SOCIOECONOMIC INEQUALITY IN HIV PREVENTION AMONGST FEMALE SEX WORKERS: AN ANALYSIS OF PRE-EXPOSURE PROPHYLAXIS USE.

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DECLARATION

This research project is my original work and has not been presented for a degree in any other University or any other award.

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This project has been submitted for examination with my approval as the University Supervisor.

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Dr. Elizabeth Owiti, Ph.D

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To God the giver of life, the author of my destiny, I would like to thank Him for the knowledge and wisdom He has bestowed upon me, for the strength to trudge on despite everything else.

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OPERATIONAL DEFINITION

Drop-in centers are safe spaces, usually located within the community and in areas of greatest density of sex workers, where sex workers congregate to access services like health care, legal services and other direct services. Sex workers may utilize this place to relax, socialize and old meeting that strengthen them as a group.

Health inequality refers to the disparities in an individual's or population health status evidenced by the pattern of distribution of the health determinants amongst two or more sub-populations.

Hotspot refers to an area of significant activity where women solicit or find their clients and is not necessarily a place where sexual acts take place. These geographic locations include bar with lodging, bar without lodging, sex den/brothel, strip club, street/highway, home, casino, beach, guest house/hotel/lodging, massage parlour, tea kiosk, khat kiosk and park.

Response efficacy as used in the AIDS risk reduction model, the degree of adherence to healthy and less risky sexual behavior is seen to be effective in reducing the risk of transmission of HIV.

Risky sexual behavior: According to my study, risky sexual behavior refers to having an additional sexual partner aside to a main sexual partner. It also refers to inconsistent condom use, non-disclosure to sexual partner as well as participating on transactional sex.

Self-efficacy in this research, people's perceptions of their capacity to carry out activities that will produce desired results are established. This applies to the risk reduction model of AIDS

Sex workers: these are individuals (men and transgender) who receive money or goods in return for sexual services and who also describe those practices as income-generating to the degree that they do not regard sex work as their task. I'm going to consider the female sex workers in my research.

Socioeconomic inequality in health in this study refers to variations in the use of Oral Pre exposure prophylaxis in relation to the socioeconomic status of female sex workers.

Socioeconomic inequality Refers to the variations in the spectrum of economic and social factors affecting a person's well-being, including employment, education and wealth.

Wealth index, A composite calculation of the aggregate living standards of a household is determined on the basis of the ownership of selected property.

LIST OF ABBREVIATIONS AND ACRONYMS

AIDS   Acquired Immunodeficiency Syndrome

ARRM   AIDS Risk Reduction Model

ART   Ant retroviral Therapy

FSW   Female Sex Workers

GDP   Gross Domestic Product

GLM   Generalized Linear Models

HIV   Human Immunodeficiency Virus

HRQOL   Health related Quality of Life

MCA   Mean Component Analysis

MOH   Ministry Of Health

MSM   Men having sex with Men

PCA   Principal Component Analysis

PEP   Post Exposure Prophylaxis

PMTCT   Prevention of Mother to Child Transmission

PREP   Pre Exposure Prophylaxis

PWID   People Who Inject Drugs

SSA   Sub Saharan Africa

UNAIDS   United Nation Programme on HIV and AIDs

WHO   World Health Organization

ABSTRACT

Introduction: Globally, HIV and AIDS still remains a major health and economic burden with disproportionate burden in SSA. The global trend of the disease is on a decline, however, SSA has witnessed slower decline in her indicators. The Key population are reported as major drivers of the epidemic, accounting for 47% of the new infection globally, with a prevalence rate of 30% in Kenya. Socioeconomic inequalities amongst FSWs do exist in regards to access and coverage of health, trade at the sex market and negotiation of safe sex compounded by the illegality of the trade despite roll out of PrEP, a biomedical intervention drug, with reported 92% effectiveness. It is of private benefit and confers public health externality to the sex network and the general population.

Objectives: There exist paucity of studies on determinants of demand for PrEP, socioeconomic inequalities in PrEP use and economic studies of FSWs in Kenya, a gap my study hopes to bridge. This study sought to understand the socioeconomic determinants of PrEP use; decipher the role of socioeconomic inequalities in PrEP use among the FSW and further utilize the results to inform policy change.

Methodology: Using a structured questionnaire 479 HIV negative FSWs in Kisii County were sampled to a point of saturation. Data was entered and analyzed using STATA version 14. Probit regression model was conducted to determine associations between the variables and concentration index was employed to determine the socioeconomic inequality. This study contributed to the existing literature on PrEP uptake, helped in designing FSW-specific interventions and strategies to distribute PrEP as well as to inform policy debates related to universal coverage and utilization of health services, a consideration in assessing the global performance of health systems.

Results: Of the 479 FSWs, 62% reported ever using PrEP. PrEP uptake was highest amongst these groups of FSWs; aged over 24 years, formerly and currently married, Catholics, have less than 2 children, unemployed, above secondary education, town residence, smaller households of less than 5 and belonged to the richer wealth quantile. The number of children, index scores of risk, service provision and wealth were found to be statistically significant. Concentration index showed that PrEP uptake was concentrated among the FSWs from a wealthy class.

Conclusion: Based on the findings, we observed that peer led approaches has demonstrated favorable outcomes in advocating for PrEP use amongst the FSWs and a structured roll out and implementation of the same would boost uptake. Policies and strategies aimed at enhancing PrEP uptake among the FSW may assist reduce the gap between the highest and lowest SES groups in Kisii.

Key words: "socioeconomic inequality", "PrEP use", "FSWs"

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

This section introduces the research study and demonstrates the scope of the study from a global to local perspective. It also highlights the economics behind sex work and HIV prevention and the need for epidemic control.

1.1.1 Global and Country trends in HIV & AIDS

HIV and AIDS continue to be a major global health and economic burden, but developing countries continue to bear a disproportionate epidemic burden (Kharsany & Karim, 2016a). Worldwide, approximately 36.9 million persons are infected with HIV in 2017, of which Sub-Saharan Africa (SSA) accounted for 71 percent of this burden (23.5-26.1 million). Fifteen countries account for 75% of the global burden, ten of which are based in East and South Africa: South Africa (18%), Nigeria (9%), Kenya (6%), Mozambique, Uganda, Zimbabwe and Tanzania (4% each), Zambia and Malawi (3%) and Ethiopia (2%). Since the onset of the epidemic, 77.3 million people have been diagnosed with HIV, 45.7% (35.4 million) of whom have been confirmed death-related AIDs (UNAIDS, 2014).

Globally, there has been a declining trend in HIV prevalence, new infections and AIDS related mortalities. HIV incidence has declined by 47% since its peak in 1996 (3.4 million in 1996 against 1.8 million in 2017) while AIDs-related deaths have also seen a decrease of more than 51% (1.9 million in 2004 against 940,000 in 2017) since the peak in 2004. Despite the global decline in trends, Sub-Saharan African countries have witnessed slower progress in all their indicators and dimension (UNAIDS, 2018) with an estimated decline in deaths at only 33% (2.2 million new infections in 2005 against 1.5 million in 2013).

According to the Kenya HIV estimates report, 2018, Kenya remains a high burden country with an average adult HIV prevalence rate of 4.9% with significant variation across gender (female at 5.2% and male at 4.5%), intercountry variation in prevalence rate (0.2% in Wajir to 24% in Siaya County) and varied incidence rates (0.89% in Homabay and 0% in Wajir). The young women

account for a third of all new infections. The HIV prevalence rate amongst the Key population stands at 29%.

1.1.2 The Burden of Morbidity in Priority Population

HIV infection among the population varies based on sex, age, occupation and lifestyle with women and young girls being at a higher risk than men (UNAIDS, 2014). Amongst the women folk, it is estimated that adolescent girls and young women are disproportionately vulnerable and at increased threat of contracting the virus. Globally, 380,000 new infections are reported amongst this population. SSA bears 80% of the global burden with the female folk is reported to acquire the virus 5-7 years earlier than their male counterpart. Various studies conducted in southern Africa (Halperin *et al*., 2011; Leclerc & Garenne, 2008; Leclerc-Madlala, 2008; Peltzer,Karl, 2010) have demonstrated significant male variability in sexual debut, transactional sex, gender difference in age, multiple partners and marriage, condom use and sexually transmitted infections; factors that contribute immensely to this population's vulnerability to HIV. This motivates the need for interventions that are appropriate for the protection of young women in order to achieve their sexual and reproductive health needs prior to adulthood (Kharsany & Karim, 2016b).

Amongst the sex workers, the HIV burden remains high (Kharsany & Karim, 2016b) with a prevalence rate higher than that of at least twofold in the general population. Homosexual men and men (MSM), transgender women (TGW) and people who inject drugs are at increased risk of HIV infection and transmission in comparison to the general population (UNAIDS, 2014). The increased risk of HIV infection is due to the number of lifelong partners, risky sexual acts, the probability of physical and/or sexual violence, the prospect of poverty, the inability to negotiate for successful use of condoms and marginalization. These populations are considered the major drivers to HIV infection as they account for 47% of global new HIV infection. In Eastern and Southern Africa, they account for 16% of new HIV infections (UNAIDS, 2018). These populations continue to require targeted policies and interventions if new HIV infections and prevalence are to be controlled.

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1.1.3 HIV Prevention Interventions

Led by UNAIDs, "Knowing your epidemic, know your response", this has formed the basis and opportunity of an intensified focus on HIV prevention spurred by the realization that epidemics do differ (Wilson & Halperin, 2008). In the generalized epidemics, prevention strategies like testing and counselling, school and youth programs on abstinence, treatment of sexually transmitted infections and condom distribution nonetheless remain unproven or worst disproven. As advocated by means of the World Health Organization (WHO) and the Joint United Nations Programs on HIV & AIDS (UNAIDS), Voluntary Medical Male Circumcision (VMMC) used to be encouraged for in thirteen African nations the place HIV incidence used to be high and medical circumcision was low. Being a distinctly cost positive and a one off procedure, VMMC two confers public fitness benefit; as HIV incidence reduces in guys following scale up of VMMC, there is a consequent reduction in incidence amongst the ladies people (Bailey et al., 2007; Gray et al., 2007). This learn about confirmed robust have an effect on when male circumcision was scaled up to 80% coverage thereby warding off an estimated 3,360,000 infections with time (Njeuhmeli *et al*., 2011).

The concept of treatment as prevention (TasP) was validated by various studies that demonstrated low transmission rates amongst sero-discordant couples, gay men and sex workers who received suppressive antiretroviral therapy in preventing HIV during sexual activity (Cohen *et al*., 2011; Grulich, *et al*., 2018). Long term use of ART with good adherence leads to viral suppression thus preventing disease progression and onward transmission of the virus (Cohen *et al*., 2011, 2016).

These are amongst other incredible growth made in HIV prevention intervention techniques that are primarily based on behavioral and biomedical lookup which include Prevention of Mother to Child Transmission of HIV (PMTCT), Post Exposure Prophylaxis (PEP) and damage reduction amongst PWIDs. Despite this progress, the international incidence fee is not declining significantly to attain the UNAIDs 2020 milestone. The decline is simply 18% two from the year 2010, this is decrease than two the centered 75% reduction (UNAIDS, 2018). To address these, a new HIV prevention intervention targeting high risk HIV negative population was rolled out in 2014. According to Liu *et al.,* (2013), oral PrEP significantly reduces the risk of HIV infection among key population if appropriate dosage is provided and adhered to. In 2014, WHO recommended

inclusion of PrEP within the comprehensive HIV prevention package for female sex workers (WHO, 2015). Moreover, use of PrEP as a comprehensive preventive intervention was expanded to include all the population at high risk of HIV infection (WHO, 2016).

1.1.4 PrEP Coverage in Kenya

Several countries have adopted the WHO PrEP policy and Kenya has not only adopted it but remains at the forefront in participating in research on efficacy, safety and feasibility of oral PrEP. Kenya launched PrEP in May 2017 as part of her comprehensive HIV prevention among populations at risk of HIV. In spite of free distribution at public health facilities, coverage remains very low in Kenya, 53,291 in 2017 against a target of 500,000 by 2020. It is also offered to discordant couples as coverage before a partner living with HIV achieves viral suppression after ART initiation. Kenya HIV Strategic Framework 2014/2015-2018/2019 plan includes PrEP as part of comprehensive prevention intervention for use in combination with other interventions. Adherence to PrEP reduces HIV infection by 92% among most at risk populations (Liu, 2014).

1.1.5 HIV Prevention Policies

As championed in the Sustainable Development Goals (SDGs), purpose three seeks to make certain healthful lives and promote well-being for all a long time through ending the HIV epidemic by means of the yr 2030. Kenya's coverage on proper for each citizen to obtain the perfect achievable widespread of fitness irrespective of socioeconomic status is enshrined in the Health Act 2017 and Article 43 of the Constitution of Kenya. In line with HIV prevention; the Kenya AIDS strategic Framework 2014/15 – 2018/19 and County HIV Strategic Plans outlines a decentralized, result oriented, evidence primarily based multi-sectoral strategy to HIV response. Moreover, Kenya has a HIV prevention road map document to guide the prevention strategy to considerably decrease the HIV incidence rate and related mortalities envisioning a HIV free country as espoused in the Vision 2030 document. To address this risk, the government adopted condom use and post exposure prophylaxis as policy mechanisms for preventing HIV infection among this population. However, empirical evidence shows condomless sex has a high premium given its more preferred by men (Jakubowski, Omanga, Agot, & Thirumurthy, 2016). Hence, FSWs are more inclined to engage is risky sexual behavior to earn more money. This implies the

need for more HIV prevention strategies targeting this population. Introduction of PrEP as a combination prevention therapy is considered more effective.

In addition to the 100% commitment to health for all by 2022, the Government of Kenya has also committed to fast track the AIDS response by 2020 through achievement of aggressive targets for HIV epidemic control. Additionally, the Kenya Health Policy 2014-2030 is focused on achieving Universal Health Coverage (UHC) through provision of essential services across the population thereby protection it from the financial burden of ill-health (MOH-Kenya, 2018).

1.1.6   Economics of Sex Work

Prostitution is considered the oldest trade yet scarcely studied by economists. Few economists have pioneered the use of economic theory to study commercial sex (Lokshin, Rao, Gupta, & Jana, 1999). Commercial sex refers to selling sexual intimacy (Reynolds, 1986) and may sometimes include other accompaniments like massage.

Commercial sex, like other investments in economic activity, is characterized by the perfect market assumptions in which there are many rational players who make rational choices based on their preferences and budget constraints. Women choose to supply goods and services in the market; in this case sex and men also choose to demand the same as consumers of the goods and services (Ahlburg & Jensen, 1999; Tangtammaruk, 2014). Like other goods, several factors influence demand and supply of sex in the market e.g. price level and non-price constraints like availability of substitutes like wives and girlfriends; complementary goods like massage; the characteristics of the woman - age, beauty, level of education; public health issues - perceived risk of HIV infection, condom use and other preferences among others (Ahlburg & Jensen, 1999). Increased utility is derived in sexual activities hence increase in demand resulting in increased number of clients served.

Although not considered a mainstream economic activity with economic policies and legislative frameworks, sex work remains largely illegal. In some developed countries like Australia, sex work has been mainstreamed as a business activity and legalized, whereas it is punishable by death

through stoning in Iran and Iraq. Nonetheless, the Kenyan government acknowledges the existence of this trade and its public health impact especially on HIV prevention. Given the nature of this trade and the increased risk of HIV infection among women, sex workers are classified as a HIV high-risk population. Their trade exposes them, their clientele and its network to HIV infection. In Kenya, HIV prevalence remains high and annually new HIV infections continue to increase with the major source of HIV infection being heterosexual activity. Studies show that female prostitution plays a major role in HIV transmission in Kenya. (NACC, 2018)

Socioeconomic determinants such as age, wealth and level of education have been found to influence demand for female sex work. Condom-less sex is more preferred and hence fetches a high price in the market (de la Torre, Havenner, Adams, & Ng, 2010; Jakubowski *et al*., 2016; Lokshin *et al*., 1999). Risks associated with commercial sex trade are similar to those faced in other sectors i.e. increased risk of HIV infection, sexual violence, harassment by law enforcement officers, balancing non-commercial sex issues, stigma and discrimination. Due to the illegal nature of the trade and negative cultural attitude, stigma and discrimination associated with this trade, it limits development and implementation of policy around sex work. Studies have shown that decriminalizing sex work and eliminating sexual violence against sex workers would lead to a reduction in new HIV infection by 46% and 20% respectively (WHO, 2016). Policies to govern and protect agents in this market could be lacking, however, due to public health interest and high vulnerability to HIV infection among FSWs, the government of Kenya adopted Global Comprehensive HIV prevention policies targeting the FSWs.

Successful prevention of HIV can avert secondary infections in a population and thus slow down the transmission and curb the epidemic. A review of the Kenya HIV prevention revolution roadmap document reveals a condom uptake of 32% among young adult women having sex with several partners. Furthermore, 89% report having sex with partners of unknown status. KDHS 2014 shows 15% of men aged 15-49 years have sex with sex workers, however, only 40% and 44% of the male and female folk respectively stated condom use in the last sexual encounter. Absence of effective interventions could lead to transmission of HIV to the sex workers, her regular clients and secondarily to the general population. PrEP, a health investment provides both

private benefit and public health externality. This allows for condom-less sex, thus providing an avenue for delivery of premium higher cost services, increased pleasure to both participants and a feeling of safety in light of lack of a negotiating setup especially in instances of substance abuse and intoxication. PrEP is a private and public good, staying HIV negative confers protection to self and her clientele.

1.1.7 Economic burden of HIV/AIDS

The impact of HIV and AIDS continues to be felt at all levels due to its associated mortality and morbidity. Since its onset 3 decades ago, 77 million people have been infected, of whom 45% reported deaths secondary to the disease (UNAIDS, 2018). HIV has far reaching micro and macro-economic impact (Owiti, 2013) whose effect is felt down right from the household level to the national and global level. The impact of HIV and AIDS is most marked in the SSA where the highest global burden of the disease lies. A sample of 38 African countries assessed by United Nations Population Division demonstrated that the disease has far reaching devastating effect on the population indicators: size, life expectancy and crude death rates (UNAIDS, 2001). In Kenya, HIV disproportionately affects people of working age, 15-49 years, (Aids & Council, 2018), a generation that is highly skilled and experienced. With premature mortality comes high replacements costs, a cost that would otherwise not have been borne by a country (Ifo & Aper, 2003). The shortened lives of this critical age group have effects on the economic production of a country as it impacts on the determinants of growth such as physical, human and social capital.

At the household level, the devastating impact begins once a member is diagnosed with the disease (Dixon, 2002). The effect at the household level is loss of income, loss of household productivity, an increase in household expenditure as a result of medical and burial expenses. The indirect cost is a product of absence from school and work of the family representative to cater to the needs of the sick (Dixon, 2002; Owiti, 2013). AIDS can push a household into poverty or can further impoverish a household that was already poor. Death of the breadwinner could facilitate the spread of the virus due to increase susceptibility of the widows who may resort to alternative means to provide for the family e.g. through sex work. An increased number of orphans also leads to a strain

on the economy through increased dependency ratio due to reduced total output occasioned by an increase in support for children and the elderly by a smaller active labor force (Lee *et al.*, 2014).

At a country level, HIV affects economic growth through four channels; production, distribution, allocation and regeneration (Theodore, 2011). A healthy population is key to economic growth and economic development. HIV destroys human capital, a vital component in economic development (Bonnel, 2000). HIV disease negatively impacts on the supply of labor by reducing the number of healthy days of an individual. This impacts on the production of goods and services of a country. A decline in production volume leads to difficulty in fulfilling the export orders due to a strained labor force. As thus, the country or a family resorts to importation of goods and services or production at a subsistence level. With increased cost of health care, a country and or household reroutes its resource to cater to medical costs. With increase in health expenditure, the distribution channel is affected thus weakening the income base. In such a case, the low-income earners have labor to offer which is already affected by HIV while the richer have other assets bases like land and savings and as such may afford treatment, this may widen the social strata. Finally, the regeneration channel speaks to the investment of human capital, physical capital and new technology that keeps the economy of a country growing. In conclusion, the need to control and or eliminate new HIV infections through embracing prevention strategies is dire.

Figure 1: Impact of HIV/AIDS on the economy Conceptual framework

Source: Karl Theodore, "HIV/AIDS in the Caribbean: economic issues—impact and investment response". Commission on Macroeconomics and Health Working Paper Series, Paper No. WG1:1 (Cambridge, Massachusetts, Harvard University, Center for International Developments; and Geneva, World Health Organization, 2001)
Figure 1: Conceptual framework for the impact of HIV/AIDS on the economy.

Source: (Theodore, 2011)

1.1.8 The Economic benefit of HIV prevention

At a global sphere, alleviation of existing constraints to economic growth is critical for a country to achieve its set targets. As enshrined in the SDGs, ensuring healthy lives and promoting well-being for all ages is critical and so is ending the epidemics of AIDS by the year 2030. Unlike other chronic diseases, HIV disease has characteristics that distinguish it from others. HIV being an infectious disease has positive externalities.

Generally, a range of HIV prevention strategies have confirmed to be cost saving. VMMC, a one off intervention has been verified to minimize woman to male HIV transmission by means of 60%. Further to this, attaining 80% insurance of circumcision in a population is stated to forestall 3.4 million new HIV contamination inside 15 years thereby saving cure value to up to USD 16.5 billion (Njeuhmeli et al., 2011). Funding damage reduction strategies with an investment of USD 122 billion in low and center profits countries would avoid 28 million new HIV infections (Stover *et al*., 2006). Antiretroviral therapy (ART) is a tool for HIV prevention in Treatment as Prevention (TasP) especially in a population where good coverage has been attained. Long term use of ART with good adherence leads to viral suppression thus preventing disease progression and onward transmission of the virus (Cohen *et al*., 2011, 2016). However, ART is ineffective on its own. Other combination prevention methods including condoms, PrEP as well as VMMC help to deliver a population level impact thus realizing public health impact. Impact of PrEP has been seen in regions with high coverage like N. America, W. Europe and Australia where PrEP has contributed to a decrease in new HIV infection amongst gay and MSM. Similar trends have been witnessed in San Francisco (Buchbinder, 2018) and New South Wales (Grulich, *et al*., 2018) where a decline in new HIV infection by 43% and 35% respectively is attributed to PrEP scale up.

In Kenya, HIV related mortality and morbidity is a constraint to economic development with its impact felt across all levels. Kenya's Medium Term Plan (MTP) III 2018-2022 highlights HIV and AIDS as one of the thematic areas to be addressed. Since MTP II, tremendous gains were made including an increase in domestic spending to 31% in 2017 from 17%. Challenges related to HIV prevention included poor service coverage amongst the vulnerable and priority population, high

stigma rates, low levels of comprehensive knowledge on HIV, risky sexual behavior including multiple partnerships coupled with low condom use and distribution.

Kenya's AIDS related expenduture in 2016/17 was 121.33 Billion shillings with 63.3% from development partners, 29% from domestic funding and 7.8% from private sources. Household expenditure amount to 28% of the private sources. Only 8% of the AIDs resources is allocated to HIV prevention strategies as opposed to the recommended 25%. With Kenya transitioning to a Low middle-income country (LMIC), there is an anticipated reduction in external funding despite increased cost of HIV services since the adoption of the UNAIDS 90-90-90 targets. There still remains a resource gap of 173 million shillings. Notwithstanding, the United States Government proposed a reduction in funding to USD 276 million in 2020 from 441M in 2018. It is critical that Kenya refocuses her limited financial resources on where it is most needed, HIV prevention.

1.2 Statement of the Problem

Research has shown PrEP is the first biomedical drug that have been proved to be efficient in HIV prevention among the population that are at a high risk of HIV acquisition. Its advancement therefore presents new opportunities for HIV prevention thus halting and reversing the HIV epidemic. Women are disproportionately at a higher risk of HIV infection compared to their male counterparts. The role of Female Sex Workers (FSWs) in HIV as key drivers of the infection reveals that they are 13 times at higher risk of acquiring and spreading the virus as their trade involves increased partner change, alcohol and drug use and abuse that may hinder regular condom use. Locally, sex trade is criminalized, as thus, social inequality in sex trade practice exists with risks of economic, emotional & sexual gender-based violence and harassment by law enforcement officers. While sexual behavior is a driver of HIV infection, female sex work presents a multiplier effect on the epidemic. PrEP as a HIV prevention intervention is consumed as a health and non-health good. It is both a private and public good as it confers safety to herself and her clients during sex work. Despite clinical trials and demonstration projects showing high acceptability to oral PrEP formulations, PrEP uptake in Kenya amongst eligible subpopulation still remains low, at 53,291 in 2017 against a target of 500,000 by 2020. Locally, there is a paucity of studies on determinants of demand for PrEP as well as socioeconomic inequality in PrEP use among this at

risk population, a gap my study bridges. This study provides an understanding of the socioeconomic determinants of PrEP use, deciphers the role of socioeconomic inequalities in PrEP use among the FSW and provides policy guidance on PrEP implementation.

1.3 Research Questions

The study answers these research questions:

i. What socioeconomic factors are associated with PrEP uptake?

ii. What is the role of socioeconomic inequality in PrEP uptake among FSWs?

1.4 General Objective

The study examined the socioeconomic inequality in HIV prevention among the female sex workers in Kisii County.

The specific objectives were:

i. To determine the influence of socio-economic determinants on PrEP use among female sex workers.

ii. To investigate how the socio-economic inequalities among female sex workers affect PrEP use.

1.5 Significance of the Study

From an equity perspective, reduction in health inequality is about fairness, justice and promotion of the right to health as prescribed in the WHO constitution (WHO, 1946). As elaborated in the SDGs target 3, healthy living and physical well-being across all the ages is very important. Various indicators including monitoring of HIV incidence are critical. To achieve the universal health coverage (UHC), protecting a population from the financial burden of ill-health caused by HIV disease is key. UHC can leverage on 1) the inclusion of the HIV positive population to the national health insurance schemes in order to increase the contributory base, 2) the massive HIV funding from donors thereby contributing to the risk pools and 3) established HIV prevention models. To achieve the epidemic transition benchmark and reduce the incidence-prevalence ratio set at 0.03 by UNAIDS, prevention of new HIV infection is paramount.

From an economic perspective, ill health and disability caused by HIV reduces healthy days of an FSW thereby reducing participation in economic activities over and above sex work. Preventing HIV will increase 1) family savings and investment, 2) healthy days to participate in economic activities, 3) the fiscal space in the health sector allowing for reallocation of funds to other components of health.

From a public health perspective, preventing new HIV infection within the sex workers' population is of benefit to her customers and the public at large considering the burden of HIV and the increased likelihood of HIV transmission amongst the FSW population. The results of this study is vital amongst policymakers and associations in influencing decisions on PrEP service delivery in so far as socioeconomic inequality in health is concerned thereby increasing PrEP uptake amongst the FSWs and her networks. The study will be helpful in highlighting areas of policy gap that require policy improvement within PrEP facilitation.

In view of literature expansion, this study provides new knowledge on the socioeconomic drivers of inequality in PrEP use as well as valuable and actionable insights for PrEP uptake with the expectation of an in-depth understanding of socioeconomic determinants influencing HIV prevention services that includes Oral PrEP and condom use by female sex workers in Kenya, a populace at increased risk of HIV infection. This study expands literature and understanding of the economics of commercial sex work and finally adopted concentration index method of economic analysis as used in other studies to examine how socioeconomic inequalities across the various variables affect PrEP use in this population.

1.6 Scope of the Study

This research includes the Kisii County FSWs. After the promulgation of the new constitution, Kisii County is one of 47 counties in Kenya. It is a peri-urban area and one of the top 10 counties leading, randomly and intentionally chosen, to 65% of all new HIV infections. The respondents being examined would consist of women over the age of 18. This study examined socio-economic inequalities and how they impact the prevention of HIV.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This section provides a study-related analysis of literature. The chapter also provides a description that clearly illustrates this study's research void.

2.2 Theoretical framework

This section summarizes the theories that have been reviewed in line with the research project. These include the Grossman model, the model for AIDS reduction (ARRM) and the planned behavior theory

2.2.1 Grossman Model of Health Demand

Our study addresses the demand for health by FSW and we adopt the framework by Grossman (1972). According to Grossman, he introduces health as a durable capital good, inherited but depreciates over time thus the need to invest in it. He further states that people demand for health to feel good as they derive utility from being healthy. The model also introduces demand for the health as an aspect of human capital for purpose of production, healthy workers are more productive. PrEP use amongst FSWs prevents acquisition of HIV virus, hence the FSW remains HIV negative and healthy thereby able to produce and function in the sex market. Therefore, PrEP is an investment into human capital not only to the FSW but also to their clients thus protecting them from HIV infection. By using PrEP, FSWs become producers and consumers of good health. By protecting themselves from HIV infection, they consume good health. When they remain negative, they consume good health, safe sex. Additionally, Grossman Model highlights that health is an investment commodity as well as a consumption commodity.

In view of the above theory, this study proposes to examine the socioeconomic inequalities for HIV prevention amongst the FSWs, a group that is highly susceptible to HIV by nature of their trade which would inadvertently affect their stock of health. Access to HIV preventive services and other health care components will improve on the FSW's stock of health. Furthermore, staying HIV negative increases the FSW's health capital stock over time due to increased length of years in good health which would lead to increased productivity as she continues with her trade. Use of PrEP by the FSWs would enable the country progress towards epidemic control, thus a reduction

in the cost of treatment generally and ultimately increased productivity by the FSW in all social spheres.

2.2.2 AIDS Risk Reduction Model (ARRM)

Since then, as implemented in 1990, the AIDS Risk Reduction Model (ARRM) has provided a structure for understanding and forecasting people's behavioral change actions, particularly with regard to sexual transmission of HIV and AIDS (Catania, Joseph Kegels, Susan, Coates Thomas, 1990). The model is based on 3 phases borrowed from other models of behavioral change, including the Health Belief Model, psychological causes, concept of "efficacy" and relational processes. The frameworks include: 1) identification and marking of one's actions as an issue hypothesized by awareness of one's sexual activity as being correlated with the risk of HIV transmission and perceiving oneself at risk of HIV transmission; 2) determination to change by minimizing risky sexual conduct and promoting low-risk activities; and 3) action informed by pursuing I When included in research of gay and bisexual men as well as teenage females attending family planning clinics, this model has great utility for understanding behavioral change.

In line with this study, sex work is problematic in so far as HIV transmission rate, prevalence and incidence is concerned. The commitment to change is enacted in the relevant HIV prevention policy guidelines that outline behavior change and embracing safer sexual practices and relevant health seeking behavior.

2.2.3 Theory of Planned Behavior

Icek Ajzen (1991) developed the Theory of Planned Behavior (TPB) which predicts the intention of a person to engage in behavior at a specific time and place. TPB describes all activities over which individuals should practice self-control. Behavioral intent is the key component of this model and is informed by the prospect of the likely outcome of the action and the subjective assessment of the risks and benefits of that outcome. TPB was widely used to predict and explain a wide range of health behaviors, including cigarette smoking, alcohol intake, health seeking behavior, breastfeeding practces and drug use. The TPB notes that both motivation (intention) and ability (behavioral control) rely on behavioral achievement. This differentiates between three kinds

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of beliefs-behavioral, moral, and power. The TPB consists of six principles that collectively reflect the actual behavioral control of a person; actions, behavioral preferences, subjective norms, social norms, perceived power, and perceived behavioral control. The TPB has been more active in public health than the Health Belief Model, but it is still restrictive as it assumes that the person has acquired opportunities and resources to be productive in performing the desired behavior, regardless of intent (Ajzen, 1991).

Generally speaking, the more favorable the behavioral and subjective standard attitude is, the greater the perceived behavioral influence, the better the person's intention to conduct the behavior in question. In the end, provided a sufficient degree of effective control over the acts, people are expected to fulfill their desires when the opportunity arises. This hypothesis forms the basis of the analysis as it clarifies the main idea of logic in the decision to take oral PrEP for female sex workers. This theory has driven research into how data on HIV, oral PrEP, service delivery model through public health facilities, risk level and understanding of stigma influenced FSW's uptake of preventive services.

2.3 Empirical Review

This section was discussed under the following thematic areas:

2.3.1 Socioeconomic inequalities in Health

Health inequalities, according to the WHO, are variances in the state of health or the distribution of health resources in a population resulting from social conditions in which an individual resides (WHO, 2012). Socio-economic health inequalities have continued to drive the development of new strategies (Gwatkin, 2012) in order to reduce inequalities as seen in developed countries where surveillance, research and policy programs have been implemented. Commitments to eliminating socioeconomic inequalities in health between the well and not well to do groups within and between countries is a primary objective for key global organizations in the health praternity including World Health Organization and the World Bank (Acheson, 2000; Gwatkin, Wagstaff, & Yazbeck, 2005; World Health Organization, 2013). Alleyne (2000) further states that closing in on the inter and intra-country gaps between the socio-economic classes is not simply a poverty

issue but a case of social injustice and equity (Alleyne, Casas, & Castillo-Salgado, 2000; Marmot, 2005).

There has since been global and national interest in protecting and promoting population health while reducing health inequalities. This is evidenced by the various policies that have been adopted, globally, regionally and even nationally. The World Health Organization constitution enshrines the principle of universal health in its 1946 constitution (WHO, 1946) whose main vision is to improve the health of the people without exclusions.

The Sustainable Development Goals, adopts a similar principle, especially SDG 3 that deals with "Good health and well-being" and ensures healthy lives and promotes well-being for all. The governments of African countries also realize the need for equity in health among the population and through the African Union, the continent has adopted various policies. In addition to adopting the global and regional health policies, the government of Kenya has put in place country specific policies thereby acknowledging the existence of various forms of inequities in the country and over the years establishing various policies geared towards addressing these inequities. The Constitution of Kenya 2010, the major public policy framework, clearly provides for mechanisms of redressing inequities. It provides for economic and social rights including right to health. It stipulates the public finance principles, which are supposed to promote an equitable society. It established the Equalization Funds allocated to counties that faced historical public finance allocation marginalization and geared towards basic infrastructure development (GoK, 2010). The government also developed the Health Act 2017, which in line with the constitution acknowledges the right to health and provides the legislative framework of establishing a national health system which progressively provides the highest possible standards of health in an equitable manner to all persons without discrimination (GoK, 2017). The Government of Kenya recently adopted the Big 4 Agenda for Development, one of which is Universal Health Coverage. Enshrined in the Kenya Health Sector Strategic Plan 2013- 2018 whose main goal is to accelerate the attainment of the universal health coverage (UHC), the government realizes the value of a healthy population in economic development and the role that catastrophic health expenditure plays in increasing the population's poverty level and vulnerability to poverty. To support UHC Agenda, the government

is strengthening the social health insurance scheme, National Health Insurance Fund (NHIF) and is establishing a UHC basic package. All these polices are geared towards protecting, promoting and improving equity in the population's health.

The socioeconomic factors that determine health are employment, education, and income (Wagstaff *et al*., 2000). Globally, there is ample evidence to show the degree to which social factors, including the school attainement, income and employment, have a substantial influence on how safe an individual is with large differences in health status among people of low, middle or high socio-economic status (Deaton, 2003; Ferrie et al., 2002; Krieger & Fee, 1996). This was first illustrated in the Black Report in 1980, which explored differentials in mortality among the social classes and further proposed redistributive policies, changes in social security, increased benefits in income support and improved funding for education in poor areas. Over the decades, health disparity has been a catalyst of progress in public health (Chokshi, 2018), with major policy initiatives in which several countries have taken steps such as reforms to health programs, legislation or data collection to inform the public about health inequalities.

Health disparity measurement is critical because health is a key aspect of well-being. Health inequality can mitigate or aggravate existing differences in income-based well-being (Bor, Cohen & Galea, 2017). Knowledge of health distribution across income groups provides a comprehensive image of how well wellbeing is spread across a population as well as the impact of policy options. To conclude, socio-economic health inequality can be avoided, as measuring health gaps helps identify opportunities for targeting interventions. Over the decades, WHO has documented striking differences in health across socioeconomic groups. This has been examined in various health components like child and maternal mortality, life expectancy and incidence of diseases (HIV, Tuberculosis and non-communicable diseases). WHO further postulates that health disparity has a high cost to society due to loss of productivity and tax payments, higher welfare payments and healthcare costs that may arise from morbidity and mortality which unintentionally contributes to a delay in progress towards achieving the goal of sustainable development 3, which refers to good health and well-being (Hosseinpoor et al 2018).

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2.3.2 Socioeconomic inequalities in Health among Female Sex Workers

Higher HIV prevalence is associated with countries with higher income inequality (Gillespie et al., 2007). A systematic study review reveals a positive relationship between education and less risky sexual conduct (Bärnighausen et al., 2007 & Hargreaves et al., 2015). There is also a strong correlation between condom use and health (Walque et al., 2005). HIV's social effect is surreal, as is HIV related morbidity and premature mortality increases the socioeconomic inequalities and poverty levels of a household by increasing the cost of health care, thereby decreasing the household productivity and income levels (Agatha, 2010; Béchu, 1998; Ifo & Aper, 2003).

Socioeconomic inequalities increase the susceptibility to HIV infection. Poverty increases the biological susceptibility to HIV infection as well as other infectious diseases (Anderson *et al.,* 2000). Further to this, lack of financial resources raises the need for survival tactics amongst the poorest households thus leading to high-risk behaviors, including labor migration and prostitution which increase their susceptibility to HIV infection (Collins *et al*., 2000).

There is disparity between female sex workers in accessing and using maternal and child health services, resulting in preventable morbidity and mortality (Willis, Welch, & Onda, 2016). FSWs are more susceptible to HIV, unwanted pregnancies and abortions in Sub-Saharan Africa, a region with high maternal mortality rates and HIV incidence and prevalence (Baral et al., 2012; Sutherland et al., 2011). Pregnant FSWs experience constraints to access prenatal care and skilled care delivery including discrimination by health care providers compared to other pregnant women. Considering that most FSWs are mothers, as seen in studies in India, Indonesia, Mexico, Cote d'Voire and Kenya where 80.7%, 68.7%, 93.3%, 68.5% and 82.9% respectively, these millions of children are at heightened risk of HIV due to maternal HIV, congenital syphilis due to poor access to antenatal and delivery services, fetal alcohol syndrome due to maternal alcoholism, physical and sexual abuse from health care providers and clients, poor nutritional status and upbringing as the mothers get back to work early after childbirth, early orphan-hood secondary to maternal postpartum depression and suicidal attempt (Beard *et al*., 2010; Willis *et al*., 2016).

Tran *et al.,* (2016) used concentration index analysis to assess the impact of socioeconomic inequality on access, adherence and outcome of antiretroviral therapy (ART) services and further decomposed the inequalities to estimate the drivers. The severity of inequality was seen as such: the poor had timely ART access, they experienced greater difficulty with adherence, however, the rich had higher quality of life and higher CD4 counts. Moreover, the major driver of inequality in ART access, adherence and health outcome were occupation and education. A study examining HIV prevalence and socioeconomic inequalities among the youth in seven nations in Eastern and southern Africa established a heterogeneous association between HIV prevalence and education (Hargreaves *et al.,*2015). A study on economic inequality and HIV in Malawi reported that socioeconomic inequality and high risk sexual behavior were significantly related (Durevall *et al.,*2012). The study further reported that socioeconomic inequality was a driver of extramarital sexual relationships, decreased chance of abstinence amongst young girls and an earlier sexual debut. The study further hypothesizes that economic inequality implied more transactional sex in places where the wealthier men paid for sex from the relatively poor women. This inadvertently translates to high HIV risk not only to the transactional sexual relationship but also for the sexual network.

A study on socio economic determinants of PrEP use among MSM found that employment status did not have a significant effect on the odds of observing the use of PrEP (Wheeler *et al.,* 2016). According to Cohen age statistically influenced PrEP uptake in the country. Han & Chen (2019) demonstrated a positive and statistical significance of education on PrEP uptake in China. Education as a socioeconomic factor can be detailed, general and at times specific as it determines health. An Australian study to examine the association between PrEP use and marital status indicated that PrEP uptake was higher amongst married FSWs followed by divorced, separated or widowed women then unmarried respondents (Bekker *et al.,* 2015). Of the FSWs who participated in a study in Canada, majority lived in the urban area. A majority lived alone followed by those who lived with their partners and their family/relatives (Goldenberg, 2015). Further, the characteristics of the respondents that were significantly linked to their lifestyle included age, education attainment, number of offspring, living standards and the duration they had lived in one particular area. A study conducted in Kenya and Cote d'Ivoire sought to determine influence of

motherhood/having children to female sex work. The findings revealed that mothers enter into sex work in order to provide for their children. Moreover, a greater proportion of women who engaged in commercial sex conceived while a majority procured unsafe abortion leading to morbidity and mortality (Willis, 2016).

Income is a key determinant of the health levels of individuals and families. Studies show that regular holidays essentially contribute to better health, which is enjoyed by persons with higher income (Chetty & Abraham *et al*., 2018). According to Han & Chen (2019), commercial sex workers who were aged between 26 and 40 years and were of higher education levels, belonged to a superior income bracket as compared to their colleagues. The findings further indicated that the weekly income was roughly US $115 - $339. This income was majorly spent on food, housing, transport, outfit, cosmetics, and alcohol. Notably, sex workers held "savings" in informal savings groups and banks. Approximately 22% of commercial sex workers mentioned that they earned some income from sources other than sex work.

Religion plays a critical role in determining PrEP uptake in any country. According to Barz (2014), the major religious affiliations in Uganda such as Anglican, Catholic and Muslim have been involved significantly in AIDS prevention and awareness strategies supported by the Ministry of Health's funding. Recent studies have established that a drop in the number of sexual mates, preaching of the faithfulness and abstinence message and deferral in the engagement in sex among the youth could be linked more to the behavioral changes noted in Uganda than increased rate in condom use. However, Barz (2014) found that participants in their study worried that parents or the fellow church members would seek for PrEP on medical bills or insurance statements and would find out their use of the drug which would then expose their sexual orientation.

2.4 Conceptual Framework

This study uses a conceptual framework in understanding the socioeconomic inequality amongst female sex workers in uptake of preventive services. Kunst (2001) proposed a general framework to explain the mechanisms through which socioeconomic inequality influences health: the causation mechanism, selection mechanism and confounding (Kröger, Pakpahan, & Hoffmann,

2015; Kunst, Bos, & Mackenbach, 2001; Mackenbach, Roskam, Schaap, & Menvielle, 2008; McCartney, Collins, & Mackenzie, 2013) as shown in figure below.
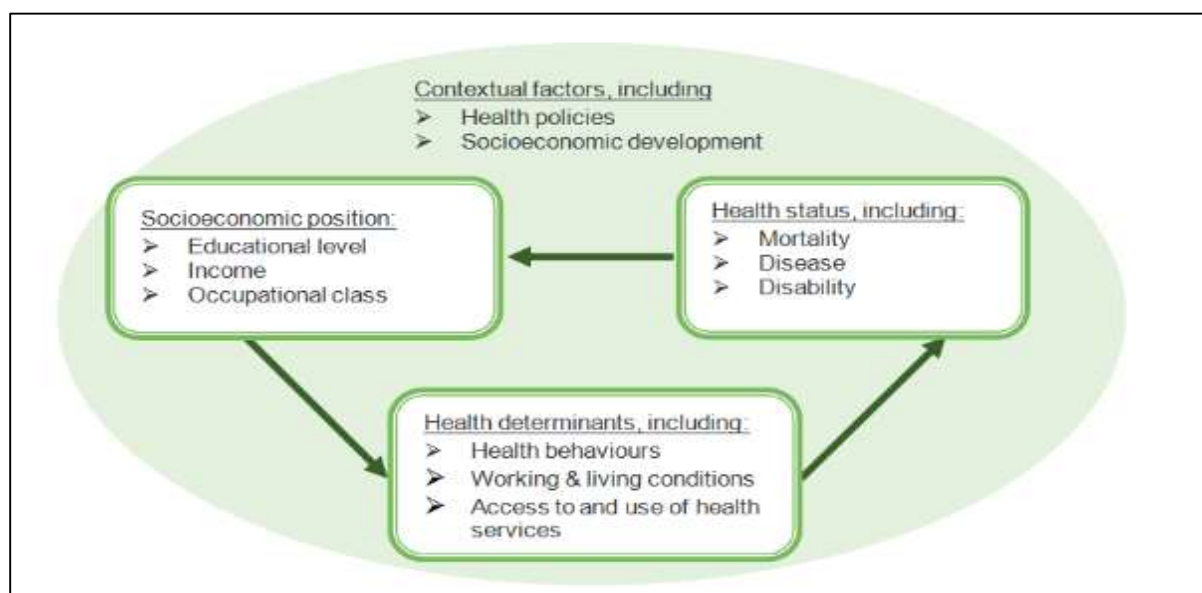
Figure 2: A structure for understanding health socio-economic inequality

These theories are conceptualized in the figure above.

The independent variables in my study are the socioeconomic positioning based on income, wealth and education level; sociodemographic characteristics of the FSWs; knowledge on HIV, PrEP and condoms and service provision factors. An assessment of how they affect uptake of Oral PrEP, the dependent variable, will be assessed through administration of a relevant questionnaire. Considering the nature of work of the FSWs, intake of the Oral PrEP will serve as a preventive measure to HIV and AIDS. Other intervening factors that may have an influence in uptake of PrEP will include HIV prevention policies, service delivery models and FSW inherent factors like length of stay in the sex work business. Non-discriminatory health care workers, flexi clinic opening times and positive peer influence would increase uptake of the pill. Good political will towards promotion of better health systems improves the overall healthcare delivery.

Independent Variables   **Dependent Variables**

```
┌─────────────────────────────┐                    ┌─────────────────────────────┐
│ Socio-Economic position     │                    │ Health status outcome       │
│                             │                    │                             │
│   -  Income level           │ ─────────────────▶ │ Uptake of Oral PrEP         │
│   -  Education              │                    │                             │
│   -  Occupational Status    │                    │                             │
│                             │                    │                             │
│                             │                    │                             │
└─────────────────────────────┘                    │                             │
              │                                     └─────────────────────────────┘
              ▼
┌─────────────────────────────┐
│ Health Determinants         │
│                             │
│ Socio- Demographic Factors  │
│                             │
│   -  Age                    │
│   -  Marital Status         │
│   -  Household size         │
│   -  Religious affiliation  │
│   -  Education attainment   │
│   -  Knowledge of HIV/AIDS, │
│      PrEP & Condom Use      │
│                             │
│ Index Scores                │
│   -  Wealth index           │
│   -  Service provision index│
│   -  Risk, motivation and   │
│      perception index       │
│                             │
└─────────────────────────────┘
```
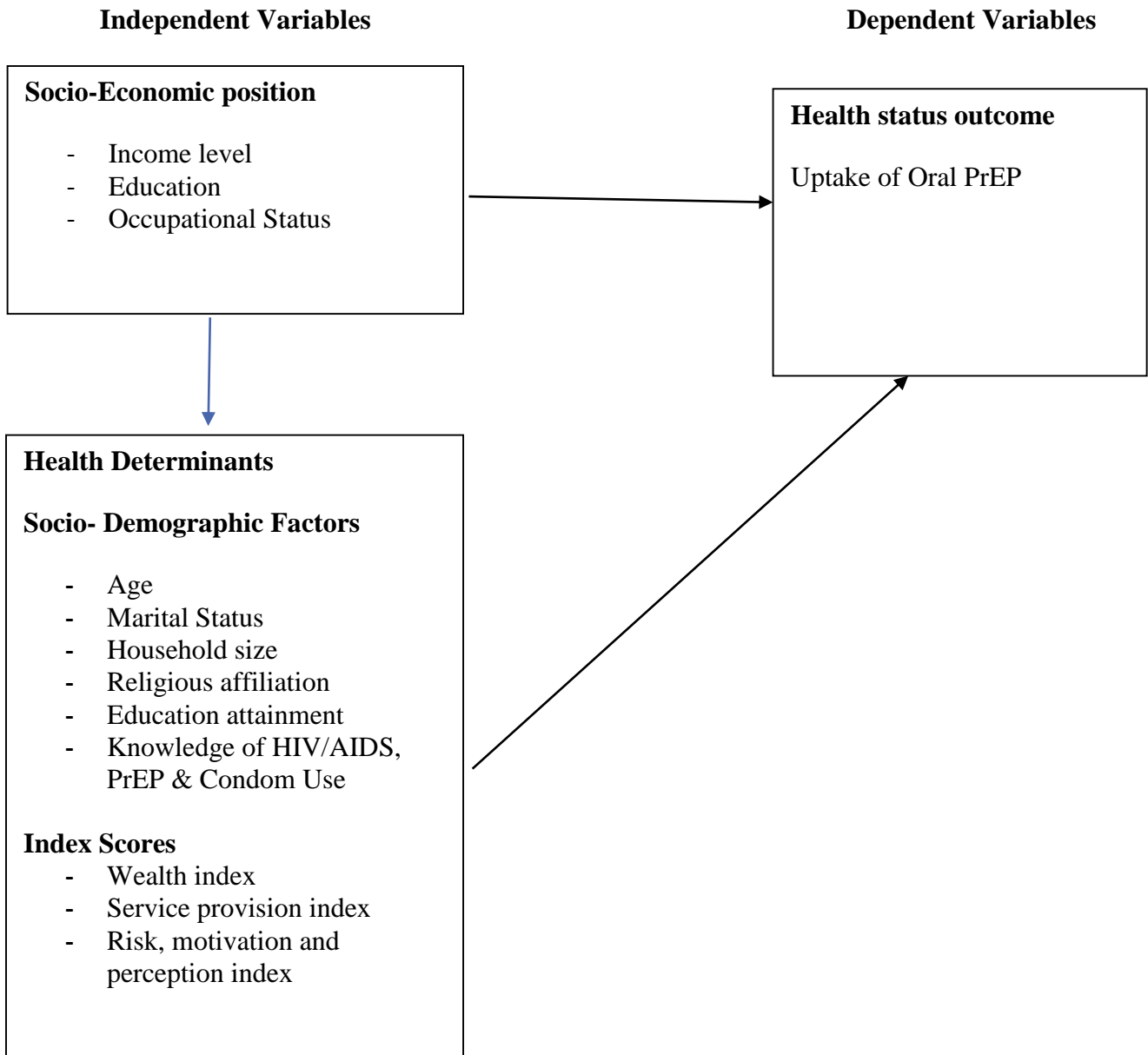
Figure 3: Conceptual Framework Adopted from Kunst *et al*., 2001

CHAPTER THREE: METHODOLOGY

3.1 Study Design

A cross-sectional study design was adopted in this study, utilizing a quantitative method (Glass & Hopkins, 1984). This study focused on the inequality in health as a result of socioeconomic variances amongst the female sex workers. The study utilized a primary data source through a structured questionnaire administered to female sex workers. The questionnaire provided relevant information on the subject matter.

3.2 Study Area Description

The study area, Kisii County, has a population size of 1.152.282 and this is according to the 2009 census survey (Male-550.464; Female-601.818;) and a population growth rate of 2.1%. Within rural areas, eighty percent of the population lives there. Most of the region is a hilly and valley land. Kisii County is bordered north-east by Nyamira County, south by Narok and west by Migori & Homabay.

Kisii county has been identified as having 669 active hotspots from the recently concluded Key Population size estimate (NASCOP, 2018), with the bar (with or without lodging) being prominent hotspots comprising 82 percent of the total hotspots. Kitutu Chache West, Bonchari, Bomachoge Chache, Nyaribari Chache, and Nyaribari Masaba sub-counties constitute 77% of the hotspots (25%, 17%, 13%, 11% and 11% respectively). The estimated number of FSWs on a normal versus peak day ranges from 2,438 to 4,203 and 4,908 to 8,168 respectively (mean of 3,321 and 6,538 respectively) with 8% of the total FSWs being under the age of 18. Kisii County has 3 Integrated Key Population sites/facilities situated within Gucha, Magena and Keumbu Sub-County Hospitals and one Drop in Centre (DiCE) located within the central business district (CBD).

The data collection was conducted within the FSW hotpots that includes the bars and streets within Kisii County where a majority of the population is based as well as the integrated sites and DiCEs where oral PrEP is accessed.

3.3 Study Population

The study population consisted of women receiving money or goods in exchange for sexual services and describing such behaviors as income generating in the same way that they do not regard sex work as their occupation. The author found within the study field 377 female sex workers. The inclusion / exclusion criteria was an important principle as it helped to produce reliable and accurate results as a study that investigated a health issue.

3.3.1   Inclusion Criteria

The first study respondent was identified in the hotspots, drop in centers and health facilities where PrEP is dispensed. In order to be included to participate in this study, the study included women who were:

i)   Over Eighteen years as at the commencement of this study as the approved age of consent.

ii) Currently not on antiretroviral therapy.

iii) Currently engaged in transactional sex

iv) Last known HIV status is negative. This was ascertained through self-disclosure and no confirmatory tests was done.

3.3.2   Exclusion Criteria

The study excluded FSWs who present with the following characteristics:

i)   Aged below 18 years. The study did not administer accent forms to caregivers and parents of under-age FSWs.

ii) FSW on antiretroviral therapy as this characteristic disqualified one from accessing PrEP.

iii) HIV positive FSW based on self-report since no confirmatory tests was done.

3.4 Sample size determination

To calculate the sample size, this study used Yamane (1967) formula. Yamane (1967) formula was utilized since it does not require approximation of the proportion of elements in the population that have the required characteristics and it is easy to use. Yamane (1967) formula is specified as shown in equation 1.

$$n = \frac{N}{1 + N(e^2)} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots 1$$

Where n is the desired sample size, N is the target population and e is the precision error. According to the recently concluded Key Population Size Estimate conducted by National STI & AIDS Control Project (NASCOP, 2018) and partners; there are 6538 female sex workers in Kisii. With a precision error of 0.05, the sample size is determined as:

$$n = \frac{6538}{1 + 6538(0.05^2)} \cong 377 \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots.2$$

Thus, the desired sample size will be 377.

3.5 Sampling procedure

The area of study was selected intentionally as the area of choice for this study. Therefore, after Nairobi County, Kisii County ranked 2nd (18%) as an area with a majority of FSW hotspots (6%) (NASCOP, 2018).

In addition, their trade is typically criminalized, as this analysis will use a snowballing sampling strategy where one respondent will refer the researcher to the next respondent until the desired sample size is reached.

3.6 Recruitment and consenting procedures

This study enrolled adult female sex workers working within the defined study area based on voluntary participation and informed choice. The first respondents were picked from the drop-in centers, FSW support groups, hotspots and the hospital facilities where they access oral PrEP. The consenting procedure was guided by the standard KNH-ERC informed consent form as appended in Appendix 1. A trained researcher was provided with a consent form that gave information that helped the respondent agree to participate in the study. The purpose of the study, possible risks and benefits of participation and rights as a volunteer were explained to simplicity. Once the respondent has understood it, he/she signed off via a signature or thumb print to constitute consent for participation in this study. Recruitment of the consenting respondents continued until the desirable sample size is reached. A trained researcher administered the questionnaire, for approximately 45-minutes, in a private area where the respondent feels comfortable answering the questions. Respondents are free to contact the principal investigator or the KNH-ERC via email or telephone to respond to any questions and concerns that may arise during or after the session.

3.7 Definition of Variables

In this study, the outcome variable took a binary response being the utilization of PrEP by the FSWs. The independent variable of this study included employment status, knowledge of PrEP and HIV, HIV risk perception, age, education level, condom use, household size, religion and number of children, as shown in table 3.1 below. The wealth quintiles were computed based on PCA.

Table 3.2: Variable Definition

Dependent Variable	Measurement	Expected Sign and Source
PrEP Uptake	Equal to 1 if using PrEP and 0 otherwise	
Independent Variables	**Measurement**	**Expected Sign and Source**
Employment Status	Equal to 1 if employed 0 otherwise	Positive sign (Nazroo *et al.,* 2017)
Age	This is a continuous variable being reported as the age of the FSW at the time of conducting the study	Positive sign (Vittinghoff & Cohen *et al.,* 2015)
Education attainment	This refers to the highest level of education attained by the FSW. Equal to 1 if achieved secondary and higher e, ducation , 0 if otherwise	Positive or negative sign Han & Chen (2019), Hargreaves *et al.,*2015
Condom Use	This will be assesed to ascertain condom use in the last sexual contact and will be coded as 1 if Yes/Consistent and 0 if otherwise	Positive sign (Lokshin *et al.,* 1999)
Household size	This will be a categorical variable 1 being > 5 members, 0 if otherwise	Positive sign Goldenberg (2015)
Religion	This variable will be coded as 1= Christian, 2= Islam, 3= Others	Positive sign (Barz *et al.,* 2014)
Wealth quintile	This will be coded as 1= Lowest2=Lower, 3= Middle, 4=Higher and 5= Highest	(Filmer, 1998)
Number of Children	This will be a continuous variable being the number of children the FSW lives with.	Positive sign Willis (2016)
Marital Status	This variable will be coded 1 if formerly or currently married and 0 if otherwise	Positive sign Bekker *et al.,* 2015

3.8 Data Collection, Processing, and Analysis

This study involved collection of primary data from elligible consenting respondents through administration of a pre-tested structured questionaires to capture data from the various respondents over a period of approximately 45 minutes. The principal investigator recruited 3 study assistants, train them through classroom and practical experience inorder to familiarise them with the process. Role playing amongst themselves were employed to gain expereince in data collection. Data quality was monitored through field spot checks. Confidentiallity amongst the data colletors was upheld.

A review of the questionaire for completeness, accuracy, clarity and legibility was done at the end of the session before parting ways with the repondent. Data analysis involved the arrangement of the obtained data, editing, cleaning and entry into an ODK tool for coding. Once all data was entered, it was uploaded into an excel sheet and later transferred to STATA version 13.0 for analysis.

3.8.1 Probit Model

Once the data were entered into STATA for review, we used descriptive statistics such as mean, mode, standard deviation, frequencies and percentages to evaluate the socio-demographic characteristics of the FSWs. The analysis used the regression model of Probit. Probit regression is a special type of Generalized Linear Models (GLM) where the bivariate result Y has a parameter p Bernoulli distribution. (probability of success $p \in (0, 1)$).

The probit link function (EY = p) where

$$probit \, E(Y) = \Phi^{-1}(p) = \Phi^{-1}(P[Y = 1]) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots 3$$

Used to transform this 0 or 1 dependent variable's expectation.

$$probit \, E(Y) = X\beta \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots 4$$

Where β is an unspecified variable vector. The reverse Probit transformation will obtain the expected probabilities

$$\hat{P}[Yi = 1] = \Phi(Xi, \hat{\beta}) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots 5$$

An assumption is made that there is a presence of latent variable Y* such that

$$Y^* = X\beta + \varepsilon \quad where \, \varepsilon \sim N(0, \sigma^2) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots 6$$

In a linear regression we would observe Y* directly but in Probit, we observe only

$$y_i = \begin{cases} 0 \ if \ y_i^* \leq 0 \\ 1 \ if \ y_i^* > 0 \end{cases}$$ 7

This translates to possible values for the error term such that:

$$\Pr(y_i^* > 0|Xi) = \Pr(y_i = 1|x_i) = \Phi\left(\frac{-\beta x_i}{\sigma}\right)$$ 8

And similarly,

$$\Pr(y_i = 0|x_i) = 1 - \Phi\left(\frac{-\beta x_i}{\sigma}\right)$$ 9

Since β and σ cannot be estimated as they enter the equation as a ratio. So, σ=1 is set to make the distribution on ε a standard normal density.

The dependent variable in the study was PrEP Uptake which is measured as a binary variable. The independent variables include; employment status, education level, income, age, marital status, religion, living arrangements and number of children. This implies that the regression model transforms to:

$$PUp_{ij} = \beta_0 + \beta_1 EmpStat_i + \beta_2 Inc_i + \beta_3 AgeCat_i + \beta_4 Educ_i + \beta_5 MS_i + \beta_6 Rel_i + \beta_7 HS_i + \beta_8 NoChi_i + \beta_9 \ CU$$
$$+ \beta_{10} \ rc1 + \beta_{11} \ rc2, + \beta_{12} \ rc3_i + \beta_{13} sc1_i + \beta_{14_i} sc2 + \beta_{15} wc1_i + \beta_{16} wc2_i + \beta_{17} wc3$$
....10

Where **PUp** = PrEP Uptake; **EmpStat** = Employment Status; **Inc** = Income**; Age categories** = Agecat; **Educ** = Education level; **MS** = Marital Status; **Rel** = Religion; **HS** = HouseHold size; **NoChi** = Number of Children; **CU**= Condom Use; RC 1,2,3=principle component of riskscore; **SC 1,2** = principle component of service score; **WC 1,2 3** = principle component of wealth index; ε = Error term.

3.8.2 Concentration Index

Concentration index, a popular tool for measuring health inequality (Wagstaff, 1991) will be applied to assess the wealth-related inequality in the health outcome, in this case, PrEP uptake. According to Wagstaff (2000), if the dependent variable is dichotomous the CI lies within the interval (μ-1, 1-μ). The interval shrinks as the mean rises and to normalize we divide the CI by 1-

μ. Health CI is therefore a standardized number of weighted levels of health with weights determined by socioeconomic ranks m_i.

$$C = \frac{2}{\mu} cov\ (h, r) \quad \text{.....} \quad 11$$

$$C(h) = \frac{2}{n^2 \mu_h} \sum_{i=1}^{n} m_i h_i \quad \text{.....} \quad 12$$

Where $m_i = \lambda i - \left[\frac{n+1}{2}\right]$

The Concentration Index of the health variable given y is defined as:

$$C(h|y) = \frac{2cov(h_i R_i)}{\bar{h}} \sum_{i=1}^{n} \{2R_i - 1\}. \quad \text{.....} \quad 13$$

If the health factor is small, the health CI C(h) can be defined as the generalized health CI $V(s)$ as:

$$V(s) = \frac{2}{n^2} \sum_{i=1}^{n} m_i h_i. \quad \text{.....} \quad 14$$

Additionally, Wagstaff (2000), and Erreygers (2009) developed the Wagstaff Index $W(x)$ and the Erreygers Index $E(x)$, with the following expression:

$$W(x) = \frac{2(b_x - a_x)}{n^2 (b_x - \mu_x)(\mu_x - a_x)} \sum_{i=1}^{n} m_i x_i \quad \text{.....} \quad 15$$

While the

$$E(x) = \frac{8}{n^2 (b_x - a_x)} \sum_{i=1}^{n} m_i x_i \text{ Where } x = h,\ s \quad \text{.....} \quad 16$$

Equation 14 and 15 are all versions of a general expression that vary only in the standardization applied to the weighted number of health levels.

Generally, the CI ranges between -1 and +1, when it is 0, there is no difference in PrEP uptake among the different socioeconomic groups. A CI with a positive value imply that the concentration of uptake of PrEP concentrates in higher SES.

3.9 Quality Assurance Procedures
3.9.1 Diagnostic Tests
In conducting diagnostics tests for the model, residual analysis was undertaken by generating descriptive statistics. The diagnostic tests that were conducted include: multicollinerality, autocorrelation and Heteroskedasticity.

3.9.2 Pilot study

A pilot study was conducted and attracted participants who did not participate in the actual study from the target population. This was done to determine any flaws in the test when correctly answering the questions. The pilot study will involve 10% of the expected study sample from outside the study area. Thereafter, answers from the pilot study were used to assess accuracy, necessary adjustments were made to the questionnaire before data collection was initiated.

3.9.3 Reliability of the Study

Reliability is how repeatable, reliable and consistent the effects of a measurement are (Carmines and Zeller, 1979). The key investigator hired experienced data collectors to ensure the study's accuracy, who were then trained and retrained to perform this project. To foster a better understanding of the research methods, the learning included both classroom and field testing as well as peer-to-peer sessions. To mitigate the respondent's mistakes and biased answers, the research assistant tried to conduct the questionnaire before the hotspots became occupied at the respondent's convenience. This timing fostered clarity in responses as there were ample time to participate.

The accuracy of the research instrument was tested to assess whether the findings could be replicated (Blumberg, Cooper & Schindler, 2011) using the Cronbach Alpha coefficient where the values ranged from 0 to 1 with 1 indicating a very reliable questionnaire and zero indicating an unreliable one. Sullivan (2011) submitted that the Cronbach Alpha coefficient should be as similar to a high reliability estimate. Consequently, the threshold for a reliable questionnaire is a coefficient of 0.7. Values of greater or equal to 0.7 will be deemed reliable and can be used to collect data for the main survey. However, if the Cronbach alpha values are less than 0.7 then the questionnaire was deemed unreliable thereby necessitating it to be modified and pilot test repeated (Singleton *et al*., 2010).

3.9.4 Validity of the Questionnaire

The extent to which the specimen of the test object fits the content to be tested by the experiment is true (Sato & Ikeda, 2015). Saunders et al. (2012) claim that there are different types of validity,

namely: material validity, criteria validity, create validity, and face validity. The analysis will pursue the reliability of the content to determine the extent to which a test instrument accurately tests the variables. The accuracy of the content of the questionnaire will be checked by submitting it to the supervisor who will consider missing items and propose appropriate corrections. The validity of the construction shows the degree to which a test measures what it intends to measure.

This is an academic project and approval will, therefore, be sought from the school of graduate studies (SGS), then further approval from the KNH-University of Nairobi Ethics Review Committee. To further meet the ethical requirements of the study, the researcher only administered data collection tools to willing FSWs who were guided on what the study was about and once they understand, a written consent form to fill was provided. The participants were assured of utmost confidentiality and no victimization as guided by the Belmont principles. There were daily debriefing session between the principal investigator and the study assistants to discuss problems encountered in the field, offer clarifications on unclear components of the questionaire, performance review and reassigning of work where applicable. The researcher encouraged to foster counselling attributes during the data collection process to encourage respondents towards carthatic disclosures.

3.10 Study results dissemination plan

The author intended to protect the study participants ' rights and welfare by ensuring: fair selection of participants; ensuring sufficient informed consent; identifying and mitigating the risks involved in the study; maintaining privacy and confidentiality of the participants as well as ensuring that data collected under a pledge of confidentiality are protected from disclosure to third parties. On completion of the study, the results were disseminated during the dissertation process at the school of economics with approval of the supervisor. Further to this, the results will be published in relevant economic journals.

3.11 Limitations of the Study

The major limitation anticipated during this study was geographically limitation as it carried out in a peri-urban set up thus the findings may not be generalizable to other contextually different

areas. There poses a risk of inaccurate responses from the respondents especially in regards to details surrounding undesired behavior like sex work and disclosure of HIV status. Anonymity and confidentiality will be upheld to receive adequate and truthful responses from the respondents.

CHAPTER FOUR: FINDINGS

4.1 Introduction

This chapter provides a comprehensive overview of the findings of the research and includes the general information obtained from the data of the report, results from the analysis of probit regression and the index of concentration.

This study used primary data obtained by qualified research assistants and subsequently submitted into an Open Data Kit (ODK) system by administering the study questionnaires. The data was downloaded to an excel sheet and subsequently analyzed via STATA version 14.

4.2 Response Rate

The study sample size was 377 FSWs, however we collected data from 479 responses to allow for missing responses and any data collection errors. This translated to a 127% response rate, which was considered highly representative and adequate for the study (Jack, 2008). High nonresponse bias can be a major setback to the reliability and validity of the study findings

Table 4.1: Response Rate

Response	Frequency	Percent
Expected sample	377	100
Returned	481	
Total	**+104**	**127**

4.3 Sample Population Characteristics

This section describes further the characteristics of the sample population based on various thematic areas.

4.3.1 Household Characteristics

The mean age of female sex workers was 27 years with the youngest sex worker being 18 years while the oldest was 46 years old. On average, each female sex worker had 2 children with the highest having 10 children. Furthermore, a majority (91%) of the female sex workers were the

head of the household where as 74% of the households had less than 5 members. In terms of school attendance, 94% of the FSWs reported having attended school, out of whom, 60% reported attaining above secondary school education. More than half of the FSWs (51%) were single and had never been in a marital union, only 2% were married at the time of study. Over 80% of the FSWs were Christians, a few indicated to have no religion with less than 10% reporting that they were Muslims.

Table 4.2: Characteristics of the respondents

Variable	Obs	Mean	Standard Deviation	Minimum	Maximum
Age	479	27.18	5.97	18	46
Number of Children	479	1.73	1.33	0	10
Number of Regular mates	232	2.06	2.85	1	42
Months as a Sex Worker	478	43.55	40.35	1	300
Age when Started Sex Work	479	22.90	5.01	16	43
Sexual Activities per Week	461	4.42	5.22	0	35
Number of Months on PrEP	282	12.01	24.62	1	390

The main source of income for the respondents was sex work, whereby a majority (58%) earned a monthly income ranging between Kshs 4,000 – 10,000.

Regarding the main cooking fuel of the respondents, findings showed that 37% of the respondents used charcoal as the main cooking fuel. Cooking gas and firewood were the main cooking fuel for 24% and 21% of the respondents respectively. 2% of the respondents reported to not have a toilet facility within their premise, this demonstrating abject poverty, however, 84% of the respondents use pit latrines while 14% report usage of a flush system of waste disposal. The researcher established that majority of the respondents reside in modern houses evidenced by finished walls, floor and roof.

Table 4.3: Descriptive Statistics

Variable		Frequency (n)	Percent (%)
Age Categories	18-25 years	226	47.18
	26-30 years	142	29.65
	31-35 years	60	12.53
	36-40 years	36	7.52
	Over 40 Years	15	3.13
Education Level	Primary	176	39.55
	Secondary	269	60.45
Marital Status	Never Married	245	51.15
	Formerly & Currently Married	234	48.85
Religion	Catholic	261	54.49
	Islam	25	5.22
	None	49	10.23
	Protestant	144	30.06
Employment Status	Employed	119	25.27
	Not-Employed	275	58.39
	Self-Employed	77	16.35
Monthly Income (KShs)	< 2,000	15	3.13
	2,001- 4000	120	25.05
	4,001-10,000	197	41.13
	10,001 – 20,000	128	26.72
	20,001-30,000	19	3.97
Residence	Non-Town Area	62	12.94
	Town Area	417	87.06
Household Size	0-4 Members	358	74.74
	Over 5 Members	121	25.26

4.3.2   Sex Work

The study findings show that the mean age at which the respondents began sex work was 23 years with frequency of sex acts being as high as 35 per week. 48% of the respondents reported having regular sex partners who did not pay to have sex with them. Duration of service provision as a sex worker varied amongst the respondents with the mean duration of business being 43 months (three years and six months). In spite of sex work being characterized by a migratory pattern, this study demonstrates that a majority (87%) of the female sex workers lived in the town area while only 11% of them lived in rural areas, while a further 10% were on transit at the time of interview.

4.3.3   Uptake of Oral Pre-exposure prophylaxis amongst sex workers

Awareness amongst the FSWs on HIV and oral PrEP was high at 98% and 79.1% respectively. PrEP uptake was highest (41%) amongst the younger population ages 18-25year old, the never married population (46%), Catholics (54%), the unemployed (54%) and those who had attained secondary school education (54%). The main distribution points for PrEP were hospitals and during outreach activities serving 56% and 42% of FSWs respectively, while a majority of the respondents received information on PrEP from the health care providers (42%) and peers in sex trade (38%). There was variation in utilization of place by place of residence, among the FSW who were living in town area, 88% of them had used PrEP compared to those who resided in the rural area or were on transit at 10% and 2% respectively.

Table 4.4: PrEP Uptake with Demographic Characteristics

Prep Uptake					
Variables	**Yes**		**No**		**Total**
	n	**%**	**n**	**%**	
Age Categories					
Less than 24yrs	100	33.67	86	47.25	186
Over 24 years	197	66.33	96	52.75	293
Marital Status					
Never Married	137	46.13	108	59.34	245
Formerly & Currently Married	160	53.87	74	40.66	234
Religion					
Catholic	161	54.2	100	54.94	261
Islam	19	6.4	6	3.3	25
None	28	9.43	21	11.54	49
Protestant	89	29.97	55	30.22	144
Number of Children					
0-2 Children	156	85.71	212	71.38	368
More than 3 Children	26	14.29	85	28.62	111
Employment Status					
Employed	134	45.42	62	23.08	196
Un Employed	161	54.58	114	62.64	275
Education Level					
Primary	106	38.13	70	41.92	176
Secondary+	172	61.87	97	58.08	269
Residence					
Rural Area	36	12.12	26	14.29	62
Town Area	261	87.88	156	85.71	417
Age Started Sex Work					
<24 years	176	59.26	128	70.33	304
>24 years	121	40.74	54	29.67	175
Household Size					
0-4 Members	217	73.06	141	77.47	358
Over 5 Members	80	26.94	41	22.53	121
Wealth Index					
Lowest	48	16.44	45	26.01	93
Lower	55	18.84	38	21.97	93
Middle	60	20.55	53	30.64	113
Higher	89	30.48	29	16.76	118
Highest	40	13.7	8	4.62	48

4.3.3.1 Lack of PrEP use or Discontinuation

The study sought to determine the reasons why the respondents had never used PrEP or had discontinued use after a certain period of time, some of the high-ranking reasons were correct condom use, stigma associated with PrEP use, unavailability of the PrEP in the local hospital among others. Furthermore 86.5% of the FSW reported using condoms correctly and consistently. The findings demonstrated an equal distribution of access to services like HIV testing, Family Planning and Condom provision, cervical cancer screening and GBV services at the health facilities.

The research used main component analysis (PCA) to produce wealth index and rank the respondents in their respective socioeconomic status, a commonly used multivariate analysis methodology. In order to categorize respondents, PCA-based asset indices were created. The most commonly used arbitrary cut-off points, according to Filmer & Pritchett (2001), are the' poor' category of the lowest 40% of households, the top 20% as the wealthy and the remaining 20% as the middle group or, accordingly, the quintile household division (Gwatkin et al. 2000).

We divided households into quintiles and calculated the mean socio-economic score for each group as the disparity between adjacent quintiles in mean socio-economic score should be even if SES is distributed evenly. The study findings indicated that 20% of the FSW belonged to the poorest wealth quintile compared to 10% in the richest class as presented in Table 4.5. Uptake of PrEP was highest (30%) amongst those in the fourth quintile.

Table 4.5: Wealth Ranking

Wealth Index	Frequency (n)	Percentage (%)
Lowest	93	20.00%
Lower	93	20.00%
Middle	113	24.30%
Higher	118	25.38%
Highest	48	10.32%
Total	479	100

The study sought to determine the distribution of the demographic characteristics across the five quintile of wealth index generated. The findings indicated that majority (52.3%) of the FSW who were aged between 18-25 years old came from a poor background. The findings further indicated that among the 238 FSW who never married, majority (57.8%) of them came from a middle-class background. On religion, the study determined that the Catholics (51.3%) belong to the middle wealth quintile as compared to 37.6% of the FSW who were protestant and belong to the second class of wealth quintile.

Consequently, majority (63.9%) of the unemployed FSWs came from the fourth class of the wealth quintile. A quarter (25%) of the self-employed FSWs came from the highest wealth quintile. The study findings further indicated that majority of the FSWs resided in town area of whom 100% were in the highest wealth quintile. Majority of the FSW had attained secondary and above belonged to the fifth wealth quintile. Additionally, majority (59.8%) of the FSW who had attained primary education came from the poorest wealth quintile. The results are presented in table 4.8 below.

Table 4.6: Wealth Index by Demographic Characteristics

	Variables	Poorest		Second		Middle		Fourth		Richest	
		n	%	n	%	n	%	n	%	n	%
Age categories	< 24 years	40	43.01	45	48.39	43	38.05	44	37.29	9	18.75
	25 and above	53	56.99	48	51.61	70	61.95	74	62.71	39	81.25
Marital Status	Never Married	46	49.46	44	47.31	63	55.75	65	55.08	20	41.67
	Formerly/Currently Married	47	50.54	49	52.69	50	44.25	53	44.92	28	58.33
Religion	Catholic	46	49.46	42	45.16	58	51.33	82	69.49	27	56.25
	Islam	6	6.45	5	5.38	2	1.77	6	5.08	5	10.42
	None	12	12.9	11	11.83	15	13.27	5	4.24	3	6.25
	Protestant	29	31.18	35	37.63	38	33.63	25	21.19	13	27.08
Number of Children	0-2	64	68.82	73	78.49	88	77.88	97	82.20	34	70.83
	>3	29	31.18	20	21.51	25	22.12	21	17.80	14	29.17
Employment Status	unemployed	48	52.75	51	57.30	71	63.96	72	61.02	25	52.08
	employed	43	47.25	38	42.70	40	36.04	46	38.98	23	47.92
Education Level	Primary	49	59.76	46	54.12	31	30.1	36	31.3	10	20.83
	Secondary+	33	40.24	39	45.88	72	69.9	79	68.7	38	79.17
Residence	Rural	40	43.01	11	11.83	6	5.31	3	2.54	0	0
	Town	53	56.99	82	88.17	107	94.69	115	97.46	48	100
Age Started Sex Work	<24	71	76.34	61	65.59	69	61.06	73	61.86	22	45.83
	Over 24	22	23.66	32	34.41	44	38.94	45	38.14	26	54.17
Household Size	0-4	48	51.61	65	69.89	93	82.3	102	86.44	37	77.08
	> 5	45	48.39	28	30.11	20	17.7	16	13.56	11	22.92

4.4 Diagnostic Tests

This section outlines the various diagnostic tests that was conducted in the study

4.4.1 Reliability Test

The study's accuracy has been tested to assess internal consistency using Cronbach's Alpha. The results indicated that for the measurements, the Cronbach's Alpha was 0.712, which was very similar to 1 so the instrument was considered reliable. This supports Greene (2001) saying that Cronbach Alpha should be as close as possible to 1 for a high reliability calculation.

4.4.2 Multicollinearity Test

The study tested for multicollinearity using variance inflation factor and found that variance inflation factors for monthly income (between 2001-4000, 4,000 to 10,000, and 10,001-20,000) and age were above 10 which suggested that it was highly correlated. These variables were dropped from the model.

4.4.3 Heteroscedasticity Test

Heteroscedasticity test(s) using levels of independent variables only

Ho: Disturbance is Homoscedastic

        White/Koenker nR2 test statistic: 46.929 Chi-sq (22) P-value = 0.0015

Under the null of no heteroscedasticity, this figure is distributed as chi-squared and under the retained assumption that the regression error is normally distributed. The degrees of freedom of all these chi-square tests are equal to the number of indicator variables. The relationship between these independent variables was statistically significant with Chi-Square ($X^2_{(22)}$ = 46.929, p<0.05) indicating that heteroscedasticity was absent.

4.5 Regression Analysis

4.5.1   Probit Analysis Results

The study estimated Probit model for PrEP Uptake and found the chi square for likelihood ratio test was significant suggesting that the independent variables jointly influenced PrEP Uptake among the FSWs. Table 4.9 below shows the coefficients, standard errors and the significance of the variables. The coefficients of residence, education, religion (none), residence, average sex acts,

wc2, wc3 and monthly income (less than 2000) are negatively associated with PrEP Uptake. The variables that are statistically significant are no children, rc1, sc1, sc2 and wc1 at 1%, 5%, and 10%. Even though the other variables are not statistically significant, they tend to affect PrEP Uptake in one way or the other.

Table 4.7: Logit Model of PrEP use among FSWs

	Model 1	
VARIABLES	**Coefficients**	**SE**
No Children	-0.25*	(-0.15)
Education	-0.34	(-0.31)
Household Size	0.12	(-0.11)
Marital Status	0.38	(-0.31)
Number of Regular Partners	0.02	(-0.14)
Religion (None)	-0.26	(-0.54)
Protestant	0.02	(-0.29)
Employment Status	0.45	(-0.32)
Less than 2,000	-0.93	(-0.82)
Between 20,001 to 30.000	0.06	(-1.52)
Residence	-1.16	(-0.77)
Age Started Sex Work	0.00	(-0.04)
Average Sex Acts	-0.03	(-0.04)
rc1	0.32***	(-0.07)
rc2	0.00	(-0.08)
rc3	0.06	(-0.11)
sc1	0.49***	(-0.12)
sc2	0.35*	(-0.19)
wc1	0.23***	(-0.08)
wc2	-0.14	(-0.1)
wc3	-0.09	(-0.12)
Constant	**1.13**	**(-1.16)**
Observations	**192**	
Wald Chi2 (25)	121.27	
Prob > chi2	0.000	
Pseudo R2	0.4737	
Log pseudolikelihood	-67.363628	

Standard errors in parentheses

*** $p < 0.01$ (The coefficients are statistically significant at 1%), ** $p < 0.05$ (The coefficients are statistically significant at 5%), * $p < 0.1$ (The coefficients are statistically significant at 10%)

4.5.2 Marginal Effects

The marginal effects analysis was carried out to establish the sign and strength of association between PrEP use and the individual women characteristics. The Table 4.10 shows the marginal effect, standard errors and the z-value. An elaborative way of summarizing how means change in a response is mutual to change in covariates can be done using marginal effects. For variables that are categorical, e.g PrEP Use the marginal effects probability of a FSW using PrEP if they live in town area compared to living in rural areas holding all the other independent variables constant. i.e. how $p(Y = 1)$ is predicted to change as X_i changes from 0 to 1 holding all other X_j equal. Marginal effects make it easy to grasp and understand this relationship.

FWS age has a negative and important correlation with the use of PrEP relative to FSWs between the ages of 18 and 25 at the time of the test, FSWs between the ages of 26 and 30 were 9% less likely to use PrEP, while those aged 36 to 40 were 13% less likely to use PrEP. At 5% and 10% respectively, these associations are important. Marital status was also found to be linked to use of PrEP in a negative and significant way. Women who were either married or previously married were 12% more likely to use PrEP than single women who had never been married. This was a significant finding at 5%.

The study utilized PCA to generate index scores for risk, service provision and wealth index. The principle component variables for risk, wealth score and service provision were found to be significant at 1%, 5% and 10%. The more a sex worker perceives herself to be at risk, the more she's likely to use PrEP. Further to this, the higher the income earned by the sex worker, the higher the probability of PrEP. The risk perception of the FSWs is a driver of PrEP use and this is captured by a positive and significant relationship between to risk indicators Risk 1 and Risk 3, FSWs reporting these risks were 5% and 3% more likely to take PrEP. These findings were significant at 1% and 5% respectively. The service delivery also was associated with use of PrEP, FSWs reporting more friendly health workers experience were 8% more likely to take PrEP and this was significant at 1% level.

Table 4.8: Marginal Effects of PrEP use among FSWs

	dy/dx	S.E	z	P>z	[95% Conf.	Interval]
No Children	-0.0485	0.0278053	-1.74	0.081	-0.10299	0.006002
Education						
Primary	0	(base)				
Secondary+	-0.0624	0.0542496	-1.15	0.25	-0.16873	0.043926
Household Size	0.022953	0.0206045	1.11	0.265	-0.01743	0.063337
Marital Status						
Never Married	0	(base)				
Formerly & Currently Married	0.074149	0.060008	1.24	0.217	-0.04346	0.191762
No Regular Partners	0.003718	0.0274545	0.14	0.892	-0.05009	0.057528
Religion						
Catholic	0	(base)				
None	-0.0525	0.112555	-0.47	0.641	-0.2731	0.168104
Protestant	0.003888	0.0557864	0.07	0.944	-0.10545	0.113227
Employment Status						
Unemployed	0	(base)				
Employed	0.088783	0.0627932	1.41	0.157	-0.03429	0.211855
Less than 2000	-0.1798	0.1567834	-1.15	0.251	-0.48709	0.127485
Between 20,001_to_30000 Residence	0.011889	0.2941147	0.04	0.968	-0.56457	0.588343
Non-Town	0	(base)				
Town	-0.18133	0.0924547	-1.96	0.05	-0.36254	-0.00012
Age at Sex Work Start	0.000676	0.0075856	0.09	0.929	-0.01419	0.015543
Average Sex Acts	-0.00571	0.008248	-0.69	0.489	-0.02187	0.010457
rc1	0.062616	0.0113774	5.5	0	0.040317	0.084915
rc2	-0.00023	0.0145045	-0.02	0.987	-0.02866	0.0282
rc3	0.012543	0.0214979	0.58	0.56	-0.02959	0.054678
sc1	0.093988	0.0204298	4.6	0	0.053946	0.13403
sc2	0.067502	0.0361125	1.87	0.062	-0.00328	0.138281

wc1	0.044834	0.0152046	2.95	0.003	0.015033	0.074634
wc2	-0.02777	0.0195809	-1.42	0.156	-0.06615	0.010609
wc3	-0.01819	0.0238676	-0.76	0.446	-0.06497	0.02859

4.6   Concentration Index

The study used concentration index (C) to estimate the socioeconomic inequality in PrEP use. The concentration curve was also used to rank the FSW population's cumulative percentage ranked on the x axis by wealth and monthly income against the y axis ' cumulative percentage of PrEP uptake. The coefficient of the concentration index is used to describe the degree of socioeconomic inequality is an outcome of interest. The index ranges from −1 to+ 1.

Based on our results, the concentration curve was below the line of equality as presented in Figure 4.1 and Figure 4.2, thus C is positive. The concentration curve for income is not ambiguous and always lies below the diagonal equality line those very close to the line, this confirms greater use of PrEP among wealthy FSWs but low levels of inequality in uptake. However, the concertation index based on wealth is slightly more curve below the diagonal line providing a clearer picture of wealth inequality in PrEP use. A normalized C based on wealth index and monthly income was computed resulting in positive values; 0.089 and 0.129 respectively for the standard concentration index, showing use of PrEP by FSWs ranked higher according to both monthly income and wealth (Table 4.11). The Erreygers and Wagstaff concentration indices are also positive for both wealth and monthly income confirming that use pf PrEP is concentrated among the wealthy FSWs.

Table 4.9: Concentration Index

	Wealth Index	Monthly Income
Standard Concentration Index	0.089	0.049
	(0.000) ***	(0.012) ***
Erreygers	0.224	0.122
	(0.000)***	(0.012) ***
Wagstaff	0.240	0.129
	(0.000) ***	(0.012) ***

Figure 4: Concentration index based on monthly income and on wealth

Concentration Index Based on Monthly Income

Concentration Index Based on Wealth Index
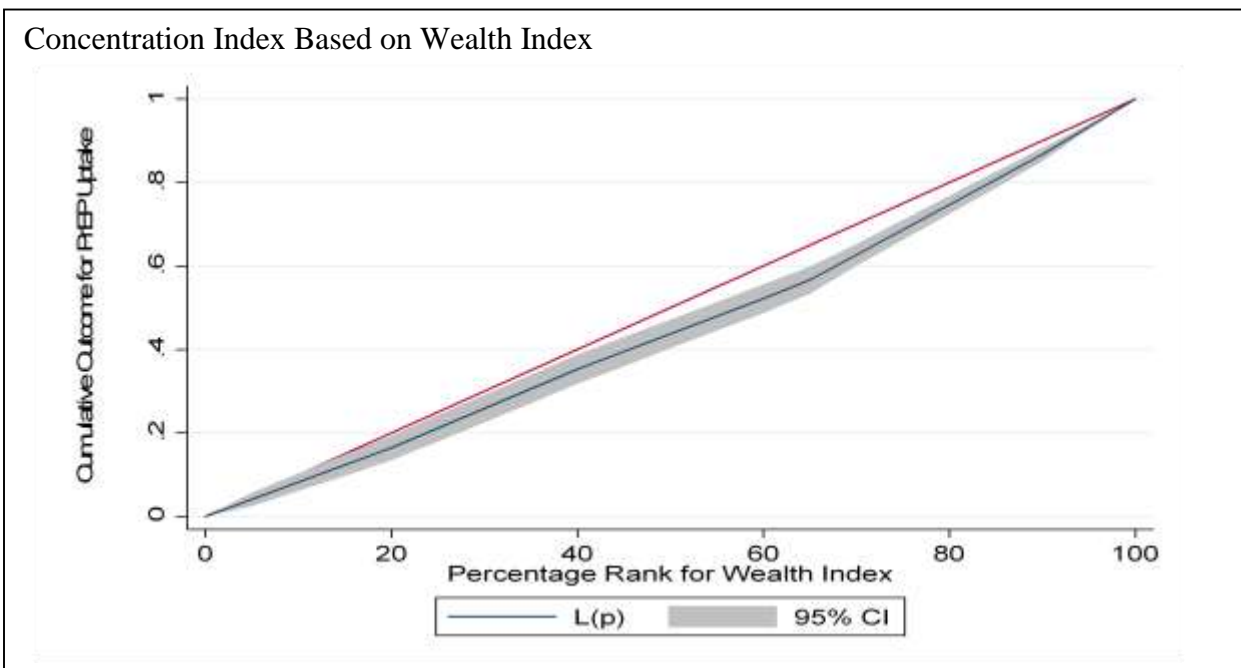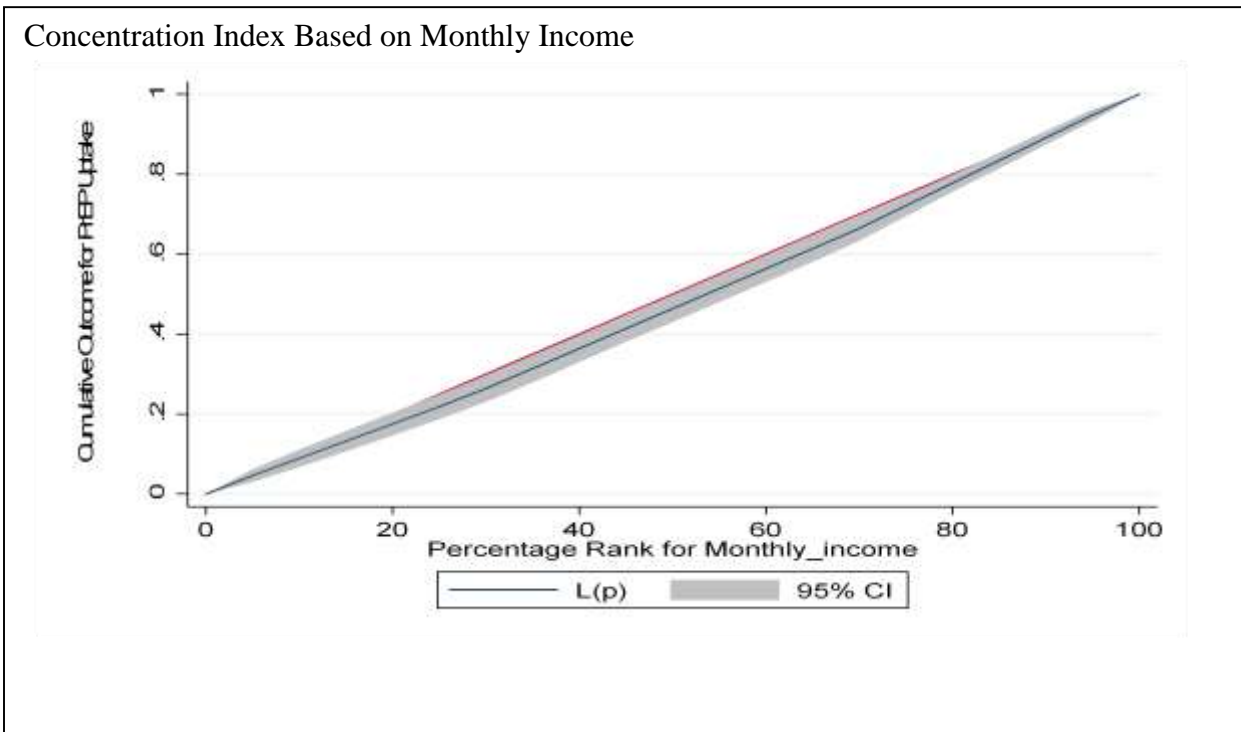
4.6.1 Comparison of Concentration Index with Residence

The study conducted a correlation analysis of the concentration index to assess wealth-related disparity in urban and non-urban take-up of PrEP. The findings showed a significant concentration of PrEP uptake among wealthy female sex workers against wealth index or monthly income in both rural and urban areas. The findings show a higher degree of disparity

Table 4.10: Erreygers normalised CI compared to residence based on wealth index

	No. of Obs.	Index value	Robust Std. Error	p-value
Combined	465	0.22	0.05	0.000
Non-Town	60	0.22	0.12	0.081
Town	405	0.23	0.05	0.000

When the CI is compared based on the monthly income, there is a large concentration of PrEP adoption among the poor FSW residing in the rural area. All studies refute the null hypothesis that in rural and urban areas the index is the same, suggesting a significant difference in the adoption of PrEP.

Table 4.11: Erreygers normalised CI compared to residence based on monthly income

Index:	No. of Obs.	Index value	Robust Std. Error	p-value
Combined	479	0.12	0.05	0.012
Non-Town	62	-0.20	0.13	0.134
Town	417	0.16	0.05	0.002

Table 4.12: Test of significance

	F-stat	p-value
Wealth Index	0.011	0.918
Monthly Income	6.348	0.012

** Test for stat. significant differences with Ho: diff=0 (assuming equal variances)

	Diff.	**Std. Err**	**z-stat**	**p-value**
Wealth Index	0.017	0.132	0.130	0.899
Monthly Income	0.365	0.143	2.550	0.011

** Test for stat. significant differences with Ho: diff=0 (large sample assumed)

4.6.2 Comparison of Concentration Index with Marital Status

Likewise, the study conducted a concentration index comparison test to determine the concentration of PrEP uptake among the FSW based on their marital status. The study conducted this comparison using wealth index and monthly income. The results showed that there is a larger concentration of PrEP uptake among the FSW that are affluent and were never married than those who were formerly & currently married. The point estimates suggest that the degree of inequality is greatest among those who never married, but the difference with those who are formerly & currently married is small. Both tests reject the null hypothesis that the index is the same. This indicates a significant difference in the uptake of PrEP between both the non-married FSW and those currently married.

Table 4.13: Erreygers normalised CI compared to marital status based on wealth index

Index:	No. of Obs	Index value	Robust SE	p-value
Combined	465	0.224	0.050	0.000
Never married	238	0.236	0.0709	0.001
Formerly & currently married	227	0.215	0.0677	0.002

Table 4.14: Erreygers normalised CI compared to marital status based on Monthly Income

Index:	No. of Obs	Index value	Robust SE	p-value
Combined	479	0.122	.0482	0.012
Never married	245	0.077	0.069	0.266
Formerly & currently married	234	0.116	0.067	0.083

Table 4.15: Based on Wealth Index

	F-stat	p-value
Wealth Index	0.042	0.837
Monthly Income	0.169	0.682

** Test for stat. significant differences with Ho: diff=0 (assuming equal variances)

	Diff.	Std. Err	z-stat	p-value
Wealth Index	-0.020	0.098	-0.21	0.837
Monthly Income	0.039	0.096	0.41	0.681

** Test for stat. significant differences with Ho: diff=0 (large sample assumed)

CHAPTER FIVE: SUMMARY, DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter summarizes the study, discusses the summary of the findings and provides the conclusions and recommendations of the study.

5.2 Summary of Findings

The study conducted a probit regression analysis to determine the associated between the predictor variables and PrEP use. The results showed that the chi square for likelihood ratio test was significant suggesting that the independent variables jointly influenced PrEP Uptake. The marginal analysis shows variation PrEP uptake across the different predictor variables. The study findings showed that a one-unit increase in age of FSW who were aged between 36-40 years old will produce a 0.128 decrease in the probability of success for PrEP uptake among the FSWs. These results contradict the results of the study conducted by Hammoud (2019) which showed that PrEP uptake was higher among the FSWs and GBM (Gay and Bisexual Men) who were younger i.e. from 25-35 years old. Hammoud (2019) conducted both multivariate poisson regression analysis in order to establish associations with PrEP initiation and also applied logistic regression to establish associations with non-uptake of PrEP among GBM and FSWs. The regression results also indicated that age was statistically significant implying that it had an influence on PrEP uptake. Additionally, the results of this study contradicts the results of a study that was conducted by Bullinger (2019) which sought to determine the influence of age on PrEP uptake. The results showed that PrEP uptake was high among the younger FSW and MSM (Men who have Sex with Men). The chi square for likelihood ratio test was significant suggesting that the independent variables jointly influenced PrEP Uptake.

The results of this study demonstrate that PrEP uptake was highest and is statistically significant amongst the previously and currently married. These results are similar to Bekker's (2015) study in Australia that examined the relationship between PrEP use and marital status.

The study findings showed that a normalized C based on wealth index and monthly income was computed resulting in positive values; 0.08935 and 0.12939 respectively. The standard concentration index of both wealth index and monthly income are positive indicating that PrEP uptake is concentrated among wealthy FSWs. Consequently, there was a significant concentration of PrEP uptake among the FSW that are wealthy in both rural and town locations. Concerning marital status and PrEP uptake, there was a significant concentration of PrEP uptake among the FSW that are wealthy and were never married and those who formerly & currently married. These results were in agreement with the results of a study conducted by Zou (2014) which showed that PrEP uptake was highly concentrated among the FSW in the wealthy class. However, the results of a study conducted by Kjellsson (2015) showed that the PrEP uptake was highly concentrated among the poor FSW. These results are in contrary to the findings of this study. This indicates that distribution of PrEP uptake across different nations varies and brings in the need for further research in this area in other countries as large.

5.3 Conclusion

Inequality studies are quite rampant and have been utilized to demonstrate the variation in health outcome (Acheson, 2000). From the reviewed literature, the health variables of interest have been mortality indicators, immunization uptake, incidence and prevalence of certain chronic diseases (HIV and cancer), however, there is paucity of studies in relation to HIV prevention aspects. This study utilises a quantifiable approach to determining factors influencing a fairly new health intervention, pre-exposure prophylaxis. Further to this, this study show cases ground breaking results of successful PrEP implementation project in the peri-urban Kisii area.

The majority of the study respondents are knowledgeable on matters PrEP, HIV and have demonstrated correct and consistent condom use. Notwithstanding, the uptake of PrEP varied across the age strata despite ongoing risky sexual behaviour. Overall, the study findings showed that the respondents were motivated to use PrEP as they understood that they are at risk of being infected by HIV. The motivation and understanding of PrEP came from the health care providers who explained to them the pill profile as well as their peers who encouraged them to take up PrEP. With awareness creating approaches in hospitals, outreaches and peers, this study presents the opportunity utilisation of social media platform and other innovative approaches to disseminate

information to the young FSWs to augment the health facility and outreach dissemination approaches. Implementation of stigma-reduction strategies through proper messaging to avert misconceptions between the oral PrEP pill and the antiretroviral drugs for HIV infected persons would influence PrEP uptake.

The findings of this study showcased an element of early sexual debut, transactional sex, multiple partner relations coupled by low PrEP uptake amongst the younger women, characteristics that increase one's vulnerability to HIV. For a country to attain her set goal in reducing incidence of HIV infection as alluded to in SDG3, appropriate interventions that protect the young women to achieve their sexual reproductive health needs prior to adulthood is key.

Results from this study show the respondents earned a decent income from sex trade and a majority of them had no other source of income. This shows that FSW could afford the basic needs to enhance their living conditions. In addition, majority of the FSW lived in houses with finished floor and finished walls with flush toilets. Therefore, the study concluded that the living conditions for the FSW were better since they could afford a better living condition. Therefore, the study concludes that that a comprehensive mix of multiple interventions – not just focusing on FSWs, but also on their family and friends, their religion as well as clinical officers or doctors– is necessary for the successful usage of PrEP in Kisii and other parts of the country. The study results showed that FSW visited clinics and health dispensary to not only to acquire PrEP services, but also to acquire other health services such as family planning, cervical cancer screening, condoms provisioning among other services. FSW indicated that the health workers were friendly to them and they cared for their health. Consequently, the health workers clearly explained to them how to take PrEP and its benefits if taken every day. In addition, the health workers explained to them how to manage side effects of PrEP and this created trust with nurses and doctors. They indicated that the health workers never discriminated against them. Therefore, the study concluded that the health workers clearly plays a bigger role in ensuring that there's proper PrEP uptake among the sex workers. Moreover, the health workers are well versant with the preventive measures and that's why the FSW have established a bond with them.

5.4 Recommendation

Based on the findings presented in this report, the study recommends use of peer led approaches as it has demonstrated favorable outcomes in advocating for PrEP use amongst the FSWs and a structured roll out and implementation of the same would boost uptake. There lies an opportunity in usage of social media platform for dissemination of PrEP messages. Education on PrEP is paramount and the researcher recommends it from this study. The basic knowledge on PrEP is not only okay but efficient in establishing a healthier sex life. Taking medication regularly is never a stand-alone decision. Studies and research have shown that STIs cannot be reduced by PrEP. Consistent condom usage reduces the risk of developing HIV by about 80 percent and reduces the risk of other STIs. It is an important component of an effective PrEP system to encourage regular condom use.

Finally, the results of this study demonstrate success in the implementation of PrEP and therefore, these interventions can be replicated in other programs like Malaria, condom dissemination, other priority population.

5.5 Areas of Further Research

In so far as PrEP uptake was above average amongst the respondents, the results demonstrated high discontinuation rates, as thus, further research on these determinants of discontinuation despite being on ongoing risk would add to literature. A decomposition study to understand the drivers of inequality in PrEP uptake would also improve on existing literature.

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APPENDICES

APPENDIX I: STUDY QUESTIONNAIRE

INSTRUCTION PAGE

I am a research assistant, carrying out a study on HIV Prevention among the Female Sex Workers in Kisii County

- Respondents are free to choose either to participate in the study or not.
- Participants in this study will not be paid in any way
- All the information obtained from the participants will be handled confidentially and strictly for the purpose of the study.
- Names of the participants are not required
- Participants are free to refuse answering any question or decide to withdraw from the study at any given time.
- There will be no alteration of data during analysis and after the study; the researcher will give feedback to the hospital for necessary action.
- These ethical clearances will be sought to contribute to safeguarding the dignity, rights, safety and wellbeing of all potential research participants.
- Kindly sign below to indicate that you agree to participate in this study

I agree to participate in this research study: **Yes/No**

Contact details

Call Angela on telephone contact 0725061639, or by postal address 17702; 00500, Nairobi. You may also contact the secretary of University of Nairobi Ethics and Review

I understand that the study is voluntary, confidentiality and anonymity are guaranteed, I do hereby accept to participate in this research study.

Participant's sign……………………………   Date………………………..

Principal researcher's sign………………………   Date……………………………

No.	A. SOCIOECONOMIC AND DEMOGRAPHIC CHARACTERISTICS
A1.	How old are you? .... Years
A2.	How many children do you currently have? …….Children
A3.	Have you attended school? ☐ Yes ☐ No If **NO,** SKIP TO A5
A4.	What is your highest level of education attained or completed? ☐ None ☐Primary ☐ Secondary ☐ College ☐ University
A5.	Are you the head of the household? ☐ Yes ☐ No
A6.	How many people do you live with in your household?.............
A7.	What is your current marital status? ☐ Single (never married) ☐ Married/living with a partner ☐ Widowed ☐ Separated ☐ Divorced
A8.	Do you have any regular partner who doesn't pay money or gifts to have sex with you? ☐ Yes ☐ No If NO, **GO TO A10**
A9.	How many regular/long standing partners do you have?
A10.	What is your religion? ☐ Catholic ☐ Protestant ☐ Islam ☐ None ☐ Other
A11.	Aside from sex work, do you have an additional source of income? ☐ Not employed ☐ Employed ☐ Self-employed
A12.	What is your current monthly income? (This is including sex work and any other source of income) in Kshs ☐ 0 -. 2,000 ☐ Kshs. 2,001 – 4,000 ☐ Kshs. 4,0001 – 10,000 ☐ Kshs. 10,001- 20,000 ☐ Kshs. 20,001-30,000 ☐ Over Ksh 30,000
A13	Where do you stay? ☐ Town area ☐ Rural area ☐ On transit
A14.	For how long have you been a sex worker? Approximately ……….. months
A15.	How old were you when you started sex work? years
A16	On average how many sex acts do you have in a week?
A17.	Have you ever used PrEP? ☐ Yes , Currently ☐ Yes, Previously ☐ No, Never ☐ Don't know
A18.	If YES to A17, for how long have you used PrEP? months
A19.	How did you access PrEP available? (Tick all that apply) ☐Hospital/Dispensary ☐ Local chemist ☐ during Outreach activity
A20.	What are the reasons making you not use PrEP?. (Tick all that apply) **ONLY FOR YES PREVIOSLY, NO & Don't Know in A17** ☐ Side effects ☐ Stigma (people will think I'm HIV positive) ☐ Unfriendly service providers ☐ Pill Burden ☐ Taking pills for a long time ☐ PrEP is not available at the local hospital ☐ I'm not aware of PrEP ☐ Too many HIV tests ☐ I use condoms correctly ☐ Distance to PrEP distribution point is far ☐ Transport cost to distribution point
A21.	Are you aware of an association/group/chama for sex workers? ☐ Yes ☐ No

A22.	If **YES to A21**, are you a member?	☐ Yes	☐ No	

B. KNOWLEDGE/INFORMATION ON HIV, PrEP & CONDOMS

B1.	Have you heard about HIV & AIDS?	☐ Yes	☐ No	
B2.	Have you ever heard of pre-exposure prophylaxis (PrEP)? ☐ Yes		☐ No	If NO, **GO TO B6**

B3	What are the benefits of taking PrEP? (tick all that apply)
	☐ Prevent HIV infection ☐ Prevent other STI ☐ Prevent pregnancy ☐ Other

B4.	Where is PrEP available? (tick all that apply) ☐ Hospital/Dispensary ☐ Local chemist ☐ Outreach activity

B5.	How do you mainly get information about PrEP? (tick all that apply)
	☐ Doctors/ health care worker ☐ FSW peers and champions ☐ Family and friends ☐ Radio ☐
	Newspapers and magazines ☐ School education ☐ Television ☐ Social Media (e.g. Facebook, twitter etc.)

		True	**False**	**Don't know**
B6.	If I eat with HIV-infected people, I will be infected with HIV	☐1	☐2	☐3
B7.	If I practice sex without condoms, I will be infected with HIV	☐1	☐2	☐3
B8.	HIV/AIDS cannot be cured	☐1	☐2	☐3
B9.	If I use condoms correctly when having sex, I can avoid HIV infection	☐1	☐2	☐3
B10.	Being with only one uninfected loyal partner can prevent HIV infection	☐1	☐2	☐3
B11.	I should take 1 oral PrEP tablet **EVERY DAY** to prevent HIV infection (SKIP If NO **TO B2)**	☐1	☐2	☐3

65

B12.	I should take 1 oral PrEP **ONLY** when I feel I am at risk of HIV infection (SKIP If NO **TO B2**)	☐1	☐2	☐3
B13.	I should use condoms correctly and consistently when I am on PrEP (SKIP If NO **TO B2**)	☐1	☐2	☐3
B14.	When I am on PrEP, I don't need to use condoms (SKIP If NO **TO B2**)	☐1	☐2	☐3
B15.	I should take PrEP to prevent other sexually transmitted infections (Not HIV) (SKIP If NO **TO B2**)	☐1	☐2	☐3
B16.	While I'm on PrEP, I will need to go for regular doctor visits (SKIP If NO **TO B2**)	☐1	☐2	☐3
B17.	The risk of HIV infection can be reduced by the treatment of sexually transmitted diseases	☐1	☐2	☐3
B18.	The short-term side-effects of PrEP may include nausea and dizziness (SKIP If NO **TO B2**)	☐1	☐2	☐3

C. MOTIVATION & RISK PERCEPTION (Educate the client on PrEP before asking these question esp. if they answered NO in B2)		**Strongly agree**	**Agree**	**Neutral**	**Disagree**	**Strongly disagree**
C1.	I am at high risk of getting HIV	☐5	☐4	☐3	☐2	☐1
C2.	I have a responsibility to contribute to HIV prevention efforts by using PrEP	☐5	☐4	☐3	☐2	☐1
C3.	I think PrEP drugs make me safer, away from HIV	☐5	☐4	☐3	☐2	☐1
C4.	I think I would be less worried about HIV infection if I were on PrEP	☐5	☐4	☐3	☐2	☐1
C 5.	I worry about the side effects of PrEP	☐5	☐4	☐3	☐2	☐1
C 6.	I'm worried that other FSW know I'm taking PrEP	☐5	☐4	☐3	☐2	☐1

C 7.	I worry that other people will discriminate me when they know I am on PrEP	☐5	☐4	☐3	☐2	☐1
C 8.	I worry that other people will think I'm HIV positive if I take PrEP	☐5	☐4	☐3	☐2	☐1
C 9.	I find it hard to take PrEP every day	☐5	☐4	☐3	☐2	☐1
C 10.	If I disclose that I'm on PrEP, my long-term sex partner(s) will be comfortable with it	☐5	☐4	☐3	☐2	☐1
C 11.	I have family members/peers to encourage me take PrEP properly	☐5	☐4	☐3	☐2	☐1
C 12.	I would take PrEP if I know family member/FSWs who is currently taking it	☐5	☐4	☐3	☐2	☐1

D. BEHAVIORAL

How confident are you that you would continue to use HIV preventive drugs in the following situation	Not at all confident	Somewhat confidence	Neutral	Confident	Very confident
D1. When HIV preventive drugs cannot be obtained immediately	☐1	☐2	☐3	☐4	☐5
D2. When you are (recently) drinking alcohol or using other drugs	☐1	☐2	☐3	☐4	☐5
D3. When your partner is upset with it	☐1	☐2	☐3	☐4	☐5
D4. When you feel it has side effects	☐1	☐2	☐3	☐4	☐5
D5. When you think that your partners will be angry with the use of HIV preventive drugs	☐1	☐2	☐3	☐4	☐5
D6. When you think the risk of AIDS is very low	☐1	☐2	☐3	☐4	☐5
D7. When you have used other protective measures such as condoms	☐1	☐2	☐3	☐4	☐5

E. SERVICE PROVISION

I now want to ask question about what you feel about how the health care providers (doctors, nurses etc.) have treated you or provided information about PrEP.	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

E1.	The health worker are friendly to me (FSW) and care for my health	☐5	☐4	☐3	☐2	☐1
E2.	I think the health worker discriminate against me (FSW)	☐5	☐4	☐3	☐2	☐1
E3.	I trust the health workers (doctors, nurses) in the health facility	☐5	☐4	☐3	☐2	☐1
E4.	The health worker explained to me how to take PrEP clearly	☐5	☐4	☐3	☐2	☐1
E5.	The health worker explained to me clearly benefits of taking PrEP every day	☐5	☐4	☐3	☐2	☐1
E6.	The health worker explained to me PrEP side effects	☐5	☐4	☐3	☐2	☐1
E7.	The health worker explained to me how to manage side effects PrEP	☐5	☐4	☐3	☐2	☐1
E8.	The health workers refused to give me PrEP	☐5	☐4	☐3	☐2	☐1

E9.	Which other services do you receive when coming to the clinic? ☐ HIV testing ☐ Family planning services ☐ Cervical cancer screening ☐ Condom provision ☐ STI screening ☐ Gender based violence assessment ☐ Others (specify)
E10.	Can the FSWs access services outside the normal working hours? ☐ Yes ☐ No ☐ Don't know

	CONDOM USE	True	False	Don't know
F1.	I used condom the last time I had sex	☐1	☐2	☐3
F2.	I Used condom every time I had sex in the last 7 days	☐1	☐2	☐3
F3.	I Used condom every time I had sex in the last 4 weeks?	☐1	☐2	☐3
F4.	I don't use condom when having sex with a client is willing to pay more for condomless sex	☐1	☐2	☐3
F5.	I don't use condom when having sex if a client refuses or becomes violent	☐1	☐2	☐3
F6.	I don't use condom when having sex if feel safe and think the client is HIV negative	☐1	☐2	☐3
F7.	I don't use condom when having sex with a regular or repeat client	☐1	☐2	☐3
F8.	I don't use condom when having sex if I've drunk alcohol or taken drugs (substance)	☐1	☐2	☐3
F9.	I don't use condom when having sex because they're not available	☐1	☐2	☐3
F10.	I don't use condom when having sex because they're too expensive	☐1	☐2	☐3
F11.	If I use condoms correctly when having sex, I can avoid HIV infection	☐1	☐2	☐3

	SOCIO-ECONOMIC ASPECTS		
	Do you have any of the following in your residence?	Yes	No
G1.	Electricity	☐1	☐2
	Radio	☐1	☐2

	Television	☐1	☐2
	Refrigerator	☐1	☐2
	Bicycle	☐1	☐2
	Motorcycle/Scooter	☐1	☐2
	Car/Truck	☐1	☐2

G2.	Main floor material ☐ Natural floor (Earth/Sand/Dung) ☐ Rudimentary (Wooden plank) ☐ Finished floor (Polished wood/ Tiles/ Cement)
G3.	Main roof material ☐ No Roof ☐ Grass thatched ☐ Iron sheet ☐ Roofing tiles
G4.	Main wall material: finished floor ☐ Natural Wall (Earth/Sand/Dung) ☐ Rudimentary (bricks with mud, Reused wood, Iron sheet ☐ Finished Wall (Bricks/stones/cement)
G5.	Toilet type: ☐ Flush ☐ Pit latrine ☐ No toilet
G6.	Cooking fuel type. Tick all that apply ☐Electricity ☐ Biogas ☐ Kerosene ☐ Charcoal ☐ Firewood ☐ Cooking Gas

APPENDIX II: STUDY TIMELINES

The study was expected to span the period as stipulated in the schedule herein:

Description	Weeks													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Proposing topic	■													
Concept writing and presentation		■												
Literature Review			■	■										
Proposal defense & Corrections					■									
Ethical reviews and Rebuttal						■	■	■						
Data collection							■	■	■	■				
Data sorting and analysis									■	■	■			
Compilation and Presentation											■	■	■	■

APPENDIX III: KNH-UON ERC APPROVAL LETTER

UNIVERSITY OF NAIROBI
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APPROVED 2 y OCT 2019 KNH/UoN-ERC

Ref: KNH-ERC/A/404

29th October, 2019

Angela Eunice Achieng' Ndaga
Reg. No. X53/7648/2017
School of Economics
College of Humanities and Social Sciences
University of Nairobi

Dear Angela,

RESEARCH PROPOSAL: SOCIOECONOMIC INEQUALITY IN HIV PREVENTION AMONGST FEMALE SEX WORKERS; AN ANALYSIS OF PRE-EXPOSURE PROPHYLAXIS USE   (P382/05/2019)

This is to inform you that the KNH- UoN Ethics & Research Committee (KNH- UoN ERC) has reviewed and approved your above research proposal. The approval period is 29th October 2019 – 28th October 2020.

This approval is subject to compliance with the following requirements:

a. Only approved documents (informed consents, study instruments, advertising materials etc) will be used.
b. All changes (amendments, deviations, violations etc.) are submitted for review and approval by KNH-UoN ERC before implementation.
c. Death and life threatening problems and serious adverse events (SAEs) or unexpected adverse events whether related or unrelated to the study must be reported to the KNH-UoN ERC within 72 hours of notification.
d. Any changes, anticipated or otherwise that may increase the risks or affect safety or welfare of study participants and others or affect the integrity of the research must be reported to KNH- UoN ERC within 72 hours.
e. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. (*Attach a comprehensive progress report to support the renewal*).
f. Submission of an *executive summary* report within 90 days upon completion of the study.
This information will form part of the data base that will be consulted in future when processing related research studies so as to minimize chances of study duplication and/ or plagiarism.

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