 HIV infected patients to determine the factors associated with ART adherence (Shigdel et al, 2014). It was determined that marital status did not have a significant effect on ART adherence (Shigdel et al., 2014). There was no significant association between marital status and adherence to ART (Shigdel et al., 2014). The study was limited and failed to explore all the dimension of ART adherence like taking ART based on dietary instructions, and also failed to take into account some of the confounding factors (Shigdel et al., 2014). Another limitation to this study was that only patients who personally collected/refilled their ART at ART centers were included and patients whose ART were delivered to their home by volunteers were not approached (Shigdel et al., 2014). My study inproved on this as all participants including those who came to the facility for their refill and those who get their ARVs in the community were included.

These articles were included my literature review because they provided the findings of the published literature regarding marital status and adherence to ART. A strength of these studies was that they were all conducted recently and as such the findings are useful to today's society. However, a major limitation is that there was no focus on FSWs. The findings of these studies will be important to one of my study's research question because marital status is a variable that was examined to determine its association with adherence to ART. None of the published literature tested marital status and adherence among FSWs. My study therefore added to the literature by testing the association between marital status and adherence to ART among FSWs in Nigeria.

Membership in a Peer Support Group and Adherence to ART

Social support was another key variable in analyzing the research topic and subsequently answered one of my research questions. Studies showed that various elements of social support were the drivers or influencers of adherence to therapies or HIV related treatment among those infected with the virus (Bekker et al., 2015). Bekker et al. (2015) explored various social support, among which was community empowerment, in ensuring adherence to treatment such as ART and general fight against HIV/AIDS among infected sex workers. Social support programs, such as those offered by World Health Organization (WHO), which entailed ARV provision for female sex workers, were recommended (Bekker et al., 2015). The willingness of the FSW to engage in all the support interventions to ensure adherence to ART was influenced by robust peer support and a generally supportive network (Bekker et al., 2015).

The weakness of the study was that it was qualitative and did not focus on a specific element of social support in detail (Bekker et al., 2015). It may not be possible to draw conclusions on the role of social support in the study of Bekker et al.

Sub-Saharan African has been known to have a higher prevalence of HIV than other regions (Lancaster et al., 2016). According to a systematic review carried out by Lancaster et al. (2016), access to the expanded ART has not been of great aid to the FSWs in sub-Saharan Africa. This was due to the suboptimal HIV care and general lack of social support (Lancaster et al., 2016). Focus in HIV treatment among FSWs should be on addressing barriers to adherence to treatment such as lack of peer support (Lancaster et al., 2016). Peer support could be in the form of support from male or female partners they engage with intimately (Lancaster et al., 2016). Perhaps this was one of the effective ways through which adherence to ART among the HIV infected FSWs can be enhanced and the HIV virus suppressed (Lancaster et al., 2016).

Lancaster et al., (2016) suggested that despite the benefits that ART had on general health and wellbeing of those infected with HIV due to reduction of viral load, it would serve no significant purpose if there was no successful engagement of the peers, society and government. Social support from peers can lead to optimal adherence and ultimately viral load suppression (Lancaster et al., 2016). The weakness of the systematic review in relation to the current research was the varying typologies of FSWs in the reviewed articles, hence the need to further explore interpretations of the findings within specific populations of FSWs (Lancaster et al., 2016). My study improved on this through the inclusion of brothel based and non-brothel based FSWs.

Goldenberg et al. (2016) conducted a longitudinal study in Vancouver Canada and suggested community-based intervention, such as use of outreach teams and follow-ups, as a social support for enhancing ART adherence and removing structural barriers that stagnate antiretroviral therapy among sex workers. The study involved FSWs within Vancouver as the participants (Goldenberg et al., 2016). Goldenberg et al. found out that out of all the HIV infected FSWs, 37.8% had experienced gaps in the use or adherence to ART. The researchers drew their longitudinal data from an open prospective cohort (Goldenberg et al., 2016). One major component of their findings was that one of the reasons for not adhering to ART among FSWs was difficulties of taking the medication daily, housing instability, and side effects among others (Goldenberg et al., 2016). However, with appropriate social support, it was possible to ensure effective engagement in HIV care and adherence to ART (Goldenberg et al., 2016). The study may have a possibility of overestimation of ART use due to the use of pharmacy records as a measure of ART use instead of observed therapy (Goldenberg et al., 2016). The researchers admitted that the use of a larger cohort made their study more effective and hence the current study took this into consideration (Goldenberg et al., 2016). The current study improved on this and used a large sample size. All FSWs eligible were included.

These articles were included in my literature review because they provided the findings of the published literature regarding social support and adherence to ART. A strength of these studies was that they were all conducted recently and as such the findings are useful to today's society. Another strength is that they all used FSWs as the participants. However, a major limitation may be the use of a small sample size. The

findings of these studies will be important to one of my study's research question because social support was a variable that was examined to determine its association with adherence to ART. My study therefore added to the literature by testing the association between social support and adherence to ART among female sex workers in Nigeria.

Facility and Community ARV Drug Refill and Adherence to ART

Mai , Le, Tran, & Do. (2018) explored the adherence to ART for patients with HIV in Vietnam. They conducted a cross-sectional survey in five ART clinics located in three provinces, such as Hanoi, Thanh Hoa, and Lao Cai (Mai et al., 2018). Their study was in the context of initiation of primary treatment (Mai et al., 2016). Mai et al. determined the ART compliance among HIV/AIDS patients in a way that they do not have to visit facilities. Based on a cross sectional study in five ART clinics within three provinces, it was determined that the percentage of suboptimal adherence among 482 patients was around 54.5% for those who went to the facility for drugs or those who sent representatives for pick up (Mai et al., 2016). In addition, suboptimal adherence was associated with residence who lived in the mountainous region (Mai et al., 2016). Although the authors stated that while ensuring ART, considerations should be made for improved resource allocation and service delivery (Mai et al, 2018), a limitation to this study was that the authors did not explore adherence when there was an alternative method of ARV uptake except going to the facility. My study improved on this and explored ARV refill through facility and in the community. Another limitation to this study was that missing data may have occurred because patients could refuse to answer

any questions or provide any information (Mai et al., 2018). My study improved on this by screening out any participant without complete data during the data abstraction.

Risher et al. (2015) examined HIV treatment cascade in men who have sex with men (MSM), people who inject drugs (PWIDs) and FSWs. The researchers conducted a literature review on care cascade of HIV for FSWs and other target populations (Risher et al., 2015). Outcomes on care cascade were established from different countries with most of them been African countries including Malawi, Zimbabwe, Togo, and Burkina Faso (Risher et al., 2015). The findings suggested that interventions that were specific to culture like peer navigators and co-location of services offer an improvement for care outcomes among FSWs (Risher et al., 2015) They also stated that studies have found that peers and sexual partners can improve HIV care cascade outcomes among KPs (Risher et al, 2015). Risher et al., (2015) suggested that the HIV care cascade was important in understanding the nature of response to the HIV epidemic. My study improved on this by examining facility and community ARV drug refill. In addition, the KP used in this study as it relates to Nigeria where MSM and PWID. My study examined FSWs.

A related study to Risher et al., (2015) was carried out on the same KP, but in Zimbabwe (Cowan et al., 2017). According to Cowan et al. (2017), very little is known regarding the diagnosis and quality of care for HIV in most Southern African nations, including Zimbabwe. They determined the effectiveness and cost effectiveness of an enhanced community–based intervention to increase uptake, retention, and adherence to antiretroviral-based prevention and therapy among FSW (Cowan et al, 2017).The findings from cross-sectional respondent influenced sampling among FSWs across

Zimbabwe indicated that most of the FSWs who had HIV infection and who were aware of their status admitted to having access to ART; yet, only 49.5% had a viral load of below 1000 copies/ml (Cowan et al., 2017). A comprehensive care for sex workers that is community based is recommended by the WHO (Cowan, et al., 2017). However, such interventions must only work across the cascade of HIV treatment uptake, retention and adherence (Cowan et al., 2017). The study had a limitation based on the sampling technique used (Cowan et al., 2017). The authors used respondent driven sampling (RDS) for this hard-to-reach population (Cowan et al., 2017). Their estimation made many assumptions about the recruitment process and the social networks of sex workers (Cowan et al., 2017). My study used already existing database of all FSWs who were not recruited for the purpose of a research but were in HIV care because they required treatment. Furthermore, the study of Cowan et al. (2017) did not set out to also determine facility-based interventions on adherence. My study improved on this and explored both facility and community-based ART refill of ARVs.

These articles were included in my literature review because they provided the findings of the published literature regarding community and facility-based ART support. and adherence to ART. A strength of these studies was that they were all conducted recently and as such the findings are useful to today's society. Another strength is that one of the studies used FSWs as the participants, while another used MSM who are also KP. However, none of the study was carried out in Nigeria. The findings of these studies were important to one of my study's research question because facility and community ARV drug refill was a variable that was examined to determine its association with

adherence to ART. My study therefore added to the literature by testing the association between facility and community ARV drug refill and adherence to ART among FSWs in Nigeria.

Alcohol and Substance Abuse and Adherence to ART

Kader, Govender, Seedat, Koch & Parry (2015) aimed to provide an understanding of the effect of the use of alcohol and other drugs on adherence to ART. They conducted a cross-sectional study and out 1503 patients attending HIV clinics in Cape Town, South Africa who were screened for problematic substance use, a sub-sample of 607 patients (303 patients who screened positive for problematic substance use and 304 who did not) participated in their study (Kader et al., 2015). Kader et al. found that harmful use of alcohol and drugs led to stoppage and missing ART, which ultimately led to progression in HIV. Harmful use of alcohol for those living with HIV was linked to poor adherence (Kader et al., 2015). Kader et al. indicated that the lowest odds for adherence resulted from a combined hazardous use of alcohol and drugs. There is an association between hazardous alcohol use and missing of doses and forgetting to take ARVs (Kader et al., 2015). The use of alcohol and drugs were important determinants of adherence (Kader et al., 2015). There were a couple of weaknesses to the study of Kader et al. (2015). First, they drew their sample from the Cape Metropole area and may not be representative of the HIV-treatment seeking population across South Africa with regards to patterns of substance use and ARV adherence (Kader et al., 2015).

Risher et al. (2015) examined HIV treatment cascade in MSM, PWID and FSWs. The researchers conducted a literature review on care cascade of HIV for FSWs and

other target populations (Risher et al., 2015). Risher et al. addressed the influence of drug and substance abuse as a factor that influenced treatment of HIV/AIDS, especially on those who inject themselves with drugs. They stated that there was laxity in adherence to ART for those who abuse drugs and other substances compared to those who are drug free (Risher et al., 2015). They also stated that reports have confirmed worse HIV care outcomes for those who abuse and inject drugs into their body, in comparison to those who do not (Risher et al., 2015). This study of Risher et al. (2015) was useful for understanding and unravelling the effect of drugs and substance abuse on adherence to ART among those who are infected with HIV and the FSWs who were the main focus of my study. The weakness in the research of Risher et al., (2015) with regards to the research question was that the authors only determined drug use in relation to adherence to ART (Risher et al., 2015). They did consider alcohol as a means of substance abuse (Risher et al., 2015). The World Health Organization (WHO) stated that substance abuse refers to the harmful or hazardous use of psychoactive substances, including alcohol and illicit drugs (WHO, 2016). More deductions can be made from Risher et al. (2015) guided by my study topic and question because my study did not only consider drug use but also took in to consideration alcohol intake.

Ti et al., (2014) conducted a study to evaluate exposure in HIV positive drug users and generalized estimated study of longitudinal link between sex work and viral load suppression. They stated that the use of illicit drugs reduced viral load suppression compared to nonuse (Tai et al., 2014). Abuse of illicit drugs has been found to be a factor of influence, not just to adherence to HIV related therapies, but also to regular adherence

to other kinds of treatment (Ti et al., 2014). This may influence the effect of functioning and effectiveness of a particular treatment that is being administered (Ti et al., 2014). Ti et al. identified the negative effect of illicit drugs on adherence to and effectiveness of ART in suppressing viral load among FWs who use illicit drugs. According to Ti et al. adherence to ART among FSWs who use illicit drugs can only be improved through evidence-based interventions. It is the only way through which maximum benefits of HIV treatment and prevention can be realized (Ti et al., 2014). Use of illicit drugs among sex workers acts as a demotivating factor for adherence to ART, just as it negatively impacts viral load suppression (Tai et al., 2014)

Despite contributing a significant knowledge to the current study through its detailed quantitative analyses of data, the study by Ti et al. (2014) had some limitations. There may have been bias in the study due to the self-report during sampling and this may not present an accurate picture of the drug use among the FSWs (Ti et al., 2014). Kekwaletswe and Morojele. (2014) determined the link between alcohol use and adherence to ART through a focus on alcohol related ART nonadherence in HIV infected individuals. They conducted a cross-sectional study with purposive sampling and used a sample size that comprised 304 male and female ART recipients at two president's emergency plan for AIDS relief (PEPFAR)-supported HIV clinics (Kekwaletswe and Morojele (2014) .A third of the participants who were drinkers reported that taking alcohol and drugs was a reason to miss their ART doses and a barrier to adherence to ART (Kekwaletswe & Morojele., 2014). Taking alcohol was one of the reasons for missing or not adhering to ART (Kekwaletswe & Morojele, 2014). Higher degrees of

alcohol use were linked to lower levels of ART adherence (Kekwaletswe & Morojele, 2014).

The study of Kekwaletswe and Morojele. (2014) had a limitation due to a reliance on self-report for assessing alcohol use which may have questionable reliability. Study participants could conceivably under-report their alcohol use in health care settings, given the prevalent communication by health care providers that alcohol use was prohibited while on ART(Kekwaletswe & Morojele., 2014). Secondly, their study only tested alcohol and not substance use (Kekwaletswe & Morojele., 2014). Unlike the study of Kekwaletswe and Morojele. my study examined substance abuse as a barrier to adherence to ART.

These articles were included in my literature review because they provided the findings of the published literature regarding alcohol and or substance and adherence to ART. A strength of these studies was that they were all conducted recently and as such the findings are useful to today's society. Another strength was that two of the studies Kekwaletswe & Morojele. (2014) and Tai et al. (2014) used good sample sizes. However, all the studies used either alcohol or substance abuse and not both. The findings of these studies were important to one of my study's research question because alcohol and substance abuse was a variable that was examined to determine its association with adherence to ART. My study therefore added to the literature by testing the association between facility and community ARV drug refill and adherence to ART among FSWs in Nigeria.

Summary and Conclusions

The literature review was a presentation of some of the major themes that are related to the current research under the different variables, including social support measured by being a member in a peer support group, demographic factors, alcohol and drug abuse, and community versus facility ARV drug refill. Some of the major themes from the literature were based on community-based interventions on HIV control, HIV prevalence rate, and adherence to ART among others. Knowledge was drawn from the literature regarding the adherence to ART among HIV infected individuals in general and also among FSWs. One main point that has been emphasized is that adherence to ART can be enhanced but only through effective intervention and care (Zulliger, Maulsey & Barrington ., 2015). One major gap in the all the literature that has been reviewed is that more studies that are specific to Nigeria are required. More studies are needed to address the kind of adherence that is expected of the HIV infected target population.

Chapter 3: Methodology

Introduction

The purpose of this study was to test the association between the social-demographic factors of age, education, job/occupational status, marital status, and social support measured by being a member in a peer support group and community versus facility ARV drug refill and patient-related factors of alcohol and substance abuse and adherence to ART among FSWs in Nigeria. In this chapter, I explain the research design used and the rationale for applying this design. The research design was in line with the study variables and the research questions. Time and resource constraints identified were consistent with the choice of design. I discuss the research design and rationale, methodology, population, sampling and sampling procedures, operationalization, and data analysis plan. The validity of research is also discussed, and the threats to both the internal and external validity of the study will be explained. The chapter also includes an explanation of the ethical procedures that were taken into consideration when collecting and collating data and other ethical issues relevant to the study.

Research Design and Rationale

Study Variables

The study entailed various variables that included dependent and independent variables guided by different hypotheses and research questions. The study design was theory driven to enable a test of association between the dependent and independent variables). The dependent variable in this study was the adherence to ART. Adherence is defined as the "extent to which a client's behaviour coincides with the prescribed health

care regimen as agreed through a shared decision-making process between the client and the health care provider" (Carter, 2005). Adherence to ART is a principal determinant of virologic suppression (Vreeman et al, 2014). The independent variables measured included the sociodemographic factors of age, education, occupational status, marital status, and social support measured by being a member in a peer support group, community versus facility ARV drug refill, and alcohol and substance abuse.

Type of Design and Connection to Research Questions

The purpose of this quantitative study was to explore the association between age, education level, job/occupational status, marital status, community versus facility ARV drug refill, peer support measured by being a member in a peer support group, alcohol and substance abuse, and adherence to ART. The research design was a cross-sectional study because it was carried out at one time point and allowed for an investigation of association between the independent variables and the outcome of interest, adherence to ART. In addition, there was no problem of loss to follow up (see Levin, 2006). The data used were collected by Heartland Alliance International between January 2015 and December 2017. This design was ideal because it allowed for the research questions posed in this study to be answered (see Prah et al., 2018). This research design gave a relevant and fairly recent detailed analysis of the FSW population living with HIV in Nigeria.

Table 1 below shows how the variables are related to the research questions and data elements.

Table 1

Variables in Relation to the Research Questions

Variables	Research Question	Data Element
Age, Education level. Job/Occupational status and Marital status	What is the association between social-demographic factors of age, education level, job/occupational status and marital status and adherence to ART among FSWs in Nigeria.	What is your age, level of education, employment status and marital status ?
Community versus Facility ARV drug refill.	What is the association between community versus facility ARV refill and adherence to ART among FSWs in Nigeria.	Do you come to the facility to receive your ARVs or does the facility send the ARVs through facility staff, peer navigators or peers?
Peer Support measured by being a member in a peer support group.	What is the association between peer support measured by member in a peer support group and adherence to ART among FSWs in Nigeria.	Are you part of a peer support group?
Alcohol and Substance Abuse	What is the association between patient related factors of alcohol and substance abuse and adherence to ART among FSWs in Nigeria	Have you undergone counselling for alcohol and substance abuse?
Adherence to ART	What is the association between the independent variables and adherence to ART	What is your adherence status?

I used a quantitative research design through cross-sectional method with analysis of secondary data abstracted from existing medical records. Using secondary data for analysis has become more prevalent because of its flexibility and because it can be used in different ways (Johnston., 2017). This design acts as a viable option especially where resources and time are limited (Johnston., 2017). The secondary data were analyzed quantitatively and systematically following evaluative and procedural steps with a focus on the research questions (see Johnston., 2017). The research questions were thought of already, and available secondary data were acquired that fit the research questions (see Cheng & Phillips, 2014). Another important aspect to put into consideration is the analytic plan that investigates variables (Cheng & Phillips, 2014). The data retrieved through quantitative research encourages comparisons between groups as well as the determination of the extent in which respondents agree (Yauch & Syeudel, 2003).

Time and Resource Constraints

The research design did have its constraints, and this includes time and resources (Munsamy, Parrish, & Steel, 2014). Data are part of the resources needed to achieve success of research (Munsamy et al., 2014). One major time constraint was the time required to get Institutional review approval (IRB) approval from Walden University and the Nigeria Institute of Medical Research. One resource constraint was the quality of data given that the research design prescribes that data will be abstracted from existing medical records (Munsamy et al., 2014). The respondents in the data set should be able to meet the inclusion criteria suggested by the study otherwise it will be of no use (Munsamy et al., 2014). Another resource constraint will be the time required to abstract

data from the two facilities and the cost of travelling to both locations. Unforeseen challenges must be addressed, especially if the research is being conducted within a resource-constrained environment like in Nigeria (Munsamy et al., 2014). It is important to understand the setting in relation to the design (Munsamy et al., 2014).

Methodology

Study Population

The target population for this study was the FSWs receiving ART in Heartland Alliance International facilities OSS in Rivers and Cross Rivers states in Nigeria (NGO Aid Map, 2019). Services provided include HIV prevention, treatment, care, and support services for KPs and their partners. A SW is an individual who earns income from the sex industry (Mgbako, 2016). The term is normally used to refer to all people who are part of the sex industry through provision of direct sexual services and the staff and those who manage the industry (Mgbako, 2016). Within the industry, all genders are involved, including both males and females (Mgbako, 2016). In the context of this study, the focus was on FSWs who provide sexual services to clients who in turn pay for the services (see Mgbako, 2016). It is a KP in the study of HIV/AIDS and this is relevant for the current study (see Ugbena et al., 2018).

Sampling and Sampling Procedures

For this quantitative cross-sectional study, the appropriate sampling strategy was a nonprobability sampling strategy (see Center for Innovation in Research, 2019). A nonprobability sample does not apply randomization in selection of participants (Center for Innovation in Research, 2019). The best type of nonprobability sampling in this case

is the convenience sampling in which participants' records for the study are selected based on their availability and if they meet the criteria for selection (Center for Innovation in Research, 2019). All FSWs initiated on ART between January 2015 and December 2017 in the two OSS were eligible for the study, and data were abstracted for all of them. This ensured that the participants were those who had been in the program for a minimum of 6 months from the start date. This was one of the inclusions and exclusion criteria. All patients who were transferred to the facilities before and during the enrolment period were excluded to avoid the influence of quality of care in the previous facility that may positively or negatively affect adherence to ART. The main purpose of this was to obtain a representative sample for the whole target population. Data were drawn from the USAID IMHIPP HIV comprehensive program (NGO Aid Map, 2019).

Archival Data

The procedures for recruitment used by Heartland Alliance International was to include all individuals who either presented at the OSS facility with HIV or screened for HIV and enrolled during community outreaches by peer outreach coordinators and peer navigators. There were no exclusion criteria for participation in the data collection, and the dataset was robust with data from 1,700 FSWs with HIV enrolled between January 2015 and December 2017 included. The procedure for gaining access to the data was connecting with the leadership of Heartland Alliance International and explaining to them the variables and intended area of research for my study. I worked with their monitoring and evaluation department to abstract and receive a deidentified data set that could be used to answer my research questions. A letter of approval was also requested for this

purpose and received. Because the data shared and requested from Heartland Alliance were deidentified, permission was not required to sign any legal documents; approval for sharing the data was accomplished through explanation of the intended research questions to Heartland Alliance International. The Monitoring and Evaluation team of Heartland Alliance International stated that the data shared comprised of all HIV positive FSWs who were enrolled into HIV ART care following the national ART treatment guidelines for HIV treatment care and support in Nigeria.

Determination of Sample and Effect Size

A power analysis was conducted to determine the minimum sample size required for my study. This gave room for enough power to be able to make concrete conclusions about the population (Sample Size Calculator, 2019). The population of FSWs on ART in the two OSSs was 3,864 FSWs and 2,626 FSWs at the Rivers and Cross Rivers OSS respectively. There was a total of 6,490 FSWs across both OSSs. The dataset captured all FSWs on ART within the required period as stated in the inclusion criteria. The power calculation was done using online source instrument called the sample size calculator. (Sample Size Calculator, 2019). The power was set at 0.8, and the alpha level, that is the probability of Type 1 error occurring, was set at 0.05 (Sample Size Calculator, 2019). Both the alpha level and the power were set to these values as they are commonly used to determine statistical significance (Rosner, 2011). Based on the power calculation I conducted, the minimum ideal sample size was 363 FSWs to have enough power to make definitive conclusions about the population (Sample Size Calculator, 2019).

Operationalization

Operationalization refers to the way in which the variables in the study will be measured. The operationalization was conducted for each variable. The dependent variable was adherence to ART. Adherence was measured as having all ARV refills completed for 6 months or more from ART initiation. The data already collected by Heartland Alliance already allowed for medication adherence to be quantified based on various refill measures (Lam & Fresco, 2015). The level of data for this variable is binary and will be yes for adherence or no for non-adherence.

Age: Age was how old an individual was at the time of the survey. This was measured as an ordinal variable for this study and was categorized as 1 for 15-19 years, 2 for 20-24years, 3 for 25-49 years, and 4 for 50+. This is the national standard for categorizing data in the national facility HIV registers.

Education level: This variable measured the level of education of an individual and was an ordinal variable and was categorized as 1 for none, 2 for primary, 3 for junior secondary, 4 for senior secondary, and 5 for postsecondary.

Job/Occupational Status: This variable represented whether an individual had a form of income and was a nominal variable and was categorized as 1 for student, 2 for employed, 3 for unemployed, and 4 for retired.

Marital Status: This was whether an individual had a partner or not and was a nominal variable and was categorized as 1 for single, 2 for married, 3 for divorced, 4 for separated, and 5 for widowed.

Community versus facility ARV drug refill: This was either an individual comes to the facility to pick up ARVs or the ARVs are taking to the individual in the community. This was a nominal variable and was categorized as 1 for facility based and 2 for community based.

Social Support was measured by being a member in a peer support group: This was whether an individual was a part of a support group with support from peers. This was a nominal variable and was measured as 1 for yes and 2 for no

Alcohol and substance use: These were whether an individual takes alcohol and uses substances. This was a nominal variable and was categorized as 1 for yes and 2 for no. Table 2 below shows how the variables were defined and coded.

Table 2

Study Variables, Meaning, and Code

Variables	Value	Coding
Age (Years)	15-19	1
	20-24	2
	25-49	3
	50+	4
Education level	None	1
	Primary	2
	Junior Secondary	3
	Senior Secondary	4
	Post-Secondary	5
Job/Occupational Status	Student	1
	Employed	2
	Unemployed	3
	Retired	4
Marital Status	Single	1
	Married	2
	Divorced	3
	Separated	4
	Widowed	5
Quality of Care	Receive ARVs in the facility	1
	Receive ARVs in the community	2
Peer Support	Member of a Support Group	1
	Not a Member of a Support Group	2
Alcohol and Substance Abuse	Take alcohol and/or abuse substance	1
	Does not take alcohol and/or abuse substance	2
Adherence	Adhere to ART	1
	Does not Adhere to ART	2

Data Analysis Plan

Data were abstracted in an Excel format from already existing medical records in the OSS. Each facility maintains a database that captures all of the variables for analysis in this study. The following data were abstracted at time T1, sociodemographic of patients including age, marital status, educational level and job/occupational status, data on social support measured by being a member of a support group, community and facility ARV drug refill and alcohol and substance use, date of ART initiation, and the location of the OSS. A line listing of the patients with unique identifiers was developed on an Excel template to capture all the variables required for analysis using Statistical Package for Social Sciences (SSPS) Version 23. Data were deidentified to remove characteristics such as names that could identify individuals by the facility staff. The final Excel template was merged for both the states and imported to SPSS Version 23 for analysis

The research questions and hypothesis for this research study are as follows:

RQ1: What is the association between social-demographic factors of age, education, marital status, job/occupational status and adherence to ART among FSWs in Nigeria.

$H_1$0: There is no association between age, education, marital status and job/occupational status and adherence to ART among FSWs in Nigeria.

H_2A: There is an association between age, education, marital status, job/occupational status and adherence to ART among FSWs in Nigeria.

RQ2: What is the association between social support measured by membership in a peer support group and adherence to ART among FSWs in Nigeria.

$H_2$0: There is no association between social support measured by membership in a peer support group and adherence to ART among FSWs in Nigeria.

H_2A: There is an association between social support measured by membership in a peer support group and adherence to ART among FSWs in Nigeria.

RQ3: What is the association between community and facility ARV drug refill and adherence to ART among FSWs in Nigeria.

$H_3$0: There is no association between community and facility ARV drug refill and adherence to ART among FSWs in Nigeria.

H_3A: There is an association between community and facility ARV drug refill and adherence to ART among FSWs in Nigeria,

RQ4: What is the association between patient related factors of alcohol and substance abuse and adherence to ART among FSWs in Nigeria

$H_4$0: There is no association between alcohol and substance abuse and adherence to ART among FSWs in Nigeria.

H_4A: There is an association between alcohol and substance abuse and adherence to ART among FSWs in Nigeria.

A description of the data abstracted using tables as way of providing numeric description of the data was done. The choice of appropriate descriptive statistics for the different variables was dependent on the distribution of the values (Simpson, 2015). Descriptive statistics, frequencies, and percentages were analyzed to describe the research

variables. Descriptive statistics was presented to describe the sample demographics and the research variables used for the analyses (Howell, 2010). Frequencies and percentages were calculated for all the variables because they were nominal (i.e., categorical) variables (Howell, 2010). In addition, descriptive statistics were used to summarize the data and to describe respondent's treatment adherence by demographics (Prah et al., 2018)

Inferential statistic calculations included a chi-square analysis to test for association between individual variables and adherence to ART. Binary Logistic regression was used as the inferential statistic to determine association between the variables (Shigdel et al., 2014). The analysis plan was based on data provided by Heartland Alliance International and entered in to statistical package for the social sciences (SPSS) to conduct regression analysis to answer the research questions. A binary logistic regression analysis was best suited because the dependent variable was categorical in nature and had two possible outcomes (Shigdel et al, 2014). The dependent variable in this study was adherence to ART which had two categories (yes=1 and No=2). I used binary logistic regression model to predict the probability that education level, community versus facility ARD refill, alcohol and substance abuse and membership of a support group determined adherence or not.

The rationale for including education, community versus facility ARV drug refill , alcohol and substance abuse, and social support through membership in a peer support group as variables was because the chi square test showed some association and research had shown that there may be some level of association with adherence to ART. The

results were analyzed and interpreted using binary logistic regression analysis for each variable and comparing adherence based on having all ARV refills completed for 6 months or more. The association of the independent variables to adherence to ART was assessed by calculation of odds ratio (*OR*) with 95% confidence interval (*CI*). In addition, the logistic regression model was fitted for all the independent variables to test for significance of individual predictors. A P-value < 0.05 was considered as statistically significant (Limaki et al, 2017). The odds ratio is the measure of association between the exposure and the outcome (Szumilas., 2010). The 95% confidence interval (*CI*) was used to estimate the precision of the *OR* (Szumilas., 2010)

Threats to Validity

Threats to External Validity

In a quantitative research, the aspect of external validity is fundamental because it guarantees generalization of conclusions made in a study (Khorsan & Crawford, 2014). One major threat to external validity is the specificity of the variables (Khorsan & Crawford, 2014).

In my study, conclusions were made across a specific population which was HIV infected FSWs in Rivers and Cross Rivers states in Nigeria (Khorsan & Crawford, 2014). Another major threat to the external validity of this research was population validity which imply the possibility of drawing inferences from evaluation of the population in question (Khorsan & Crawford , 2014). This was managed in my study because the data sets were not from the public facility but from specialized OSS facilities for KPs and as such there was less chance that the sample population were not FSWs. One other threat

was selection bias. The query of concern for instance whether the association between one of the independent variables such as age and the dependent variable which was adherence to ART exists within the entire population and not just the chosen sample (Khorsan & Crawford , 2014). It would be a threat to external validity if the research biases were witnessed within the accessible population.

Another threat to external validity was time which portrays the extent of generalization of the outcomes of this research study at a given time with other time periods (Leung , 2015). Time validity of this research was considered low because a structural adjustment was done to associate the independent variables and the dependent variable (Leung , 2015). The last significant and relevant threat to external validity was the environmental validity on whether outcomes of this study can be generalized across settings for example in the international setting (Leung, 2015). One question that may arise is, can the outcome of this study which was carried out within Nigeria apply in a global setting? for instance, within the UK (Leung., 2015). Are the outcomes of the study transferable both theoretically, practically, empirically and constructively? It would be a problem if the empirical findings cannot be transferred (Leung., 2015).

Threats to Internal Validity

Internal validity is focused on the rigor of the research design and its level is determined by the extent to which a control is exerted on extraneous variables (Campbell & Stanley., 2015). These threats would compromise the confidence of other researchers and readers in concluding that there exists a link between dependent and independent variables (Campbell & Stanley., 2015).There are many threats to internal validity but for

this research, the relevant ones include history, maturation interaction and regression testing (Campbell & Stanley., 2015).

History becomes a threat when different factors that are external to the subjects takes place by virtue of passing of time (Campbell & Stanley., 2015). For instance, the reported social support through membership in a peer support group on adherence within a year long program may have been confounded (Campbell & Stanley., 2015). Large scale historical events outside the study of the dependent variable may have influenced the data of the participants (Campbell & Stanley., 2015). Variables related to time like age may interact (Campbell & Stanley., 2015). The resultant discrepancy between groups may be due to differences in age for the related categories (Campbell & Stanley., 2015). Lastly, a query was asked whether there were any changes during the study regarding the way the dependent variable was measured (Campbell & Stanley., 2015). The measure of the dependent variable remained the same throughout my study. These are some of the threats that may impact the internal validity of the research.

Ethical Procedures

Gaining access to data of the participants required ethical considerations because the data used were confidential and captured life information and personal details of FSWs (Government of Canada., 2014). Data was collected from Heartland Alliance International (NGO Aid Map, 2019) and Walden IRB's approval was obtained to ensure that the data collection procedures were ethically adhered to. Ethical approval was also obtained from Heartland Alliance International who also had a cover form the Nigeria

Institute of Medical Research. Only information relevant to this study were available in the database were abstracted for use with no additional patient record included.

The OSS facilities have Governments of Cross Rivers and Rivers states approvals to operate as health facilities with signed MoUs. As such the collection of data by staff of Heartland Alliance International already had approvals. With regards to the treatment of the data, the dataset shared were anonymous and deidentified data that were kept confidential on an encrypted computer. The data were kept on my personal laptop and I alone can access the data. I will keep the data secure for five years per Walden IRB requirements.

Due to the nature of data collected, it was appropriate to gain approval of the community that the data involved and, in this case, the FSW community. This was not only stated in theory but done at practical level (Rivers & Lewis., 2014). As such, the network of FSWs nationally and within the states were contacted. The code of human research ethics specifies the major principles that guide ethical conduct and they include respect for dignity of persons, social responsibility, scientific value, and maximization of benefits and minimization of harm (Guraya, London, & Guraya., 2014). In respecting autonomy and with regards to mediated data retrieval such as in my study there was the need to observe copyright issues and respect ownership of data (Guraya et al., 2014). I also considered the extent to which the research may possibly disrupt social groups because it scrutinizes a social phenomenon whose information is mostly a contentious issue in the society (Guraya et al., 2014).

Summary

This chapter outlined the quantitative design which was cross-sectional in nature, as well as rationale for the use of this research method. The study used secondary data to test the association of between age, education level, marital status, job/occupational status, peer support by membership of a support group, community versus facility ARV refill and alcohol and substance abuse and adherence to ART. In addition, a population and subsequent sample size was calculated and procedures for gaining access to the study data were outlined.

The chapter also operationalized the variables which were used to measure the dependent variable of interest and included the process and procedures for data abstraction. The treatment of data was explored and statistical procedures addressing the hypotheses were explained and these include a rationale for such analyses along with the presentation of results. Finally, limitations and ethical concerns were addressed, with special consideration to internal and external validity. I adhered strictly to these procedures in gathering and analyzing data in order to cleanly and efficiently address the research problem at hand.

In chapter 4, data collection was introduced, followed by the results, and concluded with the summary.

Chapter 4: Results

Introduction

The purpose of this quantitative study was to examine the factors that affect adherence to ART among HIV-infected FSWs in Nigeria. To address the problem and purpose of this study, the following RQs and hypotheses were examined.

RQ1: What is the association between social-demographic factors of age, education, marital status, job/occupational status, and adherence to ART among FSWs in Nigeria?

$H_0$1: There is no significant association between age, education, marital status, job/occupational status, and adherence to ART among FSWs in Nigeria.

H_a1: There is a significant association between age, education, marital status, job/occupational status, and adherence to ART among FSWs in Nigeria.

RQ2: What is the association between social support measured by membership in a peer support group and adherence to ART among FSWs in Nigeria?

$H_0$2: There is no significant association between social support measured by membership in a peer support group and adherence to ART among FSWs in Nigeria.

H_a2: There is a significant association between social support measured by membership in a peer support group and adherence to ART among FSWs in Nigeria.

RQ3: What is the association between community and facility ARV drug refill and adherence to ART among FSWs in Nigeria?

$H_0$3: There is no significant association between community and facility ARV drug refill and adherence to ART among FSWs in Nigeria.

H_a3: There is a significant association between community and facility ARV drug refill and adherence to ART among FSWs in Nigeria.

RQ4: What is the association between patient-related factors of alcohol and substance abuse and adherence to ART among FSWs in Nigeria?

$H_0 4$: There is no significant association between alcohol and substance abuse and adherence to ART among FSWs in Nigeria.

$H_a 4$: There is a significant association between alcohol and substance abuse and adherence to ART among FSWs in Nigeria.

This chapter is comprised of the data collection process, findings, and descriptive statistics of the categorical variables. An explanation of the trend in the nominal and ordinal variables was done using frequencies and percentages. The RQs were examined by combination of chi-square analyses and a binary logistic regression. Significance was evaluated at the generally accepted level of $\alpha = .05$.

Data Collection

Two OSS health facilities in Rivers and Cross Rivers states run by Heartland Alliance International (HAI) were the source of the secondary data. An approval letter of permission to use the organization's data had already been received. The Walden IRB approval number for this study was 06-17-19-0563558 and the HAI approval number was HAI-CRS-RIV-21-06-19-02001.

The data were collected between July 1st and July 9th, 2019. With the support of a HAI M&E staff, data were exported from the LAMIS database into an already prepared Excel template with all variables required. Overall, the research plan was followed and

there was no deviation in gathering the data for the research. Data were collected from a total of 1,357 individuals (*n*=1357). All participants were HIV-infected FSWs. The tables below present the frequencies and percentages for the sample characteristics of all the research variables.

Table 3

Frequency Table Showing all Independent Variables

	Variables	Frequency	Percent	Valid Percent
Age	15-19	60	4.4	4.4
	20-24	267	19.7	19.7
	25-29	995	73.3	73.3
	30-49	35	2.6	2.6
	Total	1357	100	100
Education Level	None	33	2.4	2.4
	Primary	366	27	27
	Junior Secondary	60	4.4	4.4
	Senior secondary	782	57.6	57.6
	Post-Secondary	116	8.5	8.5
	Total	1357	100	100
Job/Occupational Status	Student	115	8.5	8.5
	Employed	60	4.4	4.4
	Unemployed	1176	86.7	86.7
	Retired	6	0.4	0.4
	Total	1357	100	100
Marital Status	Single	1297	95.6	95.6
	Married	50	3.7	3.7
	Divorced	2	0.1	0.1
	Separated	2	0.1	0.1
	Widowed	6	0.4	0.4
	Total	1357	100	100
Method of ARV refill	Community	571	42.1	42.1
	Facility	786	57.9	57.9
	Total	1357	100	100
Membership of a support group	Yes	661	48.7	48.7
	No	696	51.3	51.3
	Total	1357	100	100
Alcohol and Substance Use	Yes	556	41	41
	No	799	58.9	59
	Total	1355	99.9	100
Missing	System	2	0.1	
Total		1357	100	

Statistical Findings

To address all of the RQs, a series of chi-square analyses were conducted to ascertain the relationship between age, education level, job/occupational status, marital status, method of ARV refill (community vs facility), member of a support group and alcohol and substance abuse, and adherence to ART. A chi-square analysis is used to access the relationship between two categorical variables (Howell, 2010). The variables that are significant were tested in the binary regression analysis.

Age. Results of the chi-square indicated no significance, $\chi(1) = 0.211$, $p = .976$, suggesting that there was no statistical significant association between age and adherence to ART. All age groups adhered to ART in approximately the same way. Results of the chi square analysis between age and adherence to ART are presented in Table 4 below.

Table 4

Chi Square Analysis showing 2x2 table for Age and Adherence to ART

*Age (coded) * Adherence Status (yes or no) (Coded) Crosstabulation*

			Adherence Status (yes or no) (Coded)		
			Yes	No	Total
Age (coded)	15-19	Count	46	14	60
		% within Age (coded)	76.7%	23.3%	100.0%
		% within Adherence Status (yes or no) (Coded)	4.4%	4.5%	4.4%
		% of Total	3.4%	1.0%	4.4%
	20-24	Count	209	58	267
		% within Age (coded)	78.3%	21.7%	100.0%
		% within Adherence Status (yes or no) (Coded)	19.9%	18.8%	19.7%
		% of Total	15.4%	4.3%	19.7%
	25-29	Count	766	229	995
		% within Age (coded)	77.0%	23.0%	100.0%
		% within Adherence Status (yes or no) (Coded)	73.1%	74.1%	73.3%
		% of Total	56.4%	16.9%	73.3%
	25-49	Count	27	8	35
		% within Age (coded)	77.1%	22.9%	100.0%
		% within Adherence Status (yes or no) (Coded)	2.6%	2.6%	2.6%
		% of Total	2.0%	0.6%	2.6%
Total		Count	1048	309	1357
		% within Age (coded)	77.2%	22.8%	100.0%
		% within Adherence Status (yes or no) (Coded)	100.0%	100.0%	100.0%
		% of Total	77.2%	22.8%	100.0%

Education level. Results of the chi-square indicated a significance, $\chi(1) = 45.018$, $p = .000$, suggesting that there was a statistically significant association between education level and adherence to ART. All respondents adhered differently to ART based on their level of education. Results of the chi square analysis between education level and adherence to ART are presented in Table 12 below.

Table 5

Chi Square Analysis for Education Level and Adherence to ART

	Value	*df*	Asymptotic Significance (2-sided)
Pearson Chi-Square	45.018[a]	4	.000
Likelihood Ratio	48.607	4	.000
Linear-by-Linear Association	18.353	1	.000
N of Valid Cases	1357		

Note. a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 7.51.

Job/occupational status. Results of the chi-square indicated no significance, $\chi(1) = 1.600$, $p = .659$, suggesting that there was no statistically significant association between job/occupational status and adherence to ART. All respondents adhered in approximately the same way to ART regardless of their job/occupational status. 2 cells (25.0%) have expected count less than 5. This indicates that the chi-square result might not be reliable for this variable. A Fisher exact test was therefore used, and this also

showed no significance (p=.669). Results of the chi square analysis between job/occupational status and adherence to ART are presented in Table 6 below.

Table 6

Chi Square Analysis for Job/Occupational Status and Adherence to ART

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	1.600[a]	3	.659	.679		
Likelihood Ratio	1.678	3	.642	.669		
Fisher's Exact Test	1.497			.685		
Linear-by-Linear Association	1.139[b]	1	.286	.295	.156	.026
N of Valid Cases	1357					

a. 2 cells (25.0%) have expected count less than 5. The minimum expected count is 1.37.

b. The standardized statistic is 1.067.

Marital status. Results of the chi-square indicated no significance, $\chi(1) = 3.226$, $p = .521$, suggesting that there was no statistically significant association between marital status and adherence to ART. All respondents adhered in approximately the same way to ART regardless of their marital status. 6 cells (60%) have expected count less than 5. This indicates that the chi-square result might not be reliable for this variable. A Fisher exact test was therefore used, and this also showed no significance (p=.685). Results of the chi square analysis between marital status and adherence to ART are presented in Table 7 below.

Table 7
Chi Square Analysis for Marital Status and Adherence to ART

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	3.226[a]	4	.521	.506		
Likelihood Ratio	5.451	4	.244	.296		
Fisher's Exact Test	1.906			.755		
Linear-by-Linear Association	2.838[b]	1	.092	.095	.046	.019
N of Valid Cases	1357					

a. 6 cells (60.0%) have expected count less than 5. The minimum expected count is .46.
b. The standardized statistic is -1.685.

Membership of a support group. Results of the chi-square indicated significance, $\chi(1) = 114.203$, $p = .000$, suggesting that there was a statistically significant association between membership of a support group and adherence to ART. All respondents adhered in different ways to ART depending on whether they were a member of a support group or not. Results of the chi square analysis between membership of a support group and adherence to ART are presented in Table 8 below.

Table 8

Chi Square Analysis for Membership of a Support Group

	Value	*df*	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	114.203[a]	1	.000		
Continuity Correction[b]	112.823	1	.000		
Likelihood Ratio	120.007	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	114.118	1	.000		
N of Valid Cases	1357				

Note. a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 150.52.
b. Computed only for a 2x2 table

Method of ARV refill (community vs facility). Results of the chi-square indicated significance, $\chi(1) = 4.413$, $p = .036$, suggesting that there was a statistically significant association between method of ART refill and adherence to ART. All respondents adhered in the different ways to ART depending on whether their ARV refill was either in the facility or in the community. Results of the chi square analysis between method of ARV refill and adherence to ART are presented in Table 9 below.

Table 9

Chi Square Analysis for Method of ARV refill (Community versus Facility) and Adherence to ART

	Value	*df*	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	4.413[a]	1	.036		
Continuity Correction[b]	4.142	1	.042		
Likelihood Ratio	4.456	1	.035		
Fisher's Exact Test				.036	.021
Linear-by-Linear Association	4.410	1	.036		
N of Valid Cases	1357				

Note. a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 130.02.
b. Computed only for a 2x2 table

Alcohol or substance use. Results of the chi-square indicated significance, $\chi(1) = 12.438$, $p = .000$, suggesting that there was a statistically significant association between alcohol and substance use and adherence to ART. All respondents adhered in the different ways to ART depending on their alcohol and substance use behavior. Results of the chi square analysis between alcohol and substance use and adherence to ART are presented in Table 10 below.

Table 10

Chi Square Test for Alcohol and Substance Use and Adherence to ART

	Value	*df*	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	12.438[a]	1	.000		
Continuity Correction[b]	11.978	1	.001		
Likelihood Ratio	12.688	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	12.428	1	.000		
N of Valid Cases	1355				

Note. a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 126.79.
b. Computed only for a 2x2 table

Binary Logistic Regression

A binary logistic regression examined the predictive relationship between the significant predictors from the chi-square analyses and adherence to ART. Binary logistic regression was an ideal statistical analysis because the aim of this research was to ascertain the predictive association between a group of predictors and a dichotomous dependent variable (Shigdel et al., 2014). The significant predictors entered into the logistic model were Educational Level, Method of ARV Refill (Community vs Facility), Membership of a Support Group and Alcohol and substance use. The outcome variable was adherence to ART – Yes or No.

Before the analysis was conducted, the binary logistic regression assumptions were assessed for independence of errors, outliers, absence of multicollinearity

(Tabachnick & Fidell, 2013). The variables of interest were dichotomous in nature and as such there were no outliers identified and this met the assumption. For the test of absence of multicollinearity, Variance Inflation Factors (VIFs) were used and if there were values greater than 10, there would be a suggestion of the violation of this assumption (Stevens, 2009). None of the VIF values in the regression model were greater than 10 (largest VIF = 1.098), therefore, the assumption was met. Table 11 below showed the findings of the Variance Inflation Factors (VIFs). The independence of errors assumption was also met because this were personal and confidential data of respondence who gave independent responses when they accessed the health facility for medical care. As such each response was derived from a different, unrelated case.

Table 11

VIF Values for Variables Entered into Logistic Regression

Coefficients[a]

Model		Collinearity Statistics	
		Tolerance	VIF
1	Education level (coded)	.967	1.034
	Method of ARV Refill (Community versus Facility) (Coded)	.911	1.098
	Membership of a Support group (yes or no) (Coded)	.933	1.071
	Alcohol and Substance use (yes or no) (Coded)	.921	1.085

a. Dependent Variable: Adherence Status (yes or no) (Coded)

The binary logistic regression result showed that Education Level (p=.000), Method of ARV Refill (p=.000), Membership of a Support Group (p=.000) and Alcohol and Substance Use (p=.000) added significantly to the model/prediction of Adherence to ART ($\chi 2(4) = 187.362$, $p < .001$). The model explained 22.3.0% (Nagelkerke R^2) of the variance in adherence to ART as sown in table 12 and correctly classified 77.2% of the cases.

Table 12

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	1240.230[a]	.147	.223

a. Estimation terminated at iteration number 5 because parameter estimates changed by less than .001.

The predicted odds ratio of adhering to ART based on Education Level was1.385. This meant that respondents with senior secondary education were 1.385 times more likely to adhere to ART than other education levels. The predicted odds of adhering to ART based on method of ARV refill, membership of a support group and alcohol and substance use were 1.737, 6.430 and 1.820 respectively. This meant that respondents with ARV refill in the facility were 1.737 times more likely to adhere to ART than respondents with community ARV refill. Also, respondents who were a member of a support group were 6.430 times more likely to adhere to ART compared to those not in a support group. In addition, respondents who did not abuse alcohol or substance were

1.820 times likely to adhere to ART compared to those who do. Results of the binary logistic regression are presented in Table 13 below

Table 13

Results of the Binary Logistic Regression for Significant Variables and adherence to ART

Variables in the Equation

								95% C.I.for EXP(B)	
		B	S.E.	Wald	*df*	Sig.	Exp(B)	Lower	Upper
Step 1[a]	Education level (coded)	.325	.072	20.691	1	.000	1.385	1.203	1.593
	Method of ARV Refill (Community versus Facility) (Coded)	.552	.149	13.735	1	.000	1.737	1.297	2.326
	Membership of a Support group (yes or no) (Coded)	1.861	.162	132.174	1	.000	6.430	4.682	8.831
	Alcohol and Substance use (yes or no) (Coded)	.599	.150	15.871	1	.000	1.820	1.356	2.444
	Constant	-7.219	.547	174.146	1	.000	.001		

a. Variable(s) entered on step 1: Education level (coded), Method of ARV Refill (Community versus Facility) (Coded), Membership of a Support group (yes or no) (Coded), Alcohol and Substance use (yes or no) (Coded).

Summary

The aim of my research was to determine variables that predict adherence to ART in HIV infected FSWs who accessed HIV treatment services at Heartland Alliance

International OSS. This chapter presented the findings of the data collection and data analyses. Descriptive statistics using frequencies were presented first. To explore the research questions, chi-square analyses were conducted to assess the cross tabulations between the categorical characteristics of participants and adherence to ART.

Based on the result of the chi-square analysis, education level, method of ARV refill, membership of a support group and alcohol and substance abuse were significantly associated with adherence to ART. Age, job/occupational status and marital status were not significantly associated with adherence to ART.

The significant variables from the chi-square analyses were used for the binary logistic regression analysis. Overall the variables in the model were significant, suggesting that 22.3% of the variance in adherence to ART could be attributed to the predictors. All the variables entered on the logistic regression model were significant predictors of adherence to ART. Respondents who had senior secondary education only, those who received their ARVs in the facility, those who are members of a support group and those who do not abuse alcohol or substance were more likely to adhere to ART.

In chapter 5, the statistical findings were discussed in detail and comparisons to existing literature were made. The findings were also linked back to the conceptual framework selected for this research. In addition, limitations and suggestions for future research were discussed.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

HIV is a leading cause of death and a worldwide health threat to millions. In Nigeria, HIV is the third leading cause of death (Center for Disease Control and Prevention, 2018). FSWs are highly prone to HIV (Shannon et al., 2014) and an estimated 40% of FSWs are HIV infected (Mountain et al., 2014). In addition, West Africa countries including Nigeria accounts for 10-32% of new infections that are due to sex work (Bekker et al., 2014).

Treatment of HIV can be optimised through adherence to ART (Quintana et al., 2018). To prevent virologic failure due to selection of resistance mutations, a high level of adherence to ART is required (Ugbena et al., 2018). In addition, poor adherence to ART could lead to an increase in viral load of individuals who are HIV infected, and this could also bring about an increased risk of onward transmission of the HIV virus (Bock et al., 2016).

By identifying variables that can increase the possibility of adhering to ART, public health agencies can design interventions to ensure adherence to ART. Based on the literature reviews, various variables that affect adherence to ART were identified. As such, the purpose of this quantitative cross-sectional study was to test these variables and their association to adherence to ART among FSWs in Nigeria.

The results of the chi-square analysis showed that some variables were individually significantly associated with adherence to ART and these included educational level, method of ARV refill (community vs facility), membership in a

support group, and alcohol and substance use. These variables, based on the binary logistic regression analyses, created a significant model for predicting adherence to ART.

Interpretation of the Findings

I conducted chi-square tests for individual variables to ascertain their association with adherence to ART. The variables from the chi-square analysis that were significantly associated to adherence to ART were educational level, method of ARV refill (community vs facility), membership of a support group, and alcohol and substance use. Only the significantly associated variables were used in the binary logistic regression analysis.

The binary logistic regression model overall was significant and accounted for 22.3% of the variance in adherence to ART, which suggested that all variables cumulatively had an impact on adherence to ART. The significant individual predictors in the binary logistic regression model were education level, method of ARV refill, (community vs facility), membership of a support group, and alcohol and substance use. Specifically, respondents who attained secondary education level were more likely to adhere to ART compared to other levels of education. Respondents who got their ARVs from the facility were more likely to adhere to ART. Also, respondents who were a member of a support group were more likely to adhere to ART, and respondents who did not abuse alcohol or substance were also more likely to adhere to ART compared to those that did not. There was no significant relationship between age, job/occupational status, and marital status and adherence to ART. In the subsequent subsections, I detail the

connection of these findings to the extant literature as well as the relationship to the conceptual framework.

Relationship Between Findings and Existing Literature

There were few studies on predictors of adherence to ART among FSWs. However, some findings were consistent with some of the variables that contributed to the significant model determined through the chi-square analysis. In the subsequent subsections, I present these variables and the related literature as well as the study's contribution to the literature.

The findings of demographic factors of age, job/occupational status, and marital status varied differently in terms of consistency with the literature. First the findings for age varied across the literature. Okoronkwo et al. (2013) investigated the factors that affect nonadherence to ART and used age as one of the determining factors. Okoronkwo et al. stated that there was nonadherence across the various age categories with a nonadherence rate of 85.1%. However, Okoronkwo et al. concluded that there was no significant difference in nonadherence factor of age among the groups. Okoronkwo et al.'s findings, which used similar age categories, were consistent with my study. However, these findings were not consistent with another study. Lall et al. (2015 examined factors impacting adherence to and retention in care among HIV-positive youth and adolescents from key populations. Lall et al. concluded that age is an important factor of influence on adherence to ART and in control of HIV/AIDS. Also consistent with Lall et al. were the studies of Denison et al. (2015) and Shaw and Amico (2016). There was suboptimal adherence with adolescent when compared to adults; they both used age

groups of between 13 and 24years. My study finding was not consistent with these findings, and this could be due to the more comprehensive age groups that my study used. Although I focussed on age groups of ages 15 years and older in 4-year increments, the three studies focused on ages 13-24 years as a single group.

The finding for job/occupational status was not consistent with the literature. Nachega et al. (2014) determined the association between adherence to ART and employment status. Nachega et al. stated that the odds ratio for associating employment and ART adherence was 1.27 with employed HIV-infected individuals being more likely to adhere to ART than the unemployed ones, and they concluded that employment promotes adherence to ART. The difference in findings may be due to just the two categories of employed and unemployed that the authors used; I used four different categories of employment status of FSWs. Consistent with Nachega et al.'s study, Okoronkwo et al. (2013) examined factors that affected nonadherence to ART among adult HIV-infected patients. Although Okoronkwo et al. stated that there was significant difference in nonadherence factors and respondents' employment status, Okoronkwo et al. showed that the unemployed were more likely to adhere than the employed. This is unlike Nacheaga et al. who suggested that employed respondents were more likely to adhere than the non-employed. These findings that are not consistent with my study may also be due to the way the respondents were classified with some respondents such as artisans classified as employed while in my study these were classified as unemployed.

Consistent with Okoronkwo et al. (2013) is another study. Saha et al. (2014) examined adherence to highly active ART and just like Okoronkwo et al. concluded that

employed respondents were more nonadherent to HAART than those who were unemployed (Saha et al., 2014). However, this study was also not consistent with my study, and this may be due to the respondents who were majorly not FSWs compared to my study where all respondents were FSWs.

The finding that marital status did predict adherence to ART varied across the literature. Adeniyi et al. (2018) suggested that marital status was a significant factor and an independent predictor that affects adherence to ART. Adeniyi et al. stated that married pregnant women adhered more to ART than single, divorced/separated, and cohabiting women. This finding was not consistent with my study and this may be due to the respondents used by Adeniyi et al. who were not FSWs and were also pregnant. The study was consistent with another study. Bam et al. (2015) identified barriers and facilitators of ART adherence. Like Adeniyi et al., Bam et al. also stated that married respondents adhered more compared to other categories. However, another study was consistent with my study findings. Shigdel et al. (2014) examined marital status as a factor that predicted adherence to ART, and they suggested that marital status was not significantly associated with adherence to ART.

The finding that educational level contributed to predicting adherence to ART was consistent with the literature. Eyassu et al. (2016) assessed the determinants of adherence to ART and stated that level of education was significantly associated with adherence to ART. The majority of their respondents had completed secondary level and adherence to ART increased with an increase level of education (Eyassu et al., 2016). Additionally, Adeniyi et al. (2018) in their study of factors that affect adherence to ART

among HIV-infected pregnant women used education as one of the factors. Adeniyi et al. stated that the different categories of education predicted adherence to ART. Consistent with my study, Adeniyi et al. also stated that respondents with tertiary education were less likely to adhere when compared to those with Grade 1-6 (primary education) and Grades 7-12 (secondary education). Bam et al. (2015) supported these findings of adherence to ART at the primary and secondary level of education compared to tertiary education. Furthermore, Okoronkwo et al. (2013) identified education as a predicting factor. Most of their respondents had no formal education and respondents who had secondary, higher, and primary education respectively were more adherent in this order (Okoronkwo et al., 2013). Okoronkwo et al. concluded that there was a significant difference in nonadherence factors and respondents' educational status.

The findings that social support through membership in a peer support group influenced adherence to ART was also consistent with the literature. Bekker et al. (2015) study of adherence to ART explored various options of social support among infected FSWs. They concluded that the urge of FSWs to get involved in all social support interventions was determined by a robust peer support and a supportive network (Bekker et al., 2015). In addition, and consistent with the literature, Lancaster et al., (2016) systematic review of HIV care and treatment experiences among FSWs living with HIV concluded that social support from peers was one of the effective ways of addressing barriers and this led to optimal adherence and ultimately viral load suppression. Lancaster et al. stated that a focus in addressing barriers to adherence should be peer support which could be in the form of male or female partners they have engagements with.

Furthermore, Goldenberg et al. (2016) study on FSWs concluded that with appropriate social support, it was possible to achieve adherence to ART.

The findings that method of ARV refill determined by community versus facility ARV refill influences adherence to ART varied in the literature. Consistent with my study was Mai, et al., (2018) who examined adherence to ART. They stated that respondents who visited the facility had optimal adherence when compared to respondents with suboptimal adherence which was associated with residence who lived in the mountainous region (Mai et al., 2016). Although some level of adherence was acknowledged for facility ARV refills, Mai et al. did not compare this to any other form of ARV refill such as community-based interventions. However, inconsistent with my study was Risher et al. (2015) study on HIV treatment cascade. Risher et al. showed that community-based interventions such as those specific to culture like peer navigators offered improvement to care outcomes among FSWs. However , Risher et al. did not specifically determine the nature of ARV refill. Also inconsistent with my study findings was Cowan et al. (2017) study on the effectiveness and cost effectiveness of enhanced community-based interventions along the care cascade including adherence to ART. However, just like the Richer et al. (2015), Cowan et al. (2017) study was not specific to any community-based interventions for ARV refill.

The findings that alcohol and substance abuse was a predictor for adherence to ART was consistent with the literature. Kader et al. (2015) examined the effect of the use of alcohol and other drugs on adherence to ART. Kader et al. stated that drug use and alcohol intake were determinants of adherence. Also, separately, there was an

association between alcohol use and missing ARV. They concluded that harmful use of alcohol and drugs led to missing and stoppage of ART which eventually led to HIV progression. (Kader et al., 2015). Also consistent with these findings was the study of Risher et al. (2015). Risher et al. examined the influence of drugs and substance abuse on adherence to ART and concluded that there was non-adherence to ART by those who used drugs when compared to those that did not . Risher et al. further stated that there were worse HV outcomes for those who abused and injected drugs compared to those who don't. Furthermore, Tie et al., (2014) evaluated the use of drug on viral load suppression. They stated that the use of illicit drugs had an effect by reducing viral load suppression and that use of illicit drugs was a factor which influenced not just adherence to ART but also to adherence to other kinds of treatment (Tie et al., 2014). They concluded that illicit drugs usage among sex workers acted as a demotivating factor for adherence to ART, just as it negatively impacted viral load suppression (Tai et al., 2014). Kekwaletswe and Morojele (2014) examined the relationship between alcohol usage and adherence to ART. They stated that due to alcohol intake, a third of the respondents reported missing their dosage and this was a barrier to adherence. They concluded that a high level of alcohol use was related to lower levels of adherence to ART (Kekwaletswe & Morojele, 2014). This was consistent with my study which showed that alcohol and substance abuse is associated with adherence to ART

Relationship Between Findings and Conceptual Framework

My research was conducted using a survey based on the Andersen conceptual framework. The framework explores conditions that obstructs or facilitates health

utilization (Meade et al., 2015). It demonstrates the factors that influence the use of healthcare services, which is defined by enabling, predisposing, and need factors. Predisposing factors include health beliefs and race (Meade et al., 2015). It also involves social factors including education, culture, and demographics such as gender, age and marital status (Meade et al., 2015). Enabling factors include family aspects, community, and possible additions like psychological traits (Meade et al., 2015). Although the survey included demographics and the role they play on adherence to ART, predisposing factors such as age, job/occupational status and marital status, did not play a role in adherence to ART. The only predisposing factor that had a significant predictive relationship with adherence to ART was education level. The results of my study were partially consistent with these broad categories discussed below.

Predisposing, Enabling and Need Factors

My study examined the relevance of the following barriers to adherence to ART: age, education level, job/occupational status, marital status, method of ARV refill, membership of a support group and alcohol and substance abuse. These variables were in line with the literature related to the Andersen's framework used by Brady et al. (2015), Holtzman et al. (2015) and Gopalan et al (2016). In line with the Andersen's conceptual framework, collectively all of these variables were significant predictors of adherence to ART. My study collaborated the Andersen's conceptual framework 's explanation that predisposing, enabling and need factors are adequate for understanding factors that predict adherence to ART by respondents in this study.

Individually, only education level, method of ARV refill, membership of a support group and alcohol and substance use were of significance in my study. Respondents with senior secondary education were 1.385 times more likely to adhere to ART compared to other education levels. Education level was a significant predictor of adherence to ART. Similarly, those with ARV refill in the facility were 1.737 times more likely to adhere to ART than respondents with community ARV refill. Also, respondents who were a member of a support group were 6.430 times more likely to adhere to ART compared to those not in a support group. In addition, respondents who did not abuse alcohol or substance were 1.820 times more likely to adhere to ART compared to those who did.

Limitations of the Study

The first limitation of my study was that data was limited to two geographical states in Nigeria namely Rivers and Cross Rivers states. It is possible that this may not be representative of other states in Nigeria (Gourlay et al., 2013). Secondly, data for this study were derived from the OSS which are in urban areas. This could suggest results in urban areas which may also not be as representative of results obtained in rural areas (Gourlay et al., 2013). My study used secondary data which was also a limitation. The data were collected by someone else so there was a lack of control of data quality (Rahman., 2016). There may have been errors during collection and I was not able to ascertain accuracy of the person who collected the data because he was no longer available to cross-check. In addition, this was a cross sectional study which has a couple of limitations (Levin., 2006). First, it is difficult to make causal inference and as such

causality could not be judged between independent and dependent variables. In addition, because this was only a snapshot, if another timeframe was chosen, this may produce a different result (Levin., 2006). Lastly, data used was already categorized in to adherent and non-adherent. The interpretation of adherent can be subject to interpretation if the National guidelines were not adhered to strictly.

Recommendations

There is limited literature on linkage and retention which limits our understanding of HIV care and treatment experiences for FSW living with HIV in Nigeria and sub-Saharan Africa (Lancaster et al., 2016). The primary recommendation for research and practice is to bridge this gap in research by focusing on barriers that reduces adherence to ART similar to those in my research. Several additional recommendations for researchers and for clinical practice originates from this encompassing recommendation.

Recommendations for Future Researchers

More research are required regarding adherence to ART among HIV infected FSWs. This is because FSWs are very prone to HIV infection (Shannon et al., 2014). In addition, our understanding of the treatment for FSWs is limited (Lancaster et al., 2016). For example, researchers should determine how job/occupational status relates with adherence to ART by looking deeper in to poverty and unemployment with variables like lack of money for personal needs and transport and food shortage (Azia et al., 2016). In additional, level of education can be further researched and linked to treatment literacy. Furthermore, because the method of ARV refill also determined adherence, further

research could be conducted to identify the underlying reasons why respondents adhered more successfully with facility ARV refill compared to community ARV refill.

My study ascertained that the Andersen's conceptual framework especially, predisposing factors such as educational level and peer support and enabling factors such as method of ARV refill were appropriate factors in determining adherence to ART among HIV infected FSWs. Further research could use the Andersen's conceptual framework to access other variables which may contribute to adherence to ART such as stigma and discrimination, race, health system factors, therapy related and cultural factors. Alternatively, researchers could also examine adherence to ART in terms of treatment outcomes such as quality of care, CD4+ level, HIV viral load and opportunist infection (OIs) and death (Brady et al., 2015). This could help determine the health status of patents to determine how adherence relates to viral load suppression and improved quality of life.

Some of these recommendation for future research resulted from the limitations of my study. For example, there are many brothels in rural areas with FSWs who have low socioeconomic status and are prone to risky behaviors. As such future researchers should consider using data from health facilities (OSS) in rural areas. Researchers could also consider including participants from several different OSS in Nigeria. For example, this research was conducted in Rivers and Cross Rivers state which are both on the South-South geographical zone of the country. Researchers should use sites in the North central states such as Benue state which also has high HIV prevalence (NAIIS, 2018). In addition, future research could also pick OSS from my study and sites from the North

Central region in Nigeria and perform a comparative analysis. This additional research would help ascertain the generalizability of the Andersen's conceptual framework variables identified in the present study as well as reduce the limitations of homogeneity of my study's sample. This change could have implications for research regarding demographics and other enabling variables.

Researchers may also consider looking deeper in to the categories of age, education level, job/occupational status and marital status to ascertain which specific category influences adherence more and possibly conduct a hierarchical logistical regression to understand how each variable played a role in the model.

Implications

General

The findings of this study have implications both at the clinical and community levels. My study showed that several variables influenced adherence to ART among HIV infected FSWs including demographic factor of education level, method of ARV refill, membership of a support group (community vs facility refill) and alcohol and substance use. My study also indicated that individual variables predicted adherence to ART. Knowledge and understanding of how these factors influence adherence to ART may lead to improvement in health status and quality of life.

First, tailored interventions targeting FSWs with varying levels of education is required. When FSWs are initiated into ART treatment, the demographic factor of education level may guide health workers and programs of interventions to place them on the appropriate level of treatment support such as individual adherence counsellors and

treatment supporters such as peer navigators. Secondly, the method of ARV refill also played a role in adherence. More respondents visited the facility which may be due to the services they receive at the facility. They would see a medical doctor and have access to other services as well than when compared to community ARV refill which may be delivered through peer navigators or lower cadre health professionals. The implication is that interventions may be designed to encourage FSWs to visit the facility more frequently. In addition, interventions may also be designed to move services closer to the people in the community for easier access. Also, there are implications for membership of a support group. The implication of this is also to design a form of social support interventions that helps to support HIV infected FSWs. These forms of support could be through peer support as suggested by my study result and other kinds of interventions that ensures that FSWs adhere to treatment. Lastly, there are also implications for alcohol and substance use. During ART initiation into care, screening questions could determine FSWs who drink and abuse drugs and this could be factored in the kind of support for adherence such as counselling to be provided.

Government Health Agencies and HIV Treatment Programs

There are no government HIV treatment programs that specifically target Key Populations such as FSWs. Another implication from this study is that when government invests specifically on treatment care and support interventions for FSW, they could consider interventions for retention in care and adherence to ART considering these variables as factors. In addition, donor agencies and implementing partners such as Heartland Alliance International whose data was used for this study could design tailored

interventions in the early stages of the projects that specially target FSWs for retention in care and adherence using these variables.

Implications for Social Change

I examined the predictors of adherence to ART among FSWs in Nigeria and this was aimed at improving the treatment outcomes of FSWs which could improve their quality of life as well as that of their families and communities. Health and social workers in government and non-governmental organizations through this research could be informed of ways of possibly supporting FSWs to address the social problems they face. It is possible that the outcome of my study may help bring about a positive social change in the states of focus and impact on lives.

My study may have substantial implication on social change and suggest the requirement of government and non-government stakeholders to implement an all-inclusive KP policy that could aid in reducing the barriers the FSWs face in receiving comprehensive health services as well as endorsing a wide range of interventions which are specific to these population. If tailored interventions are created and successful the lives of FSWs, their families, communities and customers may be improved.

Studies like mine have significant implications for social change, in their ability to solidly inform programs and policies aimed at ensuring healthy HIV infected FSWs who are sexually active, are at a lower risk of transmitting the HIV virus, are virally suppressed and to reduce mortality. By conducting this research, I was in a position to suggest the association of some predictors and adherence to ART. Also, through this

study, I am privileged in providing further knowledge and have suggested predictors such as education level and other factors that influence adherence to ART in Nigeria.

Conclusion

Adhering poorly to ART increases drug resistance to HIV virus, limits the efficacy of treatment, brings about disease progression and reduces therapeutic options in the future (UNAIDS., 2016). Also, poor adherence increases the risk of transmission due to viral replication not suppressed (Bock et al., 2016). Through this study, I identified variables that could predict adherence to ART: age, method of ARV refill (community vs facility), membership of a support group and alcohol and substance use. The implication for program implementers and health care providers is that health interventions could be designed for HIV infected FSWs based on social demographic factors such as education level, social support factor such as being a member of a peer support group, patient related factor such as alcohol and substance use and health system factors such as method of ARV refill (Facility vs Community). This also has implication for practice based on a policy and reforms in providing access to health services. The social change implications directly notify the implementation of all-inclusive KP policies that could aid in lessening the barriers the FSWs face in receiving comprehensive health services as well as endorsing a wide range of interventions such as alcohol and drug rehabilitation, counselling and incentives to join peer support groups that could benefit FSWs, their clients and families.

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