ECONOMIC FACTORS AND HIV RISK AMONG FEMALE SEX WORKERS IN SENEGAL

by

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Abstract

Stigma and economic disadvantages have been underscored as structural determinants for HIV acquisition and transmission among female sex workers (FSWs). The objective of this thesis is to explore the economic factors in relation to HIV prevention among FSWs, within the programmatic context where integrated stigma mitigation interventions took place.

The integrated stigma mitigation interventions (ISMI) aimed to optimize HIV service delivery through stigma mitigation for FSWs. This thesis firstly documented the implementation of the ISMI through their key stakeholders' lenses. Experiences and opinions were elicited from interviews with the HIV healthcare providers and from focus group discussions with the FSW peer educators on the acceptability, adoption, etc. of the ISMI. It was found that ISMI were well accepted and adopted among the FSW community. However, various opinions existed among HIV healthcare providers.

To explore HIV acquisition and transmission through structural determinants, this dissertation extended its scope to economic disadvantages and its role in potentiating or mitigating HIV risk among FSWs. Firstly, economic factors such as FSWs' income from sex work, and perceived degree of financial insufficiency were tested in relation to condom use behaviors using the data of 758 FSWs recruited from Dakar and Mbour. Bivariate and multivariate logistic regressions were used, and statistically significant associations were observed between FSWs' perceived degree of financial insufficiency and condom non-use with regular and new clients during the last sex act. The income measure was not associated with condom use with all types of sexual partners.

Next, the role of economic hardship experienced by FSWs and its implications for HIV risk were explored using data from 45 interviews conducted with 15 FSWs from Dakar. FSWs reported pronounced economic hardship during the entry to sex work and around religious events. Most reported no condomless sex with their clients even in economic hardship. As often the sole breadwinners for their households, they reported replying on sex work for a living and supporting kinship. Many FSWs tried to cope with the economic hardship, through seeking additional income-generating opportunities and participating in saving groups. However, there were contextual barriers for them to escape from economic hardship.

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Preface and acknowledgements

This thesis research was planned in my third year of the PhD program in Social and Behavioral Interventions. My understanding of "health behavior change" had shifted from individual level focus, to a broad interest in potential structural determinants in the context. Stigma reduction and economic factors were particularly interesting to me, as the former was a dynamic social process, and the latter tied closely to equity. Senegal is a unique country especially when it comes to stigma reduction and economic factors among FSWs due partly to its legal, social and cultural environment. It's traditional and religious, but at the same time, progressive, in terms of legalizing female sex work, and responding to HIV prevention needs. I decided to pursue my research interests there after reading literature and living in Dakar for half a year in 2015. The thesis was built within an ongoing parent study implementing the ISMI. It was hoped that the chapters of this thesis would help contribute to the sharing of lessons learned from the implementation of the ISMI, and the understanding of economic factors in the HIV risk environment.

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Caitlin Kennedy, in addition to her advice on my proposal and serving on all my exams committees, provided technical guidance specific to HIV prevention among FSWs and pampering moral support through the toughest times. I would like to also acknowledge the unwavering support from faculty, staff and colleagues at my home department, especially Dr. Peter Winch, Cristina Salazar, Karla McCarthy, Drs. Kwame Sakyi, Emily Hurley, and Elena Broaddus, Jessica Rothstein, Audrey Buckland and Kate Perepezko. No words can express my gratitude to my parents for their unconditional love and everything.

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List of terms and abbreviations

FGD	Focus group discussions
FSW	Female sex worker
HIV	Human immunodeficiency virus
HP2	HIV prevention 2.0
LMIC(s)	Low- and middle-income country(countries)
IRB	Institutional review board
ISMI	Integrated stigma mitigation interventions
NPP	Non-paying partners
NGO	Non-governmental organization
SSA	Sub-Sahara Africa
WHO	World health organization

Chapter 1. Introduction

1.1 Background

1.1.1 HIV EPIDEMIC IS CONCENTRATED AMONG FEMALE SEX WORKERS

Worldwide, sex workers face an unmet need for HIV prevention, treatment and related care services [1]. The burden of HIV/AIDS is disproportionately high among the FSW population in both high-income and low and middle-income countries [2]. The HIV epidemics in Senegal were concentrated among a few key populations, including FSWs.

Senegal has been a model country in terms of taking early action on HIV prevention and care provision in Sub-Saharan Africa (SSA) since 1986 [3]. Because of decades of effort, the HIV prevalence at the country level remained steady below 1% and relatively lower than those among most other SSA countries [3]. In contrast, among FSWs, the estimated HIV prevalence has always been much higher than 1%. In the past two decades, several studies attempted to estimate the HIV prevalence among FSWs using various sampling strategies. The results showed that the HIV prevalence was about 19.8% between 2000 and 2004 based on a cross-sectional study among registered FSWs from three clinics in Dakar, Mbour and Sebikotane [4]. Another cross-sectional study conducted in Ziguinchor in 2002 with 68 FSWs reported an HIV prevalence of 28.5% among study participants [5]. In 2003 and 2006, the estimates from different samples suggested that HIV prevalence was approximately 10% and 20% among FSW population [6, 7]. According to UNAIDS' data, the HIV prevalence among sex workers in Senegal was 18.45% and 18.5% in 2011 and 2013, respectively [8]. In UNAIDS' most recent estimate in 2016, the

HIV prevalence among Senegalese FSWs was 6.6% [9]. Although the gap between FSWs and female adults seemed smaller in more recent years, the HIV prevalence among FSWs, 6.6% were still ten times higher than that among female adults, 0.6% in 2017 [9, 10].

One previous study suggested that such a concentrated epidemic might have the potential to spread to the general population as a result of actively overlapping sexual networks [11]. One study further confirmed that the venue-based HIV vulnerability in Senegal might facilitate the shift of the epidemic from concentrated high-risk population, to the general population [12]. Those findings suggested that there was need to prioritize the prevention of HIV acquisition and the onward transmission among FSWs in Senegal.

A plethora of studies have contributed to the understanding of HIV risk factors as operating at multiple levels and led to the recognition that a combined HIV prevention approach was necessary in order to effectively prevent HIV acquisition and transmission among FSWs [1, 2, 13-19]. Shifting from the focus on individual-level determinants such as knowledge and perceptions of HIV risk, the combination HIV prevention approach strongly emphasized structural-level determinants such as stigma and economic factors [1, 14, 20, 21]. It further argued that those combined preventions should be tailored to their local context [1, 14, 20].

1.1.2 STIGMA ACTS AS A BARRIER TO ACCESSING HIV PREVENTION SERVICES

Stigma was found to be one of the major barriers to HIV related care-seeking [21-25]. Stigma refers to a relationship between an attribute and discrediting stereotypes, which spoils the social

identity and limits the social functions of the stigmatized individual [26]. Stigma was further classified as perceived stigma, characterizing the negative perceptions; enacted stigma, or discrimination, characterizing behaviors or actions; and internalized stigma or self-stigma, characterizing the anticipation of discrimination from others [27-29]. The conceptualization of stigma has undergone a similar trajectory as that of HIV risk factors. Early understanding of stigma featured a psychological viewpoint, which focused on the stigmatized individuals and their confined personal experience [26, 30]. This transitioned to a broader socio-ecological framework including interpersonal and societal influences, and became an umbrella term covering multi-level actors including the moral standards in the societal context [26, 30].

In Senegal, studies have demonstrated that stigma was a prominent barrier to health service uptake among FSWs [1, 2, 31]. Duffy et al. synthesized a set of previous HIV stigma studies and stressed the urgent need "to understand and act on contextual issues such as stigma with increased political and social commitment at local, national, and international levels" [32]. Stigma reduction was emphasized by the World Health Organization (WHO) as well in its recommendations on working with FSWs to prevent HIV in low-and-middle-income countries. Reducing HIV and sex work related stigma was suggested in three of the four Good Practice Recommendations by WHO, through legalization of sex work, decriminalization of sex workers, and addressing stigma particular in healthcare settings [33]. To reduce stigma as a barrier to accessing HIV prevention services, health workers' involvement was deemed crucial [32].

1.1.3 SEX WORK AND SEX WORKER REGISTRATION IN SENEGAL

Sex work, operationally defined as exchanging sex for money or goods, is criminalized in most SSA countries. In Senegal, however, sex work is permitted and regulated by the law and policies while brothels are not legal [34]. According to the decrees and laws, FSWs are mandated to register with the law enforcement sector and *L'institut Hygiene Sociale* to be legal, or "card-carrying". Only FSWs over 21 years old are eligible for this registration. In order to maintain their legal work status, registered FSWs are required to report bi-weekly to their local health facility for STI testing at an expense of 500 CFA (approximately 0.85 USD). FSWs diagnosed with STI will be suspended from sex work until the STI is treated [35].

Not all eligible FSWs are registered. In a study published in 2002, approximately 1,500 FSWs in Senegal were officially registered with health sectors, whereas the size of FSWs in Senegal was estimated to be 4,500 from another data source [34], suggesting that a majority of FSWs remained unregistered. In fact, the fear for sex work related stigma was reported as one of the top three reasons for deciding not to register as an FSW, together with other reasons such as being less than 21 years old and not self-identifying as an FSW [35]. FSWs suffer from the stigma related to sex work in Senegalese society despite that their occupation has been legitimized since 1970 [34, 36-38]. In additional to stigma related to sex work, unregistered FSWs also face the risk of being arrested or harassed by the police if they are spotted carrying a condom, or soliciting in public [35]. In terms of their access to health services, unregistered FSWs have to pay more out-of-pocket fees for HIV testing and STI treatment compared to registered FSWs.

1.1.4 CONDOM USE

Strategies to prevent HIV acquisition and transmission include consistent condom use. In the past few decades, condom use behavior was examined from individual-level theoretical lens, such as the modified health belief model and the theory of planned behavior, and found to be associated with several constructs including but not limited to self-efficacy, perceived benefits of non-condom use, and moral norms [39]. In addition, the perceived intimacy and the types of relationships also relate to condom use behaviors, where the likelihood of using condoms was found to be inversely associated with increased intimacy especially among adolescents [40-42].

A study from Dominic Republic suggested that with increased relationship intimacy between regular paying partners and FSWs, the chance of using a condom declined [43]. One previous study in Senegal reported that the prevalence of consistent condom use with clients or paying partners was extremely high (95%), while with romantic partners extremely low (18%) in 2007 [36]. Those studies suggested that there was a clear distinction between types of partners, and potential discrepancy in condom use prevalence existed during sex with a paying partner, or client, as compared to sex with a non-paying partner (NPP). The intimacy of relationships they have with their sexual partner matters. In another study conducted in Ziguinchor (a city south of Dakar) in 2005, 35.3% of FSW participants reported not requiring condom during work [5]. The reasons for not requiring condom use included trust, not knowing the risk, and the proposition of high prices [5]. In the most recent data from UNAIDS in 2017, the prevalence of condom use among sex workers in Senegal was 94.1% [9]. Overall, the condom use among FSWs in Senegal was uncertain.

1.1.5 ECONOMIC FACTORS IN RELATION TO HIV RISK

Economic factors have been examined in relation to the HIV epidemic at the population level and HIV vulnerability at the individual level by several studies. At the population level, poverty was believed to contribute to the HIV epidemic in SSA countries where economic resources were lacking [44-46]. Many presumed that the geographical concentration of HIV in low-and-middle income countries was due in part to their relatively poor economies [44, 45, 47, 48]. Furthermore, a recent study in a high-income country reported a rapid increase in HIV infections following a major financial crisis which provoked thoughts on the potential causal relation between economic events and the HIV epidemic in a population [49]. Economic disadvantages were also believed to shape an individual's risk and vulnerability to HIV acquisition as well as its onward transmission. Studies across various countries and populations demonstrated the linkage from individual economic characteristics, such as wealth quintile [50], living in a poor household [51], asset ownership and essential items affordability [52], to HIV related knowledge, behavioral risks and infections. Possible explanations for those associations included that poor wealth strata might result in limited access to the HIV-related knowledge, and thus less engagement in HIV preventive measures [50]. Additionally, poor women were believed to often rely on men for financial and material support, and thus unable to insist on safe sex practices with their sexual partners [51, 52].

Conversely, another body of research provided contrary findings on the role of economic advantages, based on evidence from several Asian and SSA countries [53, 54]. Greener and Sarkar argued that existing evidence failed to support the hypothesis that the HIV epidemic was driven by poverty at the country or household level [53]. Fox furthered this debate by arguing

that living in a wealthier household or wealthier country in sub-Saharan Africa was associated with increased risk of HIV through the pathways of consumption, perceived low risk of HIV, and concurrent sexual partnerships, defined by Mah and Halperin as sexual relationships where "an individual has overlapping sexual relationships with more than one person" [53, 55]. Some microeconomic studies also suggested that higher income might be linked to inconsistent condom use among FSWs, which was incentivized by clients who preferred condom non-use [56, 57].

Compounding the inconsistent findings on the complex relationship between economic factors and HIV vulnerability is the lack of contextualized analysis on how economic hardship was understood and experienced by a specific population. The social epidemiology approach and macroeconomic approach have offered us a grand picture of the general role that economic determinants played in the HIV epidemic across the globe. However, those approaches tended to extract the experience of economic hardship out of its context without closely examining how the social and cultural environment shaped an individual's experience of economic in an HIV risk environment [58]. Without a nuanced and situated understanding of economic hardship in its specific risk context, such as sex work, and its implications to HIV prevention, it was difficult to effectively intervene at the structural or individual level [59].

Economic hardship was herein defined as the deprivation of economic resources including but not limited to income, assets and access to loans to meet the needs of daily life such as food, shelter and other necessities that are deemed indispensable by an individual in the local contexts. Moreover, the experience of economic hardship was defined to also entail the subjective feelings

of suffering due to the deprivation of resources. Research on economic hardship is particularly relevant among FSWs and especially in the Senegalese setting. Firstly, FSWs are marginalized worldwide with multi-faceted vulnerabilities to increased illicit drug use and alcohol consumption, police violence, and stigma [60-62]. With those vulnerabilities, FSWs may have their unique experience of economic hardship defined by their profession. Secondly, compared to reproductive aged-women not in sex work, FSWs in SSA countries and many other regions carried a disproportionate burden of HIV in terms of both proportion of new infections and HIV prevalence, which renders HIV prevention a priority among them [2, 60, 61]. In the SSA region, about 5% of new HIV infections were among sex workers [9]. In Senegal, despite the overall low national HIV prevalence compared to other West African countries, HIV prevalence was estimated to be 6.6% among sex workers between 2011 and 2016, and 3.3% among FSWs in 2017 [10, 63, 64]. Lastly, sex work has been permitted by law in Senegal [65]. In a setting with potentially less criminalization of sex work than its neighboring countries, economic determinants stood out amongst the structural drivers of HIV and might add to the explanation of the concentrated HIV epidemic among FSWs.

1.1.6 KNOWLEDGE GAPS

For the purpose of HIV prevention, most of the stigma reduction research and effort has been directed to HIV related stigma among community members and healthcare workers [66]. Research and implementation were not commonly found around sex work related stigma reduction for improved access to HIV prevention services for this vulnerable population, especially in West Africa [67]. Sex work related stigma posits additional stigma, or layering stigma on top of HIV related stigma and needs to be addressed as well [67]. In the past, the

Sonagachi project in Kolkata, India has gathered invaluable lessons learned from implementing HIV prevention programs specifically tailored for FSWs in Sonagachi, the red-light area [68, 69]. Those programs challenged the stigma related to sex work and achieved success in terms of improved self-esteem, increased sexually transmitted infections (STI) preventive behaviors, and the formation of collective agency among the FSW community [68, 69]. Following the Project Sonagachi as an example, several other programs adopted similar women empowerment strategies in India with implementation process assessment [70-73]. However, empirical evidence from SSA countries is still lacking. Consequentially, it is necessary to describe the implementation of stigma reduction programs especially for HIV prevention programming among FSWs in Senegal (addressed by Aim 1).

Next, despite the debate on the relationship between economic disadvantages and HIV risk globally, up to date there has not been any quantitative study investigating how FSWs' economic situations, such as income and subjective feelings of economic hardship, relate to FSWs' condom use behaviors with specific types of partners in Senegal. As a result, understanding the potential statistical associations between condom use and economic correlates among FSWs would contribute to the existing knowledge specifically on the implication of poverty for HIV risk in Senegal (addressed by Aim 2).

Lastly, there is a lack of contextualized understanding on what exactly economic hardship means to FSWs. Additionally, the key role of economic hardship has not been thoroughly examined qualitatively and situated in the context of Senegal (addressed by Aim 3).

1.2 Study objectives

The three aims of this dissertation all focus on providing empirical evidence for HIV prevention among FSWs in Senegal, with a slight shift from lessons learned from the existing stigma mitigation intervention in addressing HIV prevention, to the relationship between income and subjective feelings of financial insufficiency and condom use behavior, and finally to the experience and the meanings of economic hardship as well as its implications for HIV in sex work. It was hoped that addressing those three objectives would deepen the understanding of HIV prevention among FSWs and ultimately inform the future programming.

Aim 1: The first aim is to add understanding on HIV prevention through stigma mitigation from the lens of FSWs' healthcare providers for HIV care and services and FSW peer educators, by examining the perceived acceptability, adoption, appropriateness, and feasibility of a multi-tier intervention package designed for addressing stigma facing FSWs in Dakar, Mbour and Thiès (the Integrated Stigma Mitigation Interventions, ISMI). (Chapter 4)

Aim 2: The second aim is to assess the association between economic characteristics (measured by sex work income, the perceived insufficiency of financial resources, etc.) and FSWs' condom use behaviors (measured by condom use during the last sex act with a specific type of partners) using a cross-sectional sample of FSWs from Dakar and Mbour in Senegal. (Chapter 5)

Aim 3: The third aim is to qualitatively define and understand the roles of economic hardship as experienced by FSWs in Dakar, Senegal, and to understand how they relate to HIV risk using a phenomenological approach. (Chapter 6)

1.3 Organization of the dissertation

Chapter 1 of this dissertation provides an introduction of this dissertation's topic, including the background on HIV epidemic, stigma, sex work and condom use in Senegal and other settings, as well as an overview of the literature on economic hardship. In addition, knowledge gaps and study objectives are also introduced in Chapter 1. Chapter 2 provides information on the study settings of this dissertation. Information about the study sites were provided. Since the dissertation is embedded in a parent study (the HIV Prevention 2.0), the programmatic context of the parent study was explained in Chapter 2. Chapter 3 entailed an overview of the methods used in this dissertation and what research questions were addressed by using those methods.

Chapter 4, Chapter 5 and Chapter 6 are the three manuscript chapters, with each chapter corresponding to one of the study aims of this dissertation. In Chapter 4, the findings from Aim 1 on the implementation of ISMI are presented. Chapter 5 corresponds to Aim 2, which used quantitative method to assess the condom use among a sample of 758 FSWs and its economic correlates. Chapter 6 describes the experience of economic hardship among FSWs and the implication to HIV preventions among this population using qualitative methods, which addressed Aim 3.

Lastly, Chapter 7 was written as a summary of findings from the previous three manuscript chapters and how they organically complement each other in addressing HIV prevention among FSWs in Senegal.

Chapter 2. Study setting and context

2.1 Study setting

This dissertation is nested in a parent study HIV Prevention 2.0 (HP2). The parent study was conducted in three study sites in the metropolitan areas around Dakar, Mbour and Thiès, where sex work is considered relatively active [36]. Established by HP2, each study site was built within either an existing establishment of the local partner non-profit organization Enda Santé, or a health facility. At each study sites, HP2 partnered with one or two health facilities that were designated to deliver HIV prevention and treatment services to key population patients (see figure 2.1).

Figure 2.1 HP2 study sites and the collaborating health facilities designed for key populations' HIV prevention and treatment services

The Dakar region had a population of nearly three million according to the 2013 census, about 95% of whom identified as Muslim [74]. The Dakar region was the most populous among the

fourteen regions of Senegal and had been continuously growing at its periphery in terms of urbanized areas and population [75]. Mbour (or M'bour) is a city located about 50 miles south of Dakar, with a popular coastal area for tourism. Thiès is the third largest city in Senegal and located about 45 miles east of Dakar. The most commonly spoken language besides French is Wolof in those three sites. The HIV prevalence in Dakar and Mbour was 0.6% and 1.1% in 2014 according to the government surveillance data [76]. The latest HIV prevalence estimate among FSWs in those study sites was 3.3% in 2017 [64], still much higher than both the regional HIV prevalence and the national HIV prevalence among people at reproductive age in general [9].

Urbanization along with a nationwide economic decline over the last two decades, led to emerging poverty concentrated in urban areas [77]. Unemployment and food insecurity continued to affect the urban poor [77, 78]. Furthermore, data from Senegal in 2015 showed a gap between women (45%) and men (70%) in terms of labor participation rate, defined as the percentage of the working-age population currently working or actively looking for work [79]. Under those circumstances and with limited income-generating capacity, an increasing number of women opted to have sexual relationships other than traditional unions to secure material resources from multiple partners, a practice called "*Mbaraan*" in Wolof [77].

Senegal has demonstrated a strong commitment to combating HIV. The Senegalese government launched its initiative to provide Highly Active Antiretroviral Therapy in 1998 [59] and saw its scale-up in 2004 through several following programs [58]. HIV testing and counselling were also made available as part of the service package [59]. HIV related interventions for FSWs have been driven by a collaborative effort between National AIDS Program, international non-

government organizations (NGOs) and local FSW organizations. Senegal has been supported by various partners and funding agencies in the past decade with a cumulative amount of more than 44 million USD [58]. With sex work legalized, civil society played an important role as well. For example, the FSW organization *AWA*, established in 1993, has taken an active role in facilitating STI prevention workshops and supplying FSWs with condoms. However, the reach of such organization's implementation was commonly limited to FSWs who are officially registered, which shuts the door for young FSWs less than 21 years old and unregistered FSWs.

2.2 Programmatic context of HP2

In response to Senegal's specific need for stigma reduction among key populations, the "HIV Prevention 2.0" (HP2) project was implemented with collective effort from the Senegalese NGO, Enda Santé, and the key population programs led by Baral at the Center for Public Health and Human Rights at the Johns Hopkins Bloomberg School of Public Health. The goal of the HP2 was to reduce perceived and enacted stigma among FSWs, and therefore improve the uptake of HIV prevention and treatment services [64]. The HP2 encompassed a variety of research and implementation activities: a baseline phase, a longitudinal cohort study phase and a intervention component to implement the integrated stigma mitigation interventions (ISMI) in the aforementioned three study sites. The overarching goal was to remove barriers in FSWs' care-seeking and to decrease HIV risk behaviors through the mitigation of enacted and perceived stigma [64]. The ISMI consisted of two components for FSWs: a community intervention and a clinical intervention [64]. It was hypothesized that FSWs' uptake of HIV prevention and treatment services would be improved as the perceived and enacted stigma would decline as a result of those interventions.

The community intervention entailed periodical group talks led by FSW peer educators who were previously training in HP2. The group talks focused on four modules: prevention, reproductive health, human rights of FSWs and stigmatization. The clinical intervention included two training sessions to healthcare providers who work in health facilities frequented by key populations. Previous quantitative findings suggested the potential utility of the ISMI measured from surveying the recipients (or end users) of the intervention, namely, members from the FSW study cohorts [64].

2.2.1 CLINICAL INTERVENTION

The clinical intervention primarily targeted enacted stigma in healthcare settings through delivering two training sessions to frontline healthcare providers, including dermatologists, social workers and midwife nurses. The training sessions consisted of lectures on the definition and common forms of stigma, causes and consequences of discrimination, HIV risk factors, confidentiality of patients, and distinguishing value judgement from the facts in healthcare setting. They also encompassed several interactive activities where common myths and misinformation about FSWs were shown for participants to select right or wrong. Additional information about the clinical intervention can be found in Lyons 2017 [64]. The goal of the clinical intervention was to foster the understanding of stigma, to dispel myths about FSWs and ultimately create a stigma-free environment at the health facilities.

2.2.2 COMMUNITY INTERVENTION

The community intervention was delivered by FSW peer educators who were selected by the parent study based on their prior experience of community work among FSWs. Prior to the community intervention, FSW peer educators received extensive trainings with the study staff on the four intervention modules: the prevention module (around HIV and other STI), the reproductive health module (including FSWs' access to and use of family planning), the human rights module (including access to healthcare services and addressing police violence) and the stigma module (around stigma definition and forms). During the community intervention, FSW peer educators hosted group talks (French: "*causerie*") among their peers who were part of the study cohort. Each peer educator was responsible for about 20 FSW peers divided into two groups. Additional information about the community intervention can be found in the quantitative analysis of the ISMI [64]. Those group talks were designed with a participatory approach [80] where the FSW peer educators took the charge, organized the meeting, delivered the group talks on those four modules and moderate their peers' discussions [81].

2.2.3 THE RECRUITMENT OF FSW PARTICIPANTS

The FSW participants were recruited into the parent study's sample by a combination of respondent-driven sampling (RDS) and convenience sampling. At baseline recruitment, FSW participants (N=758) from Dakar and Mbour were recruited through RDS, a non-probabilistic sampling strategy widely used to reach hidden populations such as sex workers and people who use drugs [82, 83]. At the baseline recruitment, the eligibility of FSW was operationally defined as a woman who reported sex work as the primary source of income for at least three consecutive

months in any of the last twelve months. Due to ethical considerations, the parent study only included FSWs who are 18 years or older.

In the recruitment of the longitudinal cohort, participants from Thiès was enrolled into the parent study's cohort as well. Longitudinal cohort members came from a convenience sampling and to be eligible, only FSWs who planned to reside in the same study site areas were included to facilitate retention.

2.2.4 INTEGRATION OF THIS DISSERTATION RESEARCH INTO THE PARENT STUDY

This dissertation is integrated into the existing framework of the parent study HP2 (see figure 2.1 below). The first aim examined the implementation outcomes of the ISMI (shown in blue color in figure 2.2); the second aim addressed the relationship between FSWs' income and perceived insufficiency to meet needs to condom use behavior with four types of sex partners (showed in green color in figure 2.2); the third aim explored FSWs' experience of economic hardship and its implications for HIV prevention (shown in orange color in figure 2.2).

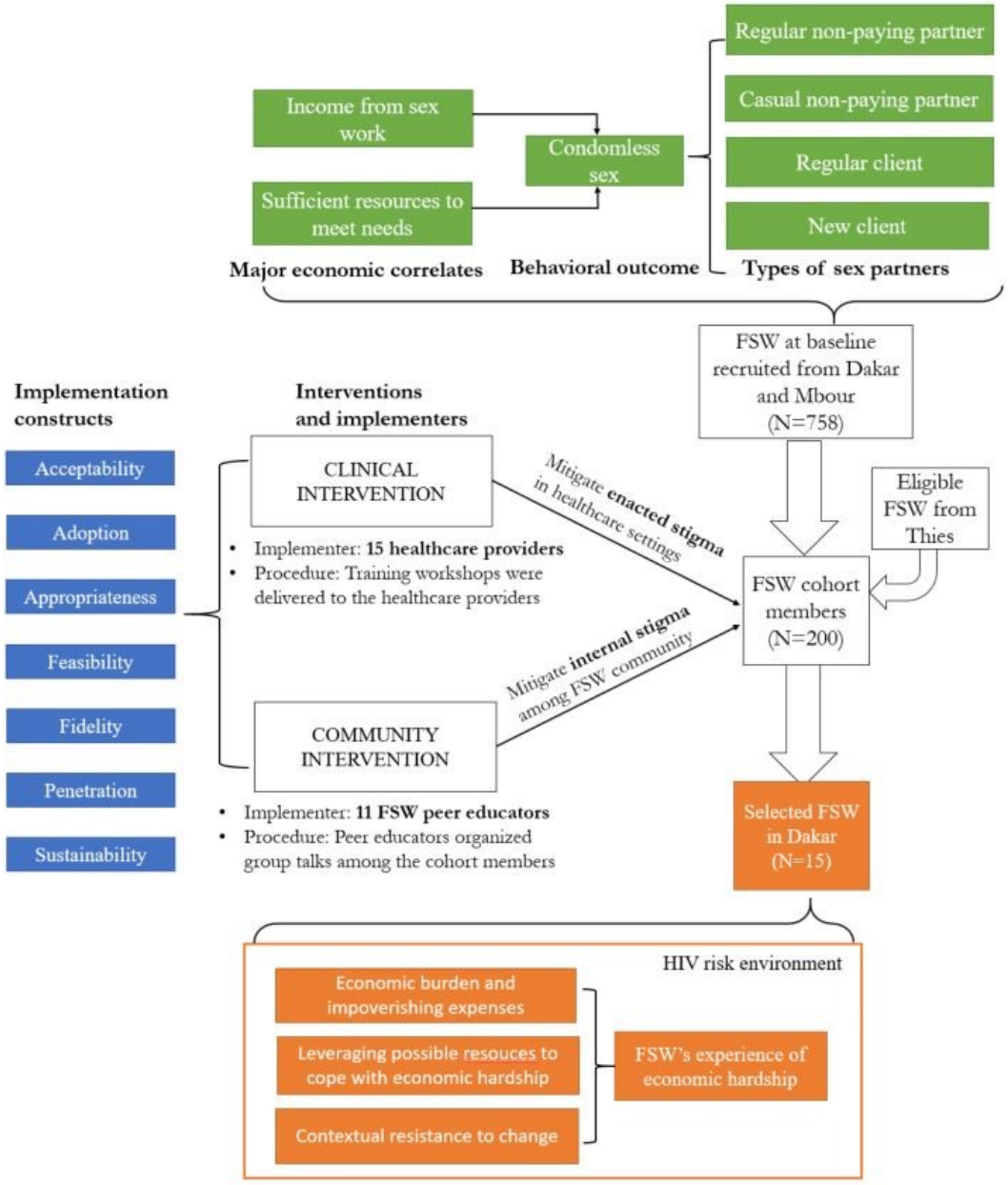

Figure 2.2 The integration of this dissertation research into the parent study

Chapter 3. Methods

3.1 Methods overview

This dissertation is nested as part of the parent study HP2. Aim 1 and Aim 3 addressed qualitative research questions answered through the collection and analyses of primary data. Aim 2's research question was addressed using the analysis secondary data retrieved from HP2's baseline dataset. An overview of aims, methods and research questions were presented below (also see table 3.1). Detailed methods used for specific aims can be found in the Methods section of the manuscript chapters.

3.1.1 AIM 1 METHODS: PROGRAMMATIC QUALITATIVE RESEARCH

To address the research questions of Aim 1, a programmatic qualitative research approach was employed to assess the implementation of the Integrated Stigma Mitigation Interventions (ISMI). Qualitative methods were chosen because they were suitable in addressing scientific inquiries about the implementation process [84]. Qualitative evidence would provide insight into the implementation, capture the process of the implementation and elicit various stakeholders' experience and opinions about the implementation. For ISMI specifically, previous analyses have been conducted to assess the overall implementation outcomes from surveying the end users, namely, FSW cohort members. In order to provide complementary and explanatory information to the existing knowledge on ISMI implementation and triangulate the information sources, a PQR approach was selected. Consequently, the PQR would add up to the elucidating and understanding of the implementation ISMI from lens of healthcare providers and FSW peer educators involved, as well as inform ISMI's transferability to other socio-cultural contexts.

An implementation research framework by Proctor et al. [85] was used to inform the synthesis of the qualitative findings. The implementation research framework coined by Proctor et al provided a useful lens to understand the various aspects of the ISMI from the perspective of healthcare providers and FSW peer educators involved in the interventions. The Proctor et al. framework was chosen because it focused on the implementation constructs relevant to the roles of HIV healthcare providers and FSW peer educators. Specifically, for HIV healthcare providers, their roles in the implementation was to participate in the clinical trainings from the ISMI that focused on stigma related to key populations; for FSW peer educators, their role in the implementation was to organize FSW peers from the intervention cohort into groups of ten, to prepare and host group talks to FSW peers on the following modules: prevention of STI, reproductive health, FSWs' rights to healthcare, psychosocial support and stigma mitigation. The framework by Proctor et al. entailed key constructs which are particularly relevant to the present study. Acceptability was operationally defined as the overall satisfaction of the clinical training sessions for healthcare providers, and group talks for FSW peer educators. Adoption was defined as the healthcare providers' intent to incorporate the ISMI trainings into their work routine and service delivery, and FSWs' utilization of ISMI group talks' content in their day-to-day life. Appropriateness was defined as the perceived relevance of the training to the healthcare providers' scope of work and of the group talk content to FSWs' needs. Feasibility was defined as the actual fit of the ISMI and their suitability for actual use in the local contexts. Fidelity was defined as the quality of program delivery as originally planned and intended for. Penetration was defined as the spread of training for healthcare providers and the coverage of the group talks to FSW peers in need. Finally, sustainability was defined as the sustaining effect of ISMI

reducing stigma related to sex work, and its potential integration into the larger health system [85].

The findings from Aim 1 addressed the two research questions specific to two constituent parts of ISMI: “what are the perceived acceptability, adoption, feasibility, penetration and sustainability of the clinical intervention from the lens of the healthcare providers involved?” and “what are the perceived acceptability, adoption, feasibility, penetration and sustainability of the community intervention from the lens of FSW peer educators involved?”

3.1.2 AIM 2 METHODS: CROSS-SECTIONAL STATISTICAL ANALYSIS

To address the second aim, statistical analyses were employed using HP2 baseline data of a total of 758 FSWs. Those FSWs came from two major study sites: Dakar and Mbour sites. Data were collected by a survey questionnaire with modules on socio-economic characteristics, sexual behaviors, stigma experiences, and psychological well-being [64]. For Aim 2 of this proposal, the statistical associations were assessed between FSWs’ income from sex work as well their subjective feeling of sufficiency or insufficiency of financial resources and condom use during their last sex acts with different types of partners. Bivariate and multivariate regression models were fitted to test the hypotheses.

The findings from Aim 2 addressed the following major research questions: “what was the condom use prevalence during the last sex act between FSWs and their partners?”, “is FSWs’ income from sex work statistically associated with their condom use?” and “is FSWs’ feeling of financial insufficiency to meet needs statistically associated with their condom use?”

3.1.3 AIM 3 METHODS: PHENOMENOLOGICAL RESEARCH

Under Aim 3, a phenomenological approach was adopted to unpack the experience of economic hardship among FSWs living in Dakar, and its implication to HIV risk. Phenomenological approach is suitable to study human experience. Through in-depth interviews, the essence and the common structure of economic hardship were elicited from the 15 FSWs in Aim 3's study sample. The methodology of interpretative phenomenological analysis was chosen because it is highly appropriate to be used to explore the subjective experience of a particular phenomenon as it were experienced commonly by a specific group of people [86]. In this dissertation, the phenomenon of interest is the economic hardship experienced by FSWs, both at the micro-level during the decision making on condomless sex, and at macro-level throughout their day-to-day life.

Phenomenological methods have been increasingly used to study human experiences and behaviors in relation to health in the field of public health [87-90], which also fits into the non-theory generating goal of this study. Particularly, interpretative phenomenology (IP) was chosen to guide the design of this study aiming to explore, describe and reconstruct FSWs' experience of economic hardship in an HIV high-risk context in Senegal and its implications to HIV risk. An IP approach not only emphasizes the study participants' reflection on their experience, but also underscores a researcher's engagement in a "double hermeneutic" process- "to make sense of the participant trying to make sense of what is happening to them" [91].

By interviewing FSW participants regarding their shared experience of economic hardship, insights were gained on the following research questions: “what is it like to be in economic hardship as an FSW?” (i.e. the meaning of the phenomenon of interest), and “what role does economic factors play in the HIV risk behaviors?” (i.e. the linkage between the phenomenon of interest and HIV risk).

The table below presents the overview of the three aims and methods:

Table 3.1 Overview of study objectives, research questions, methods and data

Study objectives	Research questions	Methods	Data
Aim 1	1. "What are the perceived acceptability, adoption, feasibility, penetration and sustainability of the clinical intervention from the lens of the healthcare providers involved?" 2. "What are the perceived acceptability, adoption, feasibility, penetration and sustainability of the community intervention from the lens of FSW peer educators involved?"	Programmatic Qualitative Research using face-to-face interviews and focus group discussions	Primary data collected from the interviews with healthcare providers and the focus group discussions with FSW peer educators.
Aim 2	1. "What was the condom use prevalence during the last sex act between FSWs and their partners?" 2. "Is FSWs' income from sex work statistically associated with their condom use?" 3. "Is FSWs' feeling of insufficiency to meet needs statistically associated with their condom use?"	Statistical analyses using bivariate and multivariate logistic regressions	Secondary data extracted from the baseline survey of the parent study with a total of 758 FSW participant
Aim 3	1. "What is it like to be in economic hardship as an FSW?" (i.e. the meaning of the phenomenon of interest) 2. "What role does economic factors play in the HIV risk behaviors?" (i.e. the linkage between the phenomenon of interest and HIV risk)	Interpretative phenomenological analysis	Primary data collected from the in-depth interviews with selected FSWs from Dakar

3.2 Fieldwork timeline

Below is the timeline of the fieldwork in Senegal from 2016 to 2017 pertaining to the primary data collection (table 3.2).

Table 3.2 Dissertation fieldwork timeline (Senegal based)

	Nov '16	Dec '16	Jan '17	Feb '17	Mar '17	Apr '17	May '17	Jun '17	Jul '17	Aug '17
Translating the guides										
Pre-testing the guides										
JHSPH IRB										
Senegal IBR										
Interviewer recruitment										
Interviewer training										
Interviewer training (mock session)										
Interviews with healthcare providers										
Clinical intervention 2nd session										
1st round FSW interviews										
Peer educators FGD-Dakar										
Peer educators FGD-Mbour										
2nd round FSW interviews										
Interviews with healthcare providers										
3rd round FSW interviews										
FGD in Dakar										

After the fieldwork activities as shown in the above table, data were transcribed and translated from Wolof or French to English from August to October in 2017. Analyses were carried out from October 2017 through January 2018. The manuscript chapters were drafted from November 2017 to February 2018 (see table 3.3).

Table 3.3 Dissertation analyses and writing timeline (Baltimore based)

	Jul 17'	Aug 17'	Sep 17'	Oct 17'	Nov 17'	Dec 17'	Jan 18'	Feb 18'	Mar 18'	Apr 18'
Aim 3 Data analysis										
Chapter 6 writing										
Aim 1 Data analysis										
Chapter 4 writing										
Aim 2 Data analysis										
Chapter 5 writing										
Global chapters writing										
Thesis defense exam										
Editing										

3.3 Qualitative research team

The primary data collection team included three individuals: Adama Hawa Diallo, Joseph Guimga, and Oumy Faye, who received trainings specific on conducting interviews and moderate focus group discussions. They together conducted the interviews and/or moderated the focus group discussions for the qualitative aims 1 and 3 of this dissertation.

Additionally, Adama Hawa Diallo took charge of transcribing interviews and focus group discussions while Oumy Faye took charge of translating them from French or Wolof to English. Fatou Ndow transcribed and translated the in-depth interviews with FSWs under Aim 3 from Wolof to English.

Analyses, synthesis and writing were carried out by the author of this thesis.

Below is a summary of the data collection team's demographic characteristics, language skills as well as their competency in collecting primary data.

Adama Hawa Diallo: Senegalese woman, between 25 and 30 years old, with a master's degree in social work. She previously participated in a few global health projects as data collectors for both quantitative and qualitative research. She spoke both French and Wolof.

Joseph Guimga: JG was a man, more than 50 years old. He was originally from Togo but moved to Senegal a few decades ago. He was senior and had acted as the enumerator for the baseline survey of the parent study. He had extensive experience in working with FSW and MSM communities. He spoke mainly French and some Wolof.

Oumy Faye: OF was a Senegalese woman between 25 and 30 years old with a bachelor's degree in English, and an ongoing coursework towards a master's degree in English. OF spoke Wolof, French and English.

Fatou Ndow: FN was a Gambian woman between 25 and 30 years old with a master's degree in public health. She spoke Wolof, English and some French.

The author: Chinese woman between 25 and 30 years old with a master's degree in global health, and ongoing study for a PhD in international health. She spoke English and French.

Chapter 4. Aim 1: Characterizing the Implementation of Integrated Stigma Mitigation Interventions for Female Sex Workers in Senegal: A Qualitative Analysis of Healthcare Providers' and Peer Educators' Views

4.1 Abstract

Background: Globally, FSWs carry a disproportionate burden of HIV. In response to a concentrated HIV epidemic among key populations in Senegal, the integrated stigma mitigation interventions (ISMI) was implemented with the aim to contain HIV transmission by reducing stigma and removing the barriers to accessing HIV prevention services at the health facility and community levels. The ISMI included a clinical intervention to reduce enacted stigma in healthcare settings as well as a community intervention to empower key population communities through peer education on stigma, human rights, reproductive health and STI preventions. This study aimed to explore implementation outcomes of the interventions, namely the acceptability, adoption, appropriateness, feasibility, fidelity, penetration, and sustainability, from the viewpoints of healthcare providers and FSW peer educators involved in the ISMI.

Methods: Qualitative data were collected from face-to-face interviews with 15 healthcare providers and focus group discussions with 11 FSW peer educators from three implementation sites. The development of interview and focus group discussion guides as well as the data

analyses were informed by the existing implementation research framework by Proctor et al. Transcriptions were translated into English and analyzed thematically using Atlas.ti.

Results: Peer educators largely perceived the community intervention of the ISMI as a success by creating a platform for FSWs to connect and exchange ideas, which contributed to their recognition of their rights to access care, improved self-esteem and reduction of stigma at the community level, although some peer educators suggested that societal levels of stigma against female sex workers may be difficult to change. Most HIV care providers found the clinical intervention acceptable. However, debate exists around its feasibility, adoption and appropriateness.

Conclusion: Qualitative evidence showed that healthcare providers and peer educators involved in the ISMI largely acknowledge the utility of the clinical and community interventions. According to the participants, the implementation of the clinical intervention can be further optimized by strengthening the perceived adoption, feasibility and appropriateness.

4.2 Introduction

Sub-Saharan Africa was hardest hit by the global HIV epidemic with an estimated total of 25.8 million people living with HIV in 2014 [92]. Yet, more than half of those people living with HIV were not receiving care, which underscored the urgent need to reach them with services and care [92]. Although the overall number of new infections has declined by almost 40% in Sub-Saharan Africa between 2001 and 2014, major challenges still exist [92]. In 2015, about 25% of new HIV infections in Sub-Saharan Africa occurred among key populations such as men who have sex

with men, female sex workers (FSWs) and people who inject drugs, which echoed the disproportionate burden for HIV among key populations across the globe [9]. Senegal has been a model country in Sub-Saharan Africa in terms of taking early action in HIV prevention and care since 1986 [3]. As a result of decades of effort, the HIV prevalence in the country is lower compared to most other Sub-Saharan countries [3, 93], at approximately 0.5% among its adult population aged 15-49 in 2014 [10]. Contrasting the low overall HIV prevalence is the concentrated epidemic among FSWs at 6.6% as estimated in 2016 [64].

Stigma has been underscored as a distal determinant of HIV acquisition and transmission among key populations and among the most difficult to tackle [1, 14, 20]. Stigma refers to the discrediting process associating a particular attribute or behavior, such as exchanging sex for money or goods, with spoiled social identity, which limits the social functions of stigmatized individuals [26]. Stigma was further classified as perceived stigma, characterizing the negative perceptions; enacted stigma, or discrimination, characterizing behaviors or actions; and internalized stigma or self-stigma, characterizing the anticipation of discrimination from others [27-29]. FSWs facing stigma may hesitate to seek HIV testing, preventive services and HIV care, which hinders the timely diagnosis and negatively impacts their health outcomes and quality of life in Senegal and other countries [1, 2, 31, 94-98]. In response to the stigma as a barrier to accessing care among FSWs, stigma reduction, especially in healthcare settings, was emphasized by the World Health Organization (WHO) in its recommendations on working with FSWs from low-and-middle income countries (LMICs) [33].

For the purpose of HIV prevention, most of the stigma reduction research and effort has been directed to HIV related stigma among community members and healthcare workers [66]. Research and implementation were not commonly found around sex work related stigma reduction for improved access to HIV prevention services for this vulnerable population, especially in West Africa [67]. Sex work related stigma posits additional stigma, or layering stigma, specific to FSWs and needs to be addressed as well [67]. Project Sonagachi in Kolkata, India gathered invaluable lessons learned from implementing HIV prevention programs specifically tailored for FSWs in Sonagachi, the red-light area [68, 69]. Those programs challenged the stigma related to sex work and achieved success in terms of improved self-esteem, increased sexually transmitted infections (STI) preventive behaviors, and the formation of collective agency among the FSW community [68, 69]. Following the Project Sonagachi as an example, several other programs carried out similar women empowerment strategies in India with implementation process assessed and described [70-73]. However, empirical evidence from SSA countries is still lacking. Consequentially, it is necessary to describe the implementation of stigma reduction programs especially for HIV prevention programming among FSWs in Senegal.

The HIV Prevention 2.0 (HP2) study was developed in response to the stigma reduction needs for key populations in Senegal. One critical part of HP2 was to implement integrated stigma mitigation interventions (ISMI) in three urban areas in Senegal with the goal to reduce the perceived and enacted stigma among men who have sex with men and FSWs [64]. The ISMI comprised of two components: a community intervention component and a clinical intervention [64]. It was hypothesized by intervening at the community and health facility levels, the uptake of HIV prevention and treatment services would be improved as the perceived and enacted

stigma would decline. The community intervention entailed periodical group talks led by key population peer educators who were previously training in HP2. The group talks focused on four modules: the prevention of STIs module, women's reproductive health module, human rights module and the stigma module. The clinical intervention included two training sessions to HIV care providers who worked in health facilities frequented by key populations. Previous quantitative findings suggested the potential utility of the ISMI measured from surveying the recipients (or end users) of the intervention, namely, members from the MSM and FSW study cohorts [64]. To complement the quantitative findings in [64] and provide a comprehensive view of the ISMI implementation, qualitative evidence was needed. In addition, we aimed to provide triangulation for both information source and methodology to the previous quantitative assessment of the ISMI, through the qualitative phase. The information source was the HIV healthcare providers and FSW peer educators who played crucial roles in the ISMI' clinical and community interventions. Those participants were chosen because of their direct interaction with FSW cohort members during HIV prevention service delivery and FSW group talks. The qualitative evidence drawn from those key persons' account would enable the understanding of the context and societal environment surrounding the implementation, and thus inform potential scale-up, integration into the national HIV response, or transferability to other socio-cultural settings.

An implementation research framework by Proctor et al. [85] was used to inform the synthesis of the qualitative findings (See figure 4.1). The implementation research framework coined by Proctor et al. was chosen because it would provide a useful lens to understand the various aspects of the ISMI from the perspectives of HIV healthcare providers and FSW peer educators involved

in the interventions. The framework by Proctor et al. entailed key constructs which are particularly relevant to the present study. Acceptability was operationally defined as the overall satisfaction of the clinical training sessions for healthcare providers, and group talks for FSW peer educators. Adoption was defined as the healthcare providers' intent to incorporate the ISMI trainings into their work routine and service delivery, and FSWs' utilization of ISMI group talks' content in their day-to-day life. Appropriateness was defined as the perceived relevance of the training to the healthcare providers' scope of work and of the group talk content to FSWs' needs. Feasibility was defined as the actual fit of the ISMI and their suitability for actual use in the local contexts. Fidelity was defined as the quality of program delivery as originally planned and intended for. Penetration was defined as the spread of training for healthcare providers and the coverage of the group talks to FSW peers in need. Finally, sustainability was defined as the sustaining effect of ISMI reducing stigma related to sex work, and its potential integration into the larger health system [85].

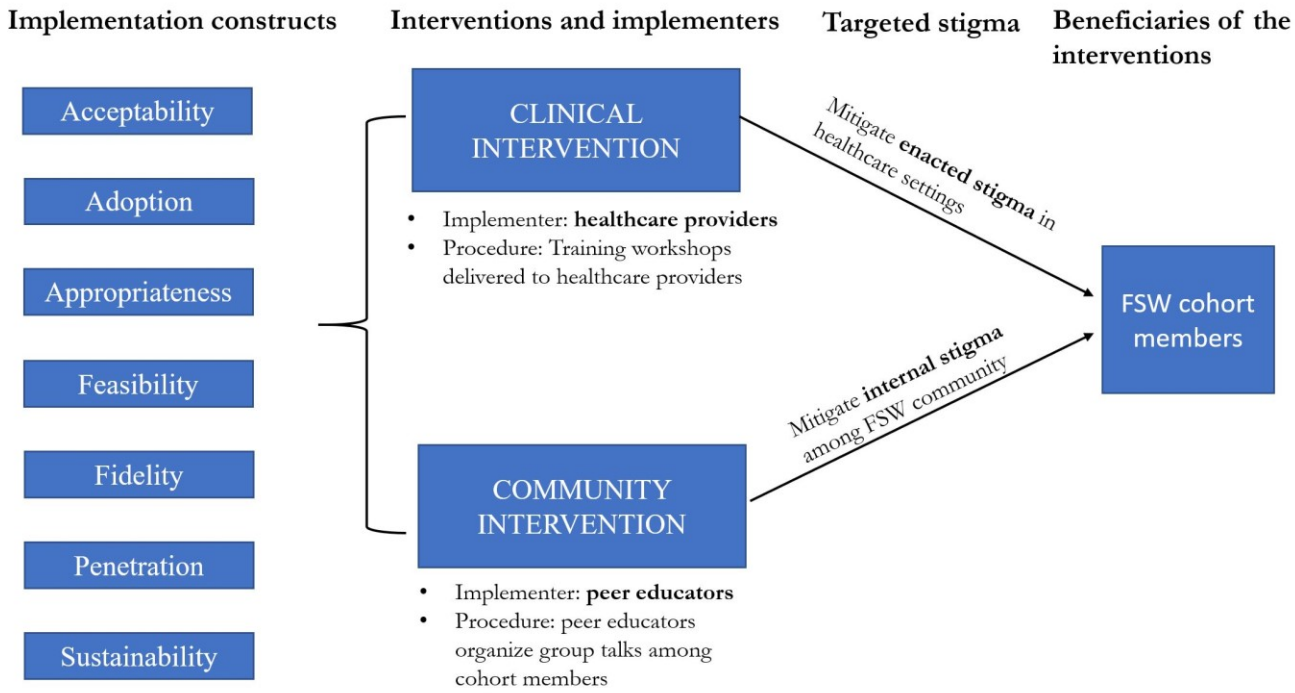

Figure 4.1 The structure of the ISMI and the key implementation constructs in the present study

4.3 Methods

4.3.1 CONTEXT

This qualitative study took place in Dakar, Mbour and Thiès areas in Senegal. There were two designated health facilities in Dakar area for HIV prevention services and care, two in Thiès and one in Mbour. STI including HIV were diagnosed and treated within the department of dermatology. The dermatology usually has certain days of a week for general outpatient consultations, while a few days specific to HIV care and services.

In each study site, there were FSW peer educators from the community, some of them were concurrently engaged in other community-based organizations or FSW associations.

4.3.1.1 Clinical Intervention Content

The training sessions consisted of lectures on the definition and common forms of stigma, causes and consequences of discrimination, HIV risk factors, confidentiality of patients, and distinguishing value judgement from the facts in healthcare settings.

Several interactive activities were also included where common myths and misinformation about FSWs were shown for the participants to select right or wrong. For example, one statement was "sex workers love money and are lazy to work. They could easily get other jobs, but they do not". Additionally, FSWs' testimonies were shared with those HIV care providers to facilitate their understanding of FSWs' life and choices. For example, one testimony started with "I had a baby when I was 17. The father refused to take responsibility. As a pregnant and unmarried woman, I had to leave the family". Additional information about the clinical intervention can be found in Lyons 2017 [64]. The goal of the clinical intervention was to foster the recognition of stigma, to dispel myths about FSWs, and ultimately create a stigma-free environment for the delivery of HIV prevention services.

4.3.1.2 Community Intervention Content

Four intervention modules were delivered over the two years of the intervention: the prevention module (around HIV and other STIs), the reproductive health module (including the access to and use of family planning), the human rights module (including the access to healthcare services and addressing police violence) and the stigma module (around the stigma's common

forms and self-esteem building). Prior to the community intervention, FSW peer educators received extensive trainings with the study staff on those modules.

During the community intervention, FSW peer educators hosted group talks among their peers who were part of the study cohort. Each peer educator was responsible for about 20 FSW peers divided into two groups. Additional information about the community intervention can be found in the quantitative analysis of the ISMI [64]. Those group talks were designed to engage the FSW community [80] where the FSW peer educators took the charge, organized the meetings, delivered the group talks on those four modules and moderate their peers' discussions [81].

4.3.2 SAMPLING AND RECRUITMENT

All healthcare providers in ISMI were informed about the present study and invited to participate in the interviews. They came from five health facilities with partnership with ISMI, including one hospital and one health center in metropolitan Dakar, one hospital in Mbour, and one hospital and one health center in Thiès. Within each facility, the following inclusion criteria were applied: eligible participants must have provided care or services to FSWs in the past three months; secondly, they must have participated in at least one of the two training sessions of the clinical intervention. In addition, healthcare providers who reported having no direct interaction with patients or clients were excluded from the study (such as lab analysts). Eligible healthcare providers were invited to participate in two rounds of interviews. Convenience sampling was used based on the healthcare providers' availability and interest to participate.

All 11 FSW peer educators were informed about the present study and invited to participate in two rounds of focus group discussions. Among them, seven were from Dakar, three from Mbour and one from Thiès.

4.3.3 DATA COLLECTION

Face-to-face interviews and focus group discussions were used as data collection methods.

For the clinical intervention, two rounds of interviews (three months apart) were conducted with HIV healthcare providers after the first and second training sessions, respectively. The rationale for conducting two rounds of interviews was to capture the nuances related to each training session. Semi-structured interview guides were developed to elicit detailed account about healthcare providers' experience of attending FSW versus non-FSW patients. In addition, questions were asked about their opinions on the content, the organization and the usefulness of the clinical intervention as well as any suggestions from them.

For the community intervention, the 11 FSW peer educators were divided into two focus groups, seven participated the FGD in Dakar, and four in Mbour. A second FGD was conducted in Dakar to delve deeper into those implementation constructs. A list of discussion points about the group talks were prepared including the content appropriateness, the implementation fidelity, the completeness of the group talks, the adoption by peers, the coverage of the group talks and other contextual factors.

Two interviewers, one woman and one man, conducted the interviews with healthcare providers. They both received a three-day training on qualitative research before data collection started. French was the interview language used with HIV healthcare providers. French and/or Wolof were options to choose from depending the collective decision of the focus group participants because the literacy for both languages varied among FSW peer educators.

Interviews with healthcare providers took place in quiet and private rooms within the hospitals or health centers for the ease and convenience of participation. Focus group discussions took place in two conference rooms in Dakar and Mbour where privacy and confidentiality were guaranteed. Participation was voluntary and informed consent was given before data collection started. Interviews and focus group discussions were recorded after permission was granted by all participating individuals. Notes were taken by the interviewers during the interviews and by a notetaker during the focus group discussions. At the end of each data collection day, salient information from the interviews or focus group discussions were debriefed and discussed between the interviewers, notetaker and the researcher.

4.3.4 DATA ANALYSIS

Interviews and focus group discussions were firstly transcribed verbatim in their original languages (primarily French with sparse Wolof words and phrases) and then translated to English. The transcriber and the translator were both Senegalese and speak French and Wolof. Wolof words used in the conversation were transcribed phonetically and then translated to English.

Interviews and focus group discussion transcriptions were read and analyzed by the researcher, and on Atlas.ti [99] for the ease of document viewing and code management. All transcriptions were read carefully, and the names of health facilities or persons were de-identified using pseudonyms. Line-by-line coding was conducted to a total of three transcriptions of healthcare provider interviews and two focus group discussions. Then, a tentative code structure was developed and applied to the coding of the remaining transcriptions. The code structure was updated when new concept or meaning unit emerged from the data. After the completion of free coding, the codes were examined on their density, coverage and relations among themselves. Then, the codes were associated with the themes pre-defined by the implementation constructs based on their relevance. Lastly, within each implementation construct, the representative quotations were presented for appraisal and synthesis.

4.3.5 ETHICAL CONSIDERATIONS

This study is part of the HIV Prevention 2.0 (HP2) study. The parent study HP2 was approved by both the Institutional Review Board (IRB) of Johns Hopkins Bloomberg School of Public Health, and by the National Research Ethics Committee of Senegal. The qualitative phase received additional approval from those two IRBs.

4.4 Results

4.4.1 DEMOGRAPHIC CHARACTERISTICS OF STUDY PARTICIPANTS

A total of 14 healthcare providers participated in the first round of interviews, of whom 12 participated in the second round. One participant from the first round of interviews withdrew because of maternal leave and another because of long-distance travel abroad. One healthcare

provider participated in only the second-round interview, totaling 13 participants for the second round.

All peer educators agreed to participate in the focus group discussions. Two focus groups were formed. Group one included FSW peer educators in Dakar region (n=7) and group two included FSW peer educators from Mbour and Thiès (n=4). The demographic characteristics for the participating HIV healthcare providers and FSW peer educators are summarized in Table 4.1 and Table 4.2. As shown in the tables, most peer educators were from Dakar and elder in terms of age. The HIV healthcare providers represented three study sites and various cadres coordinating HIV care and services. Salient content from data analysis is presented in the following sections by implementation constructs.

4.4.2 CLINICAL INTERVENTION FROM THE LENS OF HEALTHCARE PROVIDERS

4.4.2.1 Acceptability

Most healthcare providers in the present study largely considered the clinical intervention acceptable and satisfactory. Many participants acknowledged the value of trainings for HIV healthcare providers in general. Some voiced their appreciation of the training content and curriculum specifically helpful for stigma mitigation. One participant mentioned:

> *"Self-development may help us to avoid these kinds of problem… the system is just not to stigmatize and not to discriminate." (Social worker)*

Another participant recalled her participation in the first training sessions:

"It was a training that I had with G (ISMI staff) at the very beginning. And then it was useful with many health providers… and that can be helped for improving, because all we want is to improve the understanding of the health provider, to ameliorate the environment of the support, and also reduce truly all is about stigmatization and discrimination." (Nurse)

On the other hand, several issues emerged that affected the overall satisfaction, such as the overnight lodging between two training days, the per diem provided for attendance, and the duration of the training session. One participant commented:

"It must be said that the framework was appropriate, the only problem we had was that the second day was completed a little later we arrived very late in Dakar." (Social worker)

4.4.2.2 Adoption

Several participants reported their motivation to acquire more knowledge and skills in providing care and services to FSWs in general. Some reported that they found the clinic intervention useful to incorporate into their work. One participant mentioned that the training sessions helped them accept FSWs a little more:

"I think it is something that training has allowed to accept these populations a little more, so it is a plus." (Doctor)

Another participant commented on the practical use of training content in following up with FSW patients living with HIV:

"…it brought something because also uh on one hand it really allowed me to get closer a little more with my patients, my PVVIH (The acronym for "persons living with HIV" in French) patients, because in the FSW, we had patients who just came, who just found out and were missing." (Social worker)

One participant noted that although participating in the training sessions did not change one's perceptions of sex work, it did allow more acceptance of FSWs.

"But the opinion I have does not change, when I say it is not good to do this, the training did not tell me it is good, but the training allowed me to accept them a little more. To say that I have to work with them, so I accept them as they are." (Doctor)

4.4.2.3 Appropriateness

Participants largely agreed that for containing the HIV epidemic in Senegal, addressing the healthcare needs of FSWs was very relevant. One participant elaborated:

"We want to detect 90%, treating 90%, and then to have an undetectable viral load for 90% followed up. That's it, and that cannot be done without these populations because when you see that high prevalence are found in these groups, you will have to find strategies." (Doctor)

Most social reported having considerable experience working specifically with key populations such as FSWs. In communicating with FSWs and understanding their needs, they felt very competent. In contrast, a few participants reported that stigma reduction among FSWs was a

topic less relevant to them. For example, one participant mentioned her roles and thought that the challenges facing FSWs in seeking care should be the concern of social workers.

> *"… just here it is the medical care, but I think the communication component is more access to the social service level…because we have so many sick persons to manage and not only FSWs and MSM. For example, I am a specialist…I manage other consultations and I am also in the administration, so I do not think I have much of time to their…dedicate to them." (Doctor)*

4.4.2.4 Feasibility

In terms of the feasibility of addressing enacted stigma in healthcare settings and improving care and services for FSWs, a few participants mentioned that it may take some time given the local context:

> *"Frankly our religion, frankly, we cannot all of a sudden integrate, no, no … But we do it slowly and it will come, it will come." (Midwife nurse)*

Many participants said that although the programmatic effort was directed to training HIV healthcare providers, individual "stigmatizing behaviors" needed to be addressed in order to reduce stigma related to FSWs. They thought that FSWs invited criticism and stigma upon themselves at health facilities when they behaved in a way that disclosed their profession or that was "vulgar". For example, one participant said:

> *"Because in training we spoke mainly of their access problem in hospitals, so their concern is to make it easier for them to enter the health facilities, but the key populations also have to contribute … because if you do not want to be stigmatized you must not*

(have) stigmatizing behaviors, stigmatizing wearing of clothing, you are the cause of the stigmatization of yourself, so if you come to the facilities, you have to dress properly blend into the crowd as everyone." (Social worker)

"Like I said there are FSWs who behave vulgarly while speaking with indecent clothes … when they enter here I give them advice, you have to behave like that when you come here. It's the hospital. You have to avoid stigmatization." (Nurse)

Another participant (social worker) said that if the FSWs just came and left, "nobody stigmatizes them". However, if they showed up with their distinct styles, then they "try to show people my ways and all that." In that case, she continued "If people stigmatize you, (then) it is you, it is yourself that make you stigmatized."

4.4.2.5 Fidelity

Most healthcare providers in the study were not involved in the intervention design, and thus could not contribute to the "fidelity" of the clinical intervention. The construct of fidelity was only discussed in one interview with the trainer and organizer of the clinical intervention, who was part of the ISMI. He commented that the trainings were hosted in shorter time range than planned. Thus, prepared content had to be condensed for the training sessions to stay within the time frame:

"Because I think it was very short, they have, more or less, contracted the training…the time was still far more exhaustive, and then people could take the time to discuss length and breadth but when you decrease the duration it becomes a little tighter." (Doctor)

In terms of specific part that differed from what he expected, he mentioned that the per diem offered by the training was insufficient, which was also mentioned by another interviewee. The trainer also commented that the second training session was implemented less as planned compared to the first training session:

4.4.2.6 Penetration

Not many participants contributed thoughts to the penetration of the clinical intervention. One participant expressed that coverage of such training should be extended to non-healthcare provider staff working at the health facilities. The organizer and trainer suggested that the coverage of healthcare providers could be a potential area of improvement as he was expecting more attendees at the training sessions.

> *"Well uh obstacle… if there are missing people, perhaps, if we take into account to missing, well, I do not remember if everyone was there (in reflection) I think that maybe it would be at this level." (Doctor)*

4.4.2.7 Sustainability

On sustainability, a few participants felt that additional sessions to reinforce the training content would be appreciated as changes in practices can take time. For example, repetition was mentioned by one participant as crucial in maintaining the sustainable effect of the clinical intervention:

> *"You know repetition is learning even if people are trained at the university and in training schools and all but over time… there is a wear and tear… well with regard to*

these populations also if someone does not, is not accustomed to taking care of them, it is important even though they can be reinforced, framed, oriented so that they can do it correctly." (Social worker)

4.4.3 COMMUNITY INTERVENTION FROM THE LENS OF PEER EDUCATORS

4.4.3.1 Acceptability

All FSW peer educators felt that the community intervention was helpful in advancing FSWs' health, rights and reducing internalized stigma (self-stigma). They said the participatory nature enabled an environment where FSW peer educators and the peers could learn from each other.

"It is participatory group talk. There are members in our groups who are more experienced than ourselves who animate the causeries. I think everyone has something to contribute to her neighbor. It is an exchange. Be in us and everyone wins something thing." (FSW peer educator)

"So, there was advancement in terms of health, rights, stigma and discrimination. Even before there was self-stigmatization, but we are out of this phase now. So, there is improvement that has affected not only their health but also their environment." (FSW peer educator)

4.4.3.2 Adoption

A few FSW peer educators reported the usefulness of the community intervention and how its content was adopted by FSW peers especially from the STI prevention and human rights

modules. They also reported noticeable changes in desired behaviors, either condom use, or decreased self-stigma.

> *"Their behavior change is illustrative, you remark that they changed their bad habits because they often require condoms during group talks, and you feel that the message is passed, and they are in the process of their practice from what you teach." (FSW peer educator)*

Another peer educator added:

> *"Especially with photos of stigma, discrimination, and those relating to human rights. That facilitates much more understanding, and everyone now knows how to act, in case of violation of their rights. So, if you know your duties and your rights, you'll be able to know how to pull out because sex work is a profession like any other profession." (FSW peer educator)*

Some FSW peer educators further commented that, while they thought the key messages on stigma and condom use from the intervention modules were conveyed, it would be difficult to know whether the peers were indeed adopting them into their life. One peer educator mentioned:

> *"But what is for sure, they all understand the message that we transmit them. However, some of them practice it but the others do not." (FSW peer educator)*

Another participant added:

"They have in mind what is said in the talks, but right now they can be attracted by money, because they must take care of her family and if they come to see you, you cannot meet their needs." (FSW peer educator)

4.4.3.3 Appropriateness

Most FSW peer educators thought that the community intervention was suitable and proper in the local context. Firstly, compared to other ongoing interventions among the FSW community, the community intervention of HP2 had more detailed and organized content:

"Before the theme used to be taught briefly, but now with HP2, the theme is taught point by point. For example, if you say rights and duties, every word and key points in it, we really know what is covered, now with HP2." (FSW peer educator)

One peer educator added:

"But the themes of HP2 are specific to the key population, our peers." (FSW peer educator)

During the process of planning a group talk, the confidentiality and privacy of the location was always a tricky issue because no fixed location was granted, and they had to find on their own each time in preparation for the upcoming gathering. However, most participants reported that they managed to find eligible locations in the end. Specifically, some strongly wished to host the group talks at a residential apartment because it was quiet and easy to schedule. Others, on the contrary, thought private residential apartment would not be an appropriate location for the group talks.

"There was no privacy, and people were going through all the time glancing through the windows, I was obliged to mask the room and I think the organization of the group talk must have a base (location)." (FSW peer educator)

Another participant added:

"We cannot conduct a session in our houses because we must take into account children and neighbors." (FSW peer educator)

4.4.3.4 Feasibility

In terms of the feasibility of delivering group talks by the peer educators, all participants said that they received adequate training prior to the group talks and felt competent delivering the modules to their peers.

"Because we have trained and that is why we were even eager to pass along the information, we are close to our peers so that they acquire knowledge." (FSW peer educator)

In terms of other supporting resources, a few needed to be improved to increase the feasibility: firstly, from their experience, large volumes of communication demanded numerous phone calls from them to the attendees from the planning of the group talks to the hosting and to the follow-up. Participants said the phone credits allocated to them were far less than what they spent, which made it less feasible to follow up with all their peers. Secondly, participants said the transport reimbursement was very low which discouraged potential attendees who lived far away

from the group talk locations, which may lead to absence at the group talks. One participant mentioned:

> *"What I know is that they increase transport for target (peers) if it is possible for phone credits as well." (FSW peer educator)*

4.4.3.5 Fidelity

FSW peer educators said that they tried to administer the group talks as planned. However, minor adjustments were made throughout the group talks to accommodate the peers' needs, such as summarizing the content, explaining the key words and ensuring everyone understood the content.

> *"It can change because during training we were there all day, like, when we did the stigma module, and discrimination. We had a working group, we were given photos for illustration and then we gave opinions on the photos. But during the group talks, for example, I distribute photos and asks each person who has a picture, give her opinion and when you do, your photo circulating on, but others can also give their opinion after, then I will do the summarizing of stigma in health providers, in the street, with the police. After, I summarize showing demonstrations and solutions, that's what I do." (FSW peer educator)*

One participant noted:

> *"It is not that we change … we have learned, but we have to make people know some words in French which we translated into Wolof, so that the participant could better*

understand the message... So as together, we must do research to dissect the keywords found in the subject, so sometimes must get to their level." (FSW peer educator)

One group of FSW peer educators additionally mentioned the time interval between group talks was much longer than originally planned. Between two group talks, it is possible that some group members would be lost to follow up.

"Unfortunately, unfortunately I would say that we had to do every three months but sometimes we stay five months without having group talks…" (FSW peer educator)

4.4.3.6 Penetration

According to most of the participants, there were usually 20 FSW peers assigned to each FSW peer educator and divided into two groups. As a result, each group talk has a maximum number of 10 peers. Due to administrative requirements, other FSWs outside the study cohort who were interested in the group talks could not participate.

"Sometimes peers come accompanied by their friends who are not part of HP2. I explain to Person A to tell them not to enter in the group talk. The first time they had surprised me, and I took my money to give them as reimbursement of transport, but I tell them not to come back because they do not belong to HP2." (FSW peer educator)

In reaching those designated group members, FSW peer educators had various experiences. One peer educator mentioned that there was challenge in scheduling their meeting date and time. However, this issue was not shared by other peer educators.

"There is a group of 9 and 10, but sometimes for each group I sometimes miss five members." (FSW peer educator)

"I do not have the problem, if there is just one member who do not come, I call her…and that is from the phone I discuss with her… all the 9 members meet (at) the group talks." (FSW peer educator)

In addition, one peer educator mentioned that she combined groups:

"When I call the peers, I invite all 19 people, there are 10 persons in my first group and 9 in the other … sometimes it can happen that there were only 12 so I put everyone in the same group." (FSW peer educator)

4.4.3.7 Sustainability

On sustainability, a few peer educators suggested additional training for peer-educators was needed to help build their capacity to deliver future group talks.

"Nevertheless, I have also proposed that training should be more and more, we must keep on learning because sometimes you want to host group talks like HP2. So, we must go back to the origin and learn again…" (FSW peer educator)

In addition, many peer educators suggested that it was necessary to increase the frequency of group talks from once every three months to once every month, in order to have sustained effect of stigma reduction. One participant explained:

"The group talks are fixed by three months by group. It is little for a process of change of behaviors, because if one wants to have a real impact, one needs a very consistent closeness work." (FSW peer educator)

4.5 Discussion

The implementation research framework coined by Proctor et al. provided a useful lens to understand the various aspects of the ISMI from the perspective of healthcare providers and FSW peer educators involved in the interventions. Healthcare providers in this study largely considered the clinical training as acceptable, useable, appropriate and feasible. Some provided recommendations for the ISMI to be better adopted in the local context while maintaining high fidelity, reaching large coverage and having long-lasting effects on mitigating the enacted stigma. FSW peer educators involved in this study discussed the utility and the implementation aspects. In addition, they specifically discussed the practical aspects and highlighted areas for improvement, such as better addressing the location privacy of the group talks as well as increasing the frequency of the group talks. Both groups of participants valued the interventions and emphasized repetition of the trainings as key to sustained memory of the training content of ISMI. Those findings contributed to the understanding of the ISMI and provided guidance on the next steps of planning and implementing stigma reduction programs for FSWs in Senegal.

There has been limited evidence on the stigma mitigation interventions for FSWs to compare with the present study's community intervention component. As discussed in the introduction, the Sonagachi project tackled stigma related to sex work. With a similar objective of addressing the occupational health among FSWs through structural determinants, the Sonagachi project also

entailed a component led by FSW peer to facilitate the collective agency of the FSW community [69, 100, 101]. However, there were a few differences between the Sonagachi project in Kolkata, India and the ISMI in Senegal. Firstly, the Sonagachi project was deployed within the focal red-light area where FSWs were concentrated, while the ISMI spread in three study sites [69, 100, 101]. Most of the FSWs in Senegal operate their business on their own in rented rooms or houses instead of brothels with an intermediary person [93]. Thus, the group talks hosted by FSW peer educators needed to address the location and ensure the privacy of the place to gather their peers, which was discussed among study participants as affecting the appropriateness of the implementation. Both the Sonagachi project and ISMI consist of a human right-based approach to foster protective health behaviors and reduce internalized stigma related to sex work [69, 100, 101]. The mode of delivery through FSW peers was both well accepted. Findings from the present study also corroborate with the quantitative analysis results which assessed the potential utility of the ISMI [64] from the lens of intervention recipient (i.e. FSW cohort members). Both agents, the FSW peer educators and FSW cohort members reported high perceived acceptability.

Lyon et al. found that the perceived and enacted stigma in healthcare settings was not declining during the first six months of the ISMI, as reported by FSW cohort members [64]. Findings from the present study could provide insights into why the trial may not have been a reduction in stigma over this time period. Clinical intervention from the perspective of HIV care providers was widely accepted by the healthcare providers as it was in line with those healthcare providers' general interest in opportunities for work training as noted in the acceptability part of the result section. However, limited adoption was found where several healthcare providers of the present studies mentioned that the stigma against key populations would take a slow process for them to

overcome. The enduring enacted stigma in healthcare settings may also be explained by the suboptimal perceived appropriateness. Healthcare providers who deemed stigma reduction as hardly relevant to their clinical work, may be less motivated to change their attitudes or behaviors. Additionally, the feasibility section revealed that some healthcare providers thought FSWs were responsible for enacted stigma in healthcare settings based on their stereotypes. This reflects continued stigma on behalf of those healthcare providers. Those findings present the challenges to overcome in implementing stigma mitigation interventions through training healthcare providers. Future implementation may benefit from motivating the HIV healthcare providers to find intrinsic needs for and perceived relevance to such trainings. Feasibility may be enhanced through underscoring the awareness of stigmatizing behavior and adoption may be increased with possible reward mechanism.

Limitations and strengths

This study has several limitations: firstly, the data collection occurred when the intervention had been ongoing, which made it difficult to capture the baseline prior to the interventions at the initial phase of the implementation. An ideal study design would encompass a formative research phase, and a few time points during the implementation to document the dynamic changes of some implementation constructs over time, for example: the potential increase in peer educators' perceived feasibility of the intervention after hands-on trial and experiment, as well as the increased acceptability of group talks. To address this issue, a second FGD was conducted in Dakar three months after the first FGD, which added to the understanding of the process and the changes over time. Next, some of the healthcare providers participated in the clinical intervention trainings only once. Thus, we engaged as many healthcare providers as possible,

including those who only participated in the initial training, and those who only participated in the second training, adding to the credibility. In the interviews and focus group discussions, we did not probe opinions on the specific modules of the training material because the aim of this study was not to collect feedback on the modules for revising and improving the quality of training material, but rather to present a multi-façade description of the implementation from those implementation constructs, as seen by those HIV healthcare providers and peer educators. Although we did not ask about specific modules' appropriateness or usefulness during the qualitative data collection, that information has been captured by pre- and post- training questionnaires that were administered to those participating healthcare providers. Lastly, we adopted the operational definition of implementation outcomes, defined as the "effect of deliberate and purposive actions to implement" new practices and services [85], in this case, the effect was, for healthcare providers, to adopt stigma-free care practices, and for peer educators to provide support to reduce the internalized stigma among FSW peer network. In the original framework by Proctor et al. [85], implementation cost was another key construct in assessing the implementation outcomes, but was not addressed in the present study. The reason was that the researchers felt that quantitative evidence would add more value in capturing the cost and in fact, one separate analysis on cost-effectiveness of the parent study has been planned.

The understanding of implementation process is oftentimes thwarted by lack of nuanced details and programmatic information. This study filled the gap on understanding the implementation ISMI through qualitative assessment of a multi-tier stigma mitigation program for HIV prevention among FSWs in Senegal. By engaging healthcare providers and peer educators who were key agents of the ISMI, the findings were triangulated.

4.6 Conclusions

Qualitative evidence showed that healthcare providers and FSW peer educators involved in the ISMI largely accepted clinical and community interventions. The community intervention was perceived widely appropriate and feasible and adopted into decreased stigma and HIV risk behaviors among FSW peers. Debate existed around the clinical intervention and its implementation can be further optimized by strengthening healthcare providers' perceived feasibility, adoption and appropriateness.

4.7 Tables for Chapter 4

Table 4.1 Characteristics of the healthcare providers in the sample

Gender (n, %)	**N=15**
Female	13 (87%)
Male	2 (13%)
Age category (n, %)	
31-35	4 (27%)
36-40	2 (13%)
41-45	3 (20%)
46	6 (40%)
Sites (n, %)	
Dakar	8 (53%)
Mbour	2 (13%)
Thiès	5 (33%)
Cadre (n, %)	
Doctor	5 (33%)
Nurse	3 (20%)
Social worker	7 (47%)
Years of experience providing care	
Mean(±SD)	12 (± 6.3)
Median (Min, Max)	12.5 (2, 20)
Years of work at the current facility	
Mean(±SD)	5.9 (± 4.7)
Median (Min, Max)	5 (1, 14)

Table 4.2 Characteristics of the FSW peer educators in the sample

	N=11
Age category (n, %)	
31-35	2 (18%)
36-40	1 (9%)
41-45	4 (36%)
≥46	4 (36%)
Sites (n, %)	
Dakar	7 (64%)
Mbour	3 (27%)
Thiès	1 (9%)

Chapter 5. Aim 2: Associations between income, perceived financial insufficiency and HIV risk behavior among female sex workers in Senegal

5.1 Abstract

Background: Condom use has been promoted as an effective means to prevent HIV transmission. The relationship between income, the perceived financial insufficiency of money and condom use was inconclusive and never explored the Senegalese context.

Methods: Using a cross-sectional dataset of 758 FSWs, this study presents FSWs' condom use with various types of sex partners and their economic correlates including income and perceived sufficiency of money to meet needs. Bivariate and multivariate logistic regressions were performed to assess the association between FSWs' condom use during the last sex act and each economic variable of interest, within specific types of sex partners.

Results: Condom use prevalence during vaginal sex was the highest with new clients (93.5%), followed by with regular clients (91.5%) and casual non-paying partners (84.7%). The lowest prevalence of condom use was observed between participants and their regular non-paying partners (60.2%). Increased condom use was found during the last sex act with certain types of clients among FSWs with financial responsibility for one or more children, compared to those without (AOR= 1.81, 95%CI:1.04-3.17 for regular non-paying partners; AOR= 2.62, 95%CI: 0.58-11.86 for casual non-paying partners; AOR=1.99, 95%CI:1.10-3.58 for regular clients). Decreased condom use with clients was found among those reporting severe perceived financial

insufficiency (AOR=0.51, 95%CI: 0.26-0.99 for regular clients; AOR=0.22, 95%CI: 0.09-0.55 for new clients), and those reporting financial affluency (AOR=0.27, 95%CI: 0.12-0.61 for regular clients; AOR=0.15, 95%CI: 0.05-0.46 for new clients) when compared to those reporting neutral about their financial resources to meet needs. Income sharing, perceived ability to borrow money from other FSWs, weekly income from sex work, and having additional income from other jobs than sex work, were not significantly associated with condom use.

Conclusions: FSWs' subjective feeling of financial insufficiency and affluency were both inversely related to their condom use with certain types of partners. Financial responsibility for one or more children related to increased condom use with regular sexual partners. Future research may investigate the cognitive measurement of perceived financial insufficiency that potentiates HIV risk among FSWs and the mechanism of the relationship between financial responsibility for dependent children and condom use.

5.2 Introduction

Despite the emerging new HIV prevention technologies such as pre-exposure prophylaxis (PrEP), condoms remain as an effective means to prevent HIV transmission when used consistently. Previous research has shown that latex condoms can reduce the risk of HIV transmission by 95% per contact from men to women [102]. Additionally, condom was recommended by World Health Organization, UNFPA and UNAIDS not only for its effectiveness in HIV prevention, but also for its utility in preventing other sexually transmitted infections (STI) and unintended pregnancy [103].

The relationship between economic factors and condom use have been explored from various angles in previous research. One body of research focused on the socioeconomic characteristics of a population and their associations with condom use [104]. Economic disadvantages were believed to shape an individual's risk and vulnerability to HIV acquisition as well as the transmission of STI. Studies across various countries and populations demonstrated the linkage from individual economic characteristics, such as wealth quintile [50], debts [104], and living in a poor household [51], to HIV risk behaviors. Findings from previous studies suggested that individuals from poorer areas were less likely to correctly or consistently use condoms. Conversely, some argued that the relationship between individuals' economic situation and the use of condom was reversed. Individuals from wealthier groups, living in urban areas and with more income level are more likely to forego condom during sexual intercourse [53, 54]. Another body of research across cultural settings suggested the link between sex work prices, and condom non-use which was incentivized by male clients. [56, 57].

Understanding the relationship between economic factors and condom use was particularly relevant to female sex workers. Female sex workers (FSWs) are operationally defined as women who exchange sex for money or goods. Among FSWs, the condom use can be complex [38, 105, 106]. FSWs tended to concurrently have multiple sex partners. A few studies documented the concurrency of relationships and partner types existed[107]. It was observed the prevalence of condom use was high with clients, while low with boyfriends or other romantic partners among FSWs in both Senegal and other countries. The typology of sex partners matters because it relates to FSWs' condom use behavior. In fact, the decision making on using condoms or not may be completely different between paying partners (or clients), and non-paying partners (NPP)

such as romantic partners. In addition to the discrepancy in the condom use prevalence with clients versus with NPP, condom use behavior seemed to be also inconsistent with regular clients, defined as paying partners who frequents the FSWs' sex work, versus non-regular clients (or new clients). Drawing strengths from the above mentioned existing evidence, typology of sex partners of FSWs can be constructed by two dimensions: the transactional nature, characterized by paying cash or goods per sex contact directly, versus not paying; and the frequency, characterized by regular frequenting versus casually or newly visiting. For the purpose of this analysis, to be distinguished from NPP, paying partners were referred to as clients. Existing knowledge on FSWs' condom use behavior can be further strengthened by measuring the condom use prevalence within specific type of the partners and examine the associations between FSWs' condom use behaviors and potential economic correlates.

In Senegal, there were an estimated 20,789 sex workers between 2011 and 2015 [9]. HIV prevalence among sex workers was estimated to be 6.6% between 2011 and 2015 and 3.3% among FSWs in 2017, much higher than the HIV prevalence in the general population [9, 64]. Few studies on FSWs have examined economic correlates and condom use behaviors with different types of partners among FSWs in Senegal [4, 6, 34, 38]. Moreover, economic correlates should be considered in both objective indicators and subjective indicators [108]. Objective indicators refer to the measures of resources in quantifying units, such as income, while subjective indicators refer to the cognitive state where an individual realized they do not have enough financial resources to meet their needs [108]. This study particularly focuses on FSWs' condom use behaviors and their correlates including the income from sex work and the perceived sufficiency of money to meet needs. In addition, four other correlates were examined as well in

relation to FSWs' condom use behavior. Two of them were potential sources of expenses: financial responsibility for one or more children, and obligatory income sharing with a third person involved in sex work. The other two were potential sources of income or financial aid: employment or having other income generating activities, and the ability to count on other FSWs if one needed to borrow money. Understanding the relationships between those economic correlates and FSWs' condom use behavior could shed light on decision making around condom use with different types of partners and inform HIV prevention recommendations for the FSW community.

This study describes FSWs' condom use behaviors with consideration of the types of sex partners, and examined the association between income, perceived insufficiency of money to meet ends and the condom use or non-use during the last sex act with each type of sex partners commonly reported. The objectives of this study were to improve the understanding of FSWs' condom use behaviors with regards to specific types of sex partners, and to assess the potential associations between FSWs' condom use behaviors and economic correlates including the income from sex work and the perceived insufficiency to meet needs.

5.3 Methods

5.3.1 STUDY DESIGN

The present study used the cross-sectional data collected by the parent study of HIV Prevention 2.0 (HP2) [64]. The HP2 parent study focused on mitigating stigma and preventing HIV among key population groups including FSWs and MSM in three study sites: Dakar, Mbour, and Thiès, Senegal [64]. The HP2 project was carried out in two phases: a cross-sectional phase at the

baseline between 2014 and 2015, and a following two-year longitudinal cohort study phase from 2015 to 2017 [64]. For the baseline phase, FSWs were eligible to participate if they reported being 18 years old or older, and engaged in sex work in past 12 months as a primary source of income [64]. A combination of respondent-driven sampling (RDS) and purposeful sampling was employed to recruit potential participants [64]. Enrolled study participants at the baseline phase were interviewed once by a study staff member. Data were collected on digital tablet computers using a pre-programmed questionnaire [64]. The questions in the baseline questionnaire encompassed a wide range of topics including socioeconomic and demographic information, human rights violation, stigma, healthcare utilization and sexual and reproductive history. In the end, a total of 758 FSWs were recruited from Dakar and Mbour metropolitan areas. The data used in this study came from this baseline sample (N=758) of the HP2 project [64].

5.3.2 DATA SAMPLES

Among the 758 study participants, a total of four analytical samples were created based on the type of sex partners FSWs have: regular non-paying partners (regular NPP, such as boyfriend and husband), casual non-paying partners (casual NPP, such as casual sex partners, but not paying clients), regular clients and new clients. This classification was based on the findings from previous studies suggesting FSWs' condom use behavior differed by the types of sex partners [93, 107]. In addition, to avoid potential recall bias, only participants who had a specific type of partners in the last 12 months were included. In other words, a participant who reported having regular NPP a year ago but not within the last 12 months would be ineligible for the regular NPP data sample. Three questions from the questionnaire were used to define an individual's eligibility to be included in a specific analytical sample. For example, for regular

NPP, the three questions were “in the last 12 months, have you had a regular non-paying male partner?”, “have you ever had vaginal sex with a regular non-paying male partner?” and “have you ever had anal sex with a regular non-paying male partner?” Individuals who reported “yes” to the first question, and “yes” to at least one of the latter two questions, were included in the regular NPP analytical sample. Similarly, those who reported having a casual NPP in the past 12 months and having had either vaginal or anal sex with their casual NPP were included in the casual NPP analytical sample. The same three questions were used respectively to assess the eligibility to be included in the regular clients and new clients analytical samples.

5.3.3 MEASURES

The primary outcome of interest was condom use during the last sex act with specific types of sex partners, coded as a binary variable (0 = condom non-use; 1= condom use). Information on FSWs’ condom use was derived from participants’ responses to two questions for each specific type of clients: “was a condom used the last time that you had vaginal sex with a (specific type of partner)?” and ‘“was a condom used the last time that you had anal sex with a (specific type of partners)?” The two responses were then combined since both condomless vaginal sex and condomless anal sex carry heightened HIV risk and are potential sources of HIV transmission. Participants who reported condom non-use during at least one of the two sex types were coded as condom non-use. Participants who reported condom use to both vaginal and anal sex were coded as condom use. Participants who reported condom use to one type of sex and at the same time reported having never had the other type of sex (i.e. anal sex) were coded as condom use.

The independent variables were derived from the same dataset from the same baseline questionnaire. The main variables of interest were the income from sex work and the perceived insufficiency of financial resources to meet needs. Income from sex work was derived from a single-choice question: "on average, what is your weekly income (in FCFA) from sex work?" Participants could choose from seven ranges (<50,000; 50,000-100,000; 100,001- 150,000; 150,001-200,000; 200,001-250,000; 250;001-300,000; >300,000) measured in West Africa Frans (FCFA). The majority of participants in the original sample (631/758) chose <50,000 (the equivalent of 95.5 USD). Thus, the income variable was recoded as a binary variable using 50,000 FCFA (95.5 USD) as a cutoff point (0= weekly income less than 50,000 FCFA (95.5 USD); 1= weekly income equal or more than 50,000 FCFA (95.5 USD)). The perceived insufficiency of financial resources to meet one's needs was measured using a single-choice question: "do you have enough money to meet your needs?" The original five response categories were recoded as three categories (0= Having a moderate amount; 1=No, or insufficiency; 2=Yes, or sufficiency).

In addition, four other economic variables were assessed as potential correlates of FSWs' condom use behavior. In the questionnaire, participants were asked whether they shared their income with others who help with her sex work: "do you share your earning with a person who provides some service when you sell sex (this could include but not be limited to someone who arranges clients for you, or provides protection for you)?" FSWs who reported sharing income with other parties in the sex work were compared with those who reported not sharing. Additionally, FSWs were asked how many child dependents they had, by the question "how many children are you currently responsible for, whether they live with you or not (including

biological children and adopted children)?" FSWs with child dependents were compared with FSWs without child dependents. The final two variables were derived from questions relate to the potential financial resource available to FSWs: other income generating activities besides sex work, and the ability to count on peers to borrow money. Those two variables were measured by the single-choice questions: "what is your current employment status other than sex work? (0= None; 1= Having other income generating activities)" and "how much do you agree or disagree with the following statement: you can count on other sex workers if you need to borrow money (0= Neutral; 1= Disagree; 2= Agree)".

5.3.4 STATISTICAL ANALYSIS

The analyses of the present study were performed using STATA version 15.0. Firstly, the demographic characteristics of participants in dataset were tabulated and examined. Next, four analytical samples were generated as described in the data samples section above. Within each analytical sample, the outcome variable, condom use, was tabulated and presented by count and percentage for each type of sex partners and either type of sex act (vaginal or anal). Bivariate and multivariate logistic regression analyses were performed. Models were built between each of the independent variables of interest and the binary outcome variable on condom use, and within each analytical sample. Odds ratios (OR) were calculated from the bivariate analyses. Covariates including participant's age, education level, registration status and study region were included in the multivariate logistic regression models as potential confounders to calculate the adjusted odds ratio (AOR) of each independent variable. Those analyses were pre-planned based on research hypotheses and available items in the questionnaire before retrieving those variables and data.

Multiple imputation by chained equations (MICE) was used to compensate the missing values for some variables. The percentage of missing values of the outcome variables was 6/353 for the regular NPP sample, 0/72 for the casual NPP sample, 7/657 for the regular client sample, 6/571 for the new client sample. They were imputed using auxiliary variables derived from FSWs' responses on how easy they felt to use condom when having sex with this specific type of partner. The missing values for the independent variables were imputed using socio-demographic variables as auxiliary variables. A total of 10 complete analytical sample datasets were imputed for each analytical sample.

5.3.5 ETHICAL APPROVAL

This parent study was approved by the Institutional Review Board of the Johns Hopkins Bloomberg School of Public Health, and by the National Research Ethics Committee of Senegal.

5.4 Results

5.4.1 DEMOGRAPHIC CHARACTERISTICS

The demographic characteristics of participants are shown in Table 1. The average age of FSWs was 33.4 years old. The majority of study participants were recruited from the Dakar study site (66.2%, 502/758). Most participants did not complete primary education and about half of the total were literate in French or Wolof, measured as the ability to write or read in either of the two languages. Ninety percent of participants (89.6%, 679/759) identified as Muslim. All but three percent (2.9%, 22/758) were born in Senegal. Most participants were single and never married, or divorced, widowed or separated.

5.4.2 ANALYTICAL SAMPLES AND CONDOM USE

The four overlapping analytical samples and condom use are presented in Table 2. Among the 758 participants in the dataset, 45% (353/758) reported having had a regular NPP in the past 12 months, such as a boyfriend and husband, while only 9.5% (72/758) having a casual NPP in the past 12 months. Most participants reported having regular clients (87%, 657/758) in the past 12 months. About three quarters (75%, 571/758) of the participants reported having new clients in the past 12 months. Across different types of sex partners, the percentage of having had vaginal sex was much higher (close to 100%) than that for anal sex (all below 25%).

Overall, the prevalence of condom use during the last vaginal sex act was higher with regular and new clients (91.5%, 600/657 and 93.5%, 533/571 respectively) as compared to with regular and casual NPP (60.2%, 212/353 and 84.5%, 61/72 respectively). Similar trends were observed for anal sex. During the last anal sex act among those who reported having had anal sex, the prevalence of condom use was the lowest with regular NPP (54.2%, 26/48), followed by casual NPP (76.5%, 13/17) and regular clients (76.1%, 67/88); the highest prevalence was observed with new clients (83.3%, 60/72). Among those who reported having had both vaginal and anal sex, cross-tabulation showed that some participants used condom only during the last anal sex act but not the last vaginal sex and the reversed was also observed.

5.4.3 ECONOMIC CHARACTERISTICS

Most participants reported earning less than 50,000F CFA (95.5 USD) per week. In response to the question on perceived sufficiency: “do you have enough money to meet your needs?”, about

half (55.5%, 421/758) of the participants reported “not at all” or “a little” and few (12%, 90/758) reported having enough money to meet all needs. A total of 32% (245/758) of participants reported they have a moderate amount of money to meet needs. About three quarters of participants were responsible for child dependents (75.5%, 570/758). Most participants operated their sex work as a one-person business and thus did not share earnings from sex work with others (69.3%, 525/758). Approximately 70% (525/758) of participants reported having no other income-generating activities besides sex work. In response to the statement that one can count on other FSWs to borrow money from, 44% (330/758) of FSWs reported disagree while 46% (348/758) of the total reported agree.

5.4.4 ASSOCIATIONS OF ECONOMIC CHARACTERISTICS AND CONDOM USE

The results from the bivariate and multivariate analyses were presented in Table 5.3 to Table 5.6. Weekly income (high vs low) from sex work was not significantly associated with condom use across all four types of sexual partners: regular NPP (OR=0.70, 95%CI: 0.41-1.21, AOR= 0.76, 95%CI: 0.44-1.32), casual NPP (OR=1.29, 95%CI: 0.24-6.66, AOR=1.66, 95%CI: 0.29- 9.59), regular clients (OR=1.10, 95%CI: 0.54-2.26, AOR= 1.12, 95%CI: 0.54-2.32), and new clients (OR=1.16, 95%CI: 0.47-2.85, AOR=1.23, 95%CI: 0.50-3.07).

Regarding the financial sufficiency to meet needs, FSWs who reported lacking money to meet needs were significantly less likely to use condom during the last sex acts with regular clients after controlling for covariates (OR=0.56, 95%CI: 0.30-1.08, AOR=0.51, 95%CI: 0.26-0.99) and new clients (OR=0.29, 95%CI: 0.12-0.72, AOR=0.22, 95%CI: 0.09-0.55), as compared to those

who reported having moderate amount of money to meet needs (the reference group). Conversely, FSWs who reported having much money to meet needs were also significantly less likely to use condom with regular clients (OR=0.28, 95%CI=0.13-1.08, AOR= 0.27, 95%CI: 0.12-0.61) and new clients (OR= 0.20, 95%CI: 0.07-0.60, AOR=0.15, 95%CI: 0.05-0.46) as compared to those who reported a moderate amount, after controlling for covariates. Interestingly, significant associations were only observed between the sufficiency variables and the condom use with clients. With regular and casual NPP, neither the perceived insufficiency (regular NPP: OR= 1.11, 95%CI: 0.69-1.77, AOR=0.91, 95%CI: 0.56-1.49; casual NPP: OR=0.99, 95%CI: 0.29-3.43, AOR=0.81, 95%CI: 0.21-3.04). nor the perceived sufficiency (regular NPP: OR= 0.98, 95%CI: 0.53-1.83, AOR=0.71, 95%CI: 0.35-1.41) were associated with the condom use during the last sex act.

With regular NPP, having child dependents was significantly associated with condom use during the last sex act (OR=1.99, 95%CI: 1.19-3.32). After adjusting for FSWs' demographic characteristics, the effect slightly decreased but still suggesting FSWs with child dependents were more likely to report condom use with their regular NPP during the last sex act compared to FSWs with no child dependent (AOR: 1.81, 95%CI: 1.04-3.17). This association was also observed during the last sex act with casual NPP. FSWs who reported having child dependent were significantly more likely to use condom during the last sex act with casual NPP compared to FSWs without any child dependent (OR= 3.66, 95%CI: 1.03-13.08). After controlling for demographic variables, FSWs with child dependent were more likely to use condom with casual NPP as compared to FSWs without any child dependent (AOR= 2.62, 95%CI: 0.58, 11.86) although the latter trend was not statistically significant. Significant association was observed

between having child dependent and condom use during the last sex act with regular clients as well (OR=1.97, 95%CI: 1.13-3.43). After adjusting for covariates, FSWs with child dependents were found almost twice likely to report using condom during the last sex act with regular clients than FSWs without any child dependent (AOR= 1.99, 95%CI: 1.10-3.58). A similar trend was observed for sex with new clients, although statistically insignificant (OR=1.50, 95%CI: 0.75-2.98, AOR= 1.52, 95%CI: 0.74-3.13).

Additionally, the associations between condom use and other economic variables were also examined. Having another job or income generating activity is associated with increased likelihood with all types of partners (OR= 1.40, 95%CI: 0.89-2.21, AOR= 1.41, 95%CI: 0.86-2.32 for regular NPP; OR= 1.5, 95%CI: 0.37-6.11, AOR= 2.09, 95%CI: 0.41-10.70 for casual NPP; OR= 1.91, 95%CI:1.01-3.61, AOR= 1.73, 95%CI: 0.89-3.36 for regular clients; OR=1.81, 95%CI: 0.82-4.02, AOR= 1.82, 95%CI: 0.80-4.16 for new clients) despite statistical insignificance.

Sharing income with another person in sex work was not significantly associated with condom use with any of the four types of partners: regular NPP (OR=1.19, 95% CI: 0.59-2.40, AOR= 1.43, 95%CI: 0.79-2.93), casual NPP (OR= 0.37, 95% CI: 0.10-1.37, AOR=0.40, 95%CI: 0.10-1.65), regular clients (OR= 1.15, 95% CI:0.50-2.62, AOR= 1.10, 95%CI: 0.47-2.54) and new clients (OR= 1.31, 95% CI: 0.50- 3.44, AOR= 1.37, 95%CI: 0.52-3.65).

Disagreeing that one can count on other FSWs to borrow money from was associated with increased likelihood of condom use with regular NPP (OR=1.15, 95% CI: 0.56-2.36, AOR=1.12,

95%CI: 0.53-2.33), casual NPP (OR= 4.12, 95% CI: 0.22-75.98, AOR= 2.67, 95%CI: 0.11-66.46) and new clients (OR=1.47, 95% CI: 0.55-3.91, AOR= 1.46, 95%CI: 0.54-3.92). Conversely, agreeing that one can count on other FSWs to borrow money from was also associated with increased likelihood of condom use with regular NPP (OR= 1.24, 95% CI: 0.61-2.52, AOR= 1.17, 95%CI: 0.57-2.44), casual NPP (OR= 4.73, 95% CI: 0.26- 86.82, AOR= 3.41, 95%CI: 0.14-83.07) and new clients (OR= 1.55, 95% CI: 0.59-4.04, AOR= 1.43, 95%CI: 0.53-3.81). With regular clients, disagreeing that one can borrow money from other FSWs was associated with increased likelihood of condom comparing to those who held neutral stance on this matter (OR= 1.07, 95% CI: 0.30-1.93, AOR= 1.07, 95%CI: 0.41-2.77), and agreeing so was associated with decreased likelihood of condom use (OR= 0.78, 95% CI: 0.42-2.74, AOR= 0.80, 95%CI: 0.32-2.02).

5.5 Discussion

Findings from this study suggested similar condom use prevalence when compared to those reported in previous literature [4, 93]. The descriptive data showed that the absolute values of condom use percentage was higher among clients than NPP. Specifically, condom use prevalence during the last sex act with regular NPP such as boyfriends or husbands reported in this study was far less than FSWs' condom use prevalence reported by UNAIDS from Senegal (94%) [9]. Condom use prevalence during the last sex act with new clients was found to be close to the UNAIDS estimated condom prevalence [9]. This finding can be perhaps explained by the increased intimacy with and trust on NPP, as reported in previous research [43] from another country. For example, intimate relationships and regular clients were perceived as at low HIV risk by FSWs. When comparing with another study conducted in Dakar, Senegal in 2005 where

all FSW participants reported condom use with clients and only 61.9% with boyfriends or partners, our findings are consistent with each other [93]. A previous study from the same region showed that among the five factors from the theory of planned behavior (intention, perceived control, attitude, subjective norm, and moral norm), the former two factors largely determined FSWs' condom use decision during the last sex act with their boyfriends [105].

In this study, income was found not to be associated with the condom use with all types of sex partners. Previous microeconomic analyses of FSWs' income from sex work and their condom use behavior [56, 57] have found that condom non-use was associated with high income from sex work per act. The inconsistency might be partly due to the measures used for "income". In this study, income was measured as a total of weekly earnings from sex work, reported by the participants, instead of being derived from market price or average income earned per sex act. Thus, other factors such as the number of clients and work days during a week can influence the association between condom non-use and increased income. The study also found that interestingly, condom use with clients might be associated with both extreme sufficiency (or affluency) and extreme insufficiency of money to meet needs as compared to "neither disagreeing nor agreeing".

The underlying mechanism of the two associations might differ. For example, FSWs reported "very much" and "extremely" having money to meet needs, might also be those who are regularly engaged in condomless sex work for additional cash. Their perceived sufficiency of financial resources stemmed from the demand for condom non-use by clients and the high price for condomless sex. On the other hand, FSWs who reported "not at all" or "a little" might be

driven to forgo condoms in order to gain the extra money to alleviate the perceived insufficiency. It is interesting that those significant associations between sufficiency, insufficiency and condom use were only observed in the client's analytical samples, but not in the NPP sample. This might suggest that potential pathways exist particularly around the payment for sex work and warrants further investigation.

Across different types of sex partners except for new clients, statistically significant associations were observed between financial responsibility for one for more children and condom use during the last sex act. FSWs in this study with dependent children were more likely to report condom use as compared to FSWs without them. This might be explained by the potential role of motherhood on HIV risk behaviors. For example, the financial responsibility for dependent children may increase the sense of responsibility for one's health or make the long-term value of one's health more weigh more. In the meantime, an alternative explanation of this finding could be that FSWs with dependent children, especially those whose ideal family size had been reached, may use condom as a means of birth spacing or limiting. However, fertility related aspects and condom use for the purpose of family planning were not explored in the present study. Previous qualitative research [109] suggested that motherhood may have complex relationship with HIV risk among FSWs in Tanzania and may affect FSWs' demanding of condom use. Another quantitative study suggested inverse association between motherhood and HIV risk among FSWs from another setting [110]. That study measured HIV risk as consistent condom use with clients, defined as paying-partners, and accepting additional money for condomless sex, which differed from the analytical sample and measures used in the present study.

Limitations and strengths

The findings from this study should be understood in the light of several limitations. Firstly, the measures of economic variables were selected based on available questions in the parent study's baseline questionnaire. For example, the available information in the data on FSWs' income was not ideal. Future studies might want to consider collecting income data in continuous form, which would allow more modelling options during the assessment of the association. Secondly, the behavioral outcome was measured by condom use during the last sex act. This measure avoids potential recall bias since it aims to capture the most recent event. However, to measure consistent condom use, more data points would be needed. Lastly, this analysis did not directly capture the offering and accepting extra money for not using condom between clients and FSWs. Although those questions were asked in the questionnaire, a large portion of participants refused to respond, resulting in missing values for about half of the observations.

The study also has several strengths. Firstly, the study sites were located in Senegal where sex work is legalized. As a result, investigating the relationship between economic factors and FSWs' condom use behavior can be less biased from potential other correlations from sex work criminalization, Secondly, the present study broadened the scope of economic factors to include also cognitive domain, the perceived financial insufficiency, which was underscored by literature from psychology and sociology work in high-income countries, but not explored in the field of public health [108]. In that sense, the present study added to the understanding of a different dimension of economic factors and their potential linkage to HIV risk behaviors among FSWs.

5.6 Tables for Chapter 5

Table 5.1 Sociodemographic characteristics of participants in this study

	N =758
Study site	
Dakar	502 (66.2%)
Mbour	256 (33.8%)
Age, mean ± SD	32.9 (±9.9)
Education	
Less than primary	490 (64.6%)
Primary	111 (14.6%)
More than primary	151 (19.9%)
Other (“I don’t know”)	6 (0.79%)
Literate in Wolof or French	
Yes	364 (48.0%)
No	394 (52.0%)
Religion	
Muslim	679 (89.6%)
Christianity	78 (10.3%)
Missing	1 (0.1%)
Country of origin	
Senegal	736 (97.1%)
Other SSA country	22 (2.9%)
Marital status	
Married/having stable partner	22(2.9%)
Single and never married	292 (38.5%)
Divorced/Widowed/Separated	444 (58.6%)
Registration as a sex worker	
Yes	194 (25.6%)
No	563 (74.3%)
Missing	1 (0.1%)

Child dependent	
No	184 (24.3%)
Yes (mean ± SD)	570 (75.2%) (3.2±2.2)
Other (“I don’t know”)	4 (0.5%)
Weekly income	
<50,000 CFA	631 (83.3%)
≥50,000 CFA	113 (14.9%)
Missing	14 (1.9%)
Needs met	
Neutral	245 (32.3%)
No	421 (55.5%)
Yes	90 (11.9%)
Missing	2 (0.3%)
Child dependent	
Yes	570 (75.5%)
No	184 (24.3%)
Missing	4 (0.5%)
Sharing income with others	
Yes	660 (87.1%)
No	98 (12.9%)
Employment other than sex work	
Yes	233 (30.7%)
No	525 (69.3%)
Can count on other FSWs for borrowing money	
Neutral	72 (9.5%)
Disagree	330 (43.5%)
Agree	348 (45.9%)
Missing	8 (1.1%)

Table 5.2 Condom use different types of partner during the last sex act

	Sample	Vaginal sex						Anal sex					
Partner type	N= 758	Yes	No	N/A	Condom use	Condom Non-use	N/A	Yes	No	N/A	Condom use	Condom Non-use	N/A
Regular NPP	353 (46.6%)	352 (99.7%)	1 (0.28%)	0 (0%)	212 (60.2%)	138 (39.2%)	2 (0.6%)	48 (13.6%)	305 (86.4%)	0 (0%)	26 (54.2%)	22 (45.8%)	0 (0%)
Casual NPP	72 (9.5%)	72 (100.0%)	0 (0%)	0 (0%)	61 (84.7%)	11 (15.3%)	0 (0%)	17 (23.6%)	54 (75.0%)	1 (1.4%)	13 (76.5%)	4 (23.5%)	0 (0%)
Regular clients	657 (86.7%)	656 (99.9%)	1 (0.15%)	0 (0%)	600 (91.5%)	50 (7.6%)	6 (0.9%)	88 (13.4%)	568 (86.5%)	1 (0.2%)	67 (76.1%)	19 (21.6%)	2 (2.3%)
New clients	571 (75.3%)	570 (99.8%)	1 (0.18%)	0 (0%)	533 (93.5%)	34 (6.0%)	3 (0.5%)	72 (12.6%)	496 (86.9%)	3 (0.5%)	60 (83.3%)	11 (15.3%)	1 (1.4%)

Table 5.3 Bivariate and multivariate association between economic factors and condom use with regular non-paying partners (N= 353)

	Condomless sex (n/N)	**OR[1]**	**95% CI[2]**	**AOR[3]**	**95% CI[2]**
Weekly income					
<95.5 USD	35.3% (100/283)	1.00	-	1.00	-
≥ 95.5 USD	47.8% (32/67)	0.70	(0.41, 1.21)	0.76	(0.44, 1.32)
Missing	0/3	-	-		
Needs met					
Neutral	41.7% (60/144)	1.00	-	1.00	-
Disagree	38.4% (58/151)	1.11	(0.69, 1.77)	0.91	(0.56, 1.49)
Agree	42.1% (24/57)	0.98	(0.53, 1.83)	0.71	(0.35, 1.41)
Missing	0/1	-	-	-	-
Share earning					
No	40.6% (128/315)	1.00	-	1.00	-
Yes	36.8% (14/38)	1.19	(0.59, 2.40)	1.43	(0.79. 2.93)
Missing	0	-	-	-	-
Child dependent					
No	70.2% (40/75)	1.00	-	1.00	-
Yes	36.4% (101/277)	**1.99****	(1.19, 3.32)	**1.81***	(1.04, 3.17)
Missing	1/1	-	-	-	-
Ability to borrow					
Neutral	44.7% (17/38)	1.00	-	1.00	-
Disagree	40.6% (58/143)	1.15	(0.56, 2.36)	1.12	(0.53, 2.33)
Agree	39.4% (67/170)	1.24	(0.61, 2.52)	1.17	(0.57, 2.44)
Missing	0/2	-	-	-	-
Having other job					
No	42.7% (100/234)	1.00	-	1.00	-
Yes	36.1% (43/119)	1.40	(0.89, 2.21)	1.41	(0.86, 2.32)
Missing	0	-	-	-	-

* Statistical significance = p<0.05. ** p<0.01, ***p<0.001; [1]OR: odds ratio; [2]CI: Confidence Interval; [3]AOR: Adjusted Odds Ratio. Multivariate logistic regression models were adjusted for age, education level, registration status and study site. The binary outcome is condom use =1 versus condom non-use =0.

Table 5.4 Bivariate and multivariate association between economic factors and condom use with casual non-paying partners (N= 72)

	Condomless sex (n/N)	**OR[1]**	**95%CI[2]**	**AOR[3]**	**95%CI[2]**
Weekly income					
<95.5 USD	18.6% (11/59)	1.00	-	1.00	-
≥ 95.5 USD	15.4% (2/13)	1.29	(0.25, 6.66)	1.66	(0.29, 9.59)
Missing	0	-	-	-	-
Needs met					
Neutral	17.9% (5/28)	1.00	-	1.00	-
Disagree	18.6% (8/43)	0.99	(0.29, 3.43)	0.81	(0.21, 3.04)
Agree	0/1	1	-	1	-
Missing	0	-	-	-	-
Share earning					
No	14.5% (8/55)	1.00	-	1.00	-
Yes	29.4% (5/17)	0.37	(0.10, 1.37)	0.40	(0.10, 1.65)
Missing	0	-	-	-	-
Child dependent					
No	35.3% (6/17)	1.00	-	1.00	-
Yes	12.7% (7/55)	**3.66***	(1.03, 13.08)	2.62	(0.58, 11.86)
Missing	0				
Ability to borrow					
Neutral	50.0% (1/2)	1.00	-	1.00	-
Disagree	18.2% (6/33)	4.12	(0.22, 75.98)	2.67	(0.11, 66.46)
Agree	16.7% (6/36)	4.73	(0.26, 86.82)	3.41	(0.14, 83.07)
Missing	0/1	-	-	-	-
Having other job					
No	19.6% (10/51)	1.00	-	1.00	-
Yes	14.3% (3/21)	1.5	(0.37, 6.11)	2.09	(0.41, 10.70)
Missing	0	-	-	-	-

* Statistical significance = p<0.05. ** p<0.01, ***p<0.001; [1]OR: odds ratio; [2]CI: Confidence Interval; [3]AOR: Adjusted Odds Ratio. Multivariate logistic regression models were adjusted for age, education level, registration status and study site. The binary outcome is condom use =1 versus condom non-use =0.

Table 5.5 Bivariate and multivariate association between economic factors and condom use with regular clients (N= 657)

	Condomless sex (n/N)	**OR[1]**	**95%CI[2]**	**AOR[3]**	**95%CI[2]**
Weekly income					
<95.5 USD	9.8% (53/539)	1.00	-	1.00	-
≥ 95.5 USD	9.3% (10/108)	1.10	(0.54, 2.26)	1.12	(0.54, 2.32)
Missing	10% (1/10)	-	-	-	-
Needs met					
Neutral	6.1% (14/231)	1.00	-	1.00	-
Disagree	10.1% (35/345)	0.56	(0.30, 1.08)	**0.51***	(0.26, 0.99)
Agree	18.8% (15/80)	**0.28****	(0.13, 0.62)	**0.27****	(0.12, 0.61)
Missing	0	-	-	-	-
Share earning					
No	9.9% (57/578)	1.00	-	1.00	-
Yes	8.9% (7/79)	1.15	(0.50, 2.62)	1.10	(0.47, 2.54)
Missing	0	-	-	-	-
Child dependent					
No	15% (21/140)	1.00	-	1.00	-
Yes	0.3% (43/465)	**1.97***	(1.13, 3.43)	**1.99***	(1.10, 3.58)
Missing	0/4	-	-	-	-
Ability to borrow					
Neutral	8.8% (6/68)	1.00	-	1.00	-
Disagree	8.4% (23/275)	1.07	(0.31, 1.93) (0.42,	1.07	(0.41, 2.77)
Agree	11.4% (35/307)	0.78	2.74)	0.80	(0.32, 2.02
Missing	0	-	-	-	-)
Having other job					
No	11.3% (51/450)	1.00	-	1.00	-
Yes	6.3% (13/207)	**1.91***	(1.01, 3.61)	1.73	(0.89, 3.36)
Missing	0	-	-	-	-

* Statistical significance = p<0.05. ** p<0.01, ***p<0.001; [1]OR: odds ratio; [2]CI: Confidence Interval; [3]AOR: Adjusted Odds Ratio. Multivariate logistic regression models were adjusted for age, education level, registration status and study site. The binary outcome is condom use =1 versus condom non-use =0.

Table 5.6 Bivariate and multivariate association between economic factors and condom use with new clients (N= 571)

	Condomless sex (n/N)	**OR[1]**	**95%CI[2]**	**AOR[3]**	**95%CI[2]**
Weekly income					
<95.5 USD	7.1% (33/465)	1.00	-	1.00	-
≥ 95.5 USD	6.2% (6/97)	1.16	(0.47, 2.85)	1.23	(0.50, 3.07)
Missing	22.2% (2/9)	-	-	-	-
Needs met					
Neutral	2.9% (6/207)	1.00	-	1.00	-
Disagree	9.0% (27/300)	**0.29****	(0.12, 0.72)	**0.22****	(0.09, 0.55)
Agree	12.9% (8/62)	**0.20****	(0.07, 0.60)	**0.15****	(0.05, 0.46)
Missing	0/2	-	-	-	-
Share earning					
No	7.4% (36/486)	1.00	-	1.00	-
Yes	5.9% (5/85)	1.31	(0.50, 3.44)	1.37	(0.52, 3.65)
Missing	0	-	-	-	-
Child dependent					
No	9.4% (13/139)	1.00	-	1.00	-
Yes	6.5% (28/429)	1.50	(0.75, 2.98)	1.52	(0.74, 3.13)
Missing	0/3	-	-	-	-
Ability to borrow					
Neutral	9.7% (6/62)	1.00	-	1.00	-
Disagree	7.0% (16/227)	1.47	(0.55, 3.91)	1.46	(0.54, 3.92)
Agree	6.9% (19/276)	1.55	(0.59, 4.04)	1.43	(0.53, 3.81)
Missing	0/6	-	-	-	-
Having other job					
No	8.2% (33/404)	1.00	-	1.00	-
Yes	4.8% (8/167)	1.81	(0.82, 4.02)	1.82	(0.80, 4.16)
Missing	0	-	-	-	-

* Statistical significance = p<0.05. ** p<0.01, ***p<0.001; [1]OR: odds ratio; [2]CI: Confidence Interval; [3]AOR: Adjusted Odds Ratio. Multivariate logistic regression models were adjusted for age, education level, registration status and study site. The binary outcome is condom use =1 versus condom non-use =0.

Chapter 6. Aim 3: Female sex workers' experience of economic hardship in an HIV risk environment in Dakar, Senegal: a phenomenological study

6.1 Abstract

Background: There has been debate on the relationship between economic hardship and HIV risk. Despite the shifting focus from individual behavioral determinants to structural drivers of HIV such as poverty and socioeconomic status, little work has been conducted to qualitatively explore the experience of economic hardship as the central phenomenon for populations at increased risk of HIV. Female sex workers (FSWs) carry disproportionate burden of HIV compared to women of 15 to 49 years old in Senegal and many other countries. Empirical research is necessary to understand FSWs' experience of economic hardship and its implications for HIV risk.

Methods: This study examines the experience of economic hardship among 15 FSWs in Dakar metropolitan areas using a phenomenological approach. Three interviews were conducted with each study participant to elicit their experience of economic hardship and HIV risk behaviors. Thematic analysis was conducted to characterize the essence of economic hardship and its constituent dimensions.

Results: This study revealed that FSWs experienced pronounced economic hardship at certain periods and overall; their experience of economic hardship was characterized by impoverishing

economic burden and expenses, as well as limited income generating activities and contextual barriers to escaping from economic hardship. Economic hardship was not reported as reasons to have condomless sex with clients in sex work settings.

6.2 INTRODUCTION

In recent decades, with increased recognition of multi-level determinants of HIV such as poverty, stigma and gender inequality, the HIV prevention priority has shifted from individual-focused behavior change, to comprehensive prevention packages with inventions targeting structural determinants [111-116]. Among those structural determinants, economic factors have been examined in relation to the HIV epidemic at the population level and HIV vulnerability at the individual level in a plethora of studies. At the population level, poverty was believed to contribute to the HIV epidemic in sub-Saharan African (SSA) countries where nation wealth was lacking [44-46]. Many presumed that the geographical concentration of HIV in developing countries was due in part to their relatively poor economies [44, 45, 47, 48]. Furthermore, a recent study in a developed country reported a rapid increase in HIV infections following a major financial crisis which provoked thoughts on the potential causal relation between economic events and the HIV epidemic in a population [49]. Economic disadvantages were also believed to shape an individual's risk and vulnerability to HIV acquisition as well as onward transmission. Studies across various countries and populations demonstrated the linkage from individual economic characteristics, such as wealth quintile [50], living in a poor household [51], asset ownership and essential items affordability [52], to HIV related knowledge, behavioral risks and infections. Possible explanations for those associations included that poor wealth strata may result in limited access to the HIV-related knowledge, and less engaged in HIV preventive

measures[50]. Additionally, poor women were believed to often rely on men for financial and material support, and thus unable to insist on safe sex practices [51, 52].

Conversely, another body of research argued that contrary to the previously mentioned findings that associated economic disadvantage with increased risk of HIV, the relationship between the two should be inversed based on the empirical evidence from countries across Asia and sub-Saharan Africa [53, 54]. Greener and Sarkar argued that existing evidence failed to support the hypothesis that the HIV epidemic was driven by poverty at the country or household level [53]. Fox furthered this debate by arguing that living in a wealthier household or wealthier country in sub-Saharan Africa was associated with increased risk of HIV through the pathways of consumption, perceived low risk of HIV, and the concurrency of sexual partners [53]. Microeconomic studies among female sex workers (FSWs), defined as women who exchange sex for money, goods or drugs, also suggested that higher income might be linked to inconsistent condom use which was incentivized by clients who preferred condom non-use [56, 57].

Compounding the inconsistent findings on the complex relationship between economic factors and HIV vulnerability is the lack of contextualized analysis on how economic hardship was understood and experienced by a specific population. The social epidemiology approach and macroeconomic approach have offered us a grand picture of economic determinants in the HIV epidemic across the globe. However, those approaches tended to extract the experience of economic hardship out of its context without closely examining how the social and cultural environment shaped an individual's experience or how experiencing economic hardship may lead to HIV risks among those individuals [58]. Without a nuanced and situated understanding of

economic hardship in its specific risk context, such as sex work, and its implications for HIV prevention, it is difficult to effectively intervene at the structural or individual level [59]. Thus, for the purpose of this study, economic hardship was defined as the deprivation of economic resources including but not limited to income, assets and access to loans to meet the needs of daily life such as food, shelter and other necessities that are deemed indispensable by an individual in the local contexts. Moreover, the experience of economic hardship was defined to also entail the subjective feelings of suffering because of the deprivation of resources. Drawing from strengths of social sciences, this study aims to fill the gap in understanding the experience of economic hardship and its implications for HIV risks among female sex workers in Dakar, Senegal.

Research on economic hardship is particularly relevant among FSWs and especially in the Senegalese setting. Firstly, FSWs are marginalized worldwide with multi-faceted vulnerabilities to increased illicit drug use and alcohol consumption, police violence, and to stigma [60-62]. With those vulnerabilities, FSWs may present unique experience of economic hardship. Secondly, compared to reproductive aged-women not in sex work, FSWs in sub-Sahara African countries and many regions carried a disproportionate burden of HIV both in terms of prevalence and proportion of new infections, which renders HIV prevention a priority among them [2, 60, 61]. In the sub-Saharan Africa region, about 5% of new HIV infections are among sex workers. In Senegal, despite the overall low national HIV prevalence compared to other West African countries, HIV prevalence was estimated to be 6.6% among sex workers between 2011 and 2016, and 3.3% among FSWs in 2017 [10, 63, 64]. Lastly, sex work has been permitted by law in Senegal since 1969 for FSWs who registered their profession with the country's law

enforcement and public health departments [65]. In a setting with potentially less criminalization of sex work than its neighboring countries, economic determinants stood out amongst the structural drivers of HIV and might add to the explanation of the concentrated HIV epidemic among FSWs.

The present study derived from a parent project using multiple methods to explore the potential utility of a stigma mitigation intervention package to Senegalese key populations including FSWs and men who have sex with men [64]. Phenomenological methods have been increasingly used to study human experiences and behaviors in relation to health in the field of public health [87-90], which also fits into the non-theory generating goal of this study. Particularly, interpretative phenomenology (IP) was chosen to guide the design of this study aiming to explore, describe and reconstruct FSWs' experience of economic hardship in an HIV high-risk context in Senegal and its implications for HIV risk. An IP approach not only emphasizes the study participants' reflection on their experience, but also underscores a researcher's engagement in a "double hermeneutic" process- "to make sense of the participant trying to make senses of what is happening to them" [91]. Guided by the IP approach, the aim of this study is to understand the experience of economic hardship by examining FSWs' account of important past events and their feelings as they reflect on moments of economic hardship. The secondary aim is to explore the potential implications of economic hardship to HIV risk through FSW participants' reflection on HIV risks during sex work. As far as we know, this study represents the first IP analysis of economic hardship in relation to HIV in West Africa.

6.3 METHODS

6.3.1 STUDY SETTING

The study took place in the Dakar region which encompasses Dakar, Guédiawaye, Pikine and Rufisque departments on the Cap-Vert peninsula of Senegal. The Dakar region had a population of nearly three million according to the 2013 census, approximately 95% of whom identified as Muslim [74]. The Dakar region was the most populous among the fourteen regions of Senegal and had been continuously growing at its periphery in terms of urbanized areas and population [75]. Urbanization along with a nationwide economic decline over the last two decades, led to emerging poverty concentrated in urban areas [77]. Unemployment and food insecurity continued to affect the urban poor [77, 78]. Furthermore, data from Senegal in 2015 showed a gap between women (45%) and men (70%) in terms of labor participation rate, defined as the percentage of the working-age population currently working or actively looking for work [79]. In response to those contextual changes and the lack of income-generating activities in Senegal, an increasing number of women opted to have sexual relationships other than traditional unions to secure material resources from multiple partners [77]. According to the latest estimation, the HIV prevalence among FSWs was 3.3% in 2017 [64], much higher than the 0.6% among Senegalese women of reproductive age in general [9].

6.3.2 SAMPLING AND RECRUITMENT

The target sample size was 15 FSW participants with considerations of a balance between analysis depth and sample diversity. This sample size was larger than the one recommended or used by IP research traditions which typically ranged from one to ten, with each participant being interviewed in-depth once or multiple times [91, 117-119]. The inclusion criteria were: (i)

participant's age was older than 18 years old; (ii) participant self-identified as woman; (iii) participant was selling sex for money or goods as the primary source of income; (iv) participant had lived in the Dakar region for the past two years; (v) participant was not living with HIV at the time of recruitment; and (vi) participant was willing and able to commit to a total of three interviews during the study period between May and August of 2017. Guided by the IP methods, purposeful sampling for maximum variation was employed to recruit a diverse sample of FSWs who were likely to report various experience of economic hardship [91, 119]. Specifically, the self-reported weekly income was used as a reference indicator in order to capture potential diverse economic hardship experience from which the common patterns could be identified. To ensure the diversity of the sample and allow a close examination of FSWs' experience of economic hardship, the 15 participants were drawn from three income strata.

We took advantage of a 24-month open cohort of FSWs recruited by the parent project which already met the (i)-(iv) criteria. A more detailed description of the parent study can be found in Lyons 2017 [64]. At the time of the present study's planning phase, most of the cohort members just completed their 15th month study visits. Firstly, questionnaire data from the parent study on FSWs' self-reported weekly income was extracted and used to guide the stratification. To prevent occasional income fluctuations from affecting the stratification result, data from two timepoints with three months apart were included (12th month and 15th month). The weekly income cutoffs were set at 47 USD and 122 USD. FSWs who reported top-tier income at both time points or one top-tier and one middle-tier income were grouped into the high-income stratum; FSWs who reported middle-tier income at both time points are grouped into the middle-

income stratum; FSWs who reported bottom-tier income at both time points, or one bottom-tier income and one middle-tier income are grouped into the low-income stratum.

After applying criteria (v) and excluding those with missing values on weekly income in the survey data, 56 FSWs on the cohort list were still eligible. Those eligible FSWs were grouped into the three strata. Information about this qualitative study was shared with the FSW cohort members by a senior social worker who had been in close contact with FSWs in the Dakar region for the past decades due to her involvement in various local public health and social service programs. The social worker was instructed to recruit five study participants from each income stratum during her informal meetings, training sessions or home visits with those FSWs. In the end, the first five eligible FSWs from each income stratum who were approached by the social worker and agreed to participate in three rounds of interviews (criterion vi) enrolled in the present study.

6.3.3 DATA COLLECTION

Semi-structured interviews were conducted three times with each of the 15 participants from May through August in 2017, totaling 45 interviews over three months. Interviews were facilitated by a guide that explored the primary research question on FSWs' experience of economic hardship, the social context and the HIV risk environment. Specifically, the interview guide included the following five domains: daily activities and sex work norms; economic situations (including expenses and sources of income) and coping with economic hardship; condom use and sexual health; entry to sex work; and the narrative of an experience of economic hardship. Although we previously listed various probing points potentially useful during the

conversations, the interviewer was encouraged to alter the order of the questions, modify the probing strategies, or follow up on key topics that were relevant to the study aims as needed during the interviews. The interview guide was pre-tested with the field staff to ensure its cultural sensitivity prior to data collection and then translated into French and Wolof.

The interviewer was a Senegalese woman with a master's degree in social work, and she was a native speaker of French and Wolof. Prior to data collection, she received a two-day training on qualitative research and data collection techniques and participated in a one-day mock interview session. FSW participants scheduled the meeting times for their interviews at the time of recruitment. On scheduled interview days, participants arrived at the study location at the previously agreed time and connected to the researchers by mentioning the social worker's name. Participants were compensated the equivalent of 10 USD for their time as well as transportation expense each time they came for their study visit. Study participants chose whether they wanted to be interviewed in French or Wolof, considering those were the most used languages in the Dakar region. Interviews took place in closed rooms at the study site centrally located in Dakar. Due to ethical considerations, no phone number or names of the participants were asked or recorded at any time during the study. Informed consent documents were signed using symbols of the participants' choice instead of their signatures. Between different rounds of interviews, participants were referred to by a numeric code not linked to their identity.

During the interviews, detailed notes were taken by the interviewer to capture key messages from the conversation. In the meantime, observation notes were taken by the thesis author to capture relevant non-verbal information. All interviews were debriefed at the end of data

collection days between the thesis author, the interviewer and research assistant. The interviews lasted from 32 minutes to one hour and 18 minutes. All interviews were audio-recorded with permission from participants. Recordings and signed informed consent forms were secured in locked cabinets at the study location.

6.3.4 DATA ANALYSIS

The interview recordings were firstly transcribed and translated verbatim from Wolof or French to English by three research assistants who were native-speakers of the languages. During the translation, popular expressions in the original interview language were retained in the text together with their closest translations in English. Then, all transcriptions were carefully read. Personal information such as the names of neighborhood, associations, health facilities and other individuals were replaced by pseudonyms. The analysis explored the essence of FSWs' experience of economic hardship in various situations in life. For this purpose, two steps of coding were conducted. Firstly, five selected transcriptions were coded using an open coding approach, the purpose of which was to let the smallest unit of experience emerge from the participants' narratives, such as "no choice" around the entry to sex work. During this process, copious analytical notes were taken along the examination of field notes. As the initial codes repeatedly emerged from the data, a tentative code structure was developed. As the second step, deductive coding was carried out, facilitated by the use of the codes generated from the first step. Newly emerged codes were included to the code structure as the coding continued. Due to high volume of data, the thematic analysis was assisted by Atlas.ti [99].

The central aim was to understand the structure, or essence of FSWs' experience of economic hardship. Thus, salient themes related to economic hardship were identified during the analysis. Then, those themes were examined and summarized into super-ordinate themes that characterized the linkage between the themes and also described the nature of FSWs' experience of economic hardship. For example, codes, such as, "attempt to apply for jobs" and "attempt to resell goods" both referred to thematic events where FSW exerted their agency in search of an alternative means of livelihood when coping with economic hardship. Thus, the theme on "seeking alternative livelihood" belonged to the subordinate theme on "leveraging possible resources to cope with economic hardship", as illustrated in Table 6.1. To contextualize the themes in individual FSWs' life stories, a selection of examples on the economic aspect of FSWs' life was summarized and presented in Figure 6.2.

6.3.5 ETHICAL APPROVALS

This study was approved by the Johns Hopkins Bloomberg School of Public Health Institutional Review Board (IRB) and the Comité National d'Ethique pour la Recherche en Santé (CNERS) of Senegal.

6.4 RESULTS

The characteristics of the study participants are shown in Table 6.1. A diverse study sample was achieved in terms of education level, registration status, literacy and income. All participants except for one were divorced or widowed, which is not atypical among FSWs according to a systematic review on the socio-demographic characteristics of FSWs in sub-Saharan Africa [120]. In the following sections, an overview of sex work environment in Dakar was firstly

provided, followed by five subordinate themes on economic hardship which emerged from the analysis (Table 6.1). In the end, the last theme discussed the implications of economic hardship to HIV to facilitate the understanding economic hardship in relation to HIV risk (Figure 6.1). To complement the thematic presentation of findings, typical cases were selected with the narrated life stories in Figure 6.2. All names used in Figure 6.2 are pseudonyms.

In brief, FSWs' experience of economic hardship shared common characteristics across cases and presented its uniqueness from the economic hardship experienced by other populations due to the role of sex work. The essential experience of economic hardship was shaped by the following dimensions: economic burden and expenses, FSWs leveraging possible resources to cope, and contextual barriers to escaping from economic hardship.

6.4.1 A BRIEF OVERVIEW OF SEX WORK ENVIRONMENT IN DAKAR

Participants reported that there were hardly any intermediaries involved in sex work in Dakar. FSWs managed their own business directly with their clients. The mostly common form of payment was cash; many FSWs reported that payment in other forms, such as valuable goods, was unacceptable. Price was usually negotiated before sex.

> *"(FSWs) They find their own clients and no, the bar owner isn't part of it. The bar owner doesn't even come. Maybe once in a while we will see him." (registered, 45+)*

> *"Me, personally, if you come and say you want to give me your computer or phone. No. For me, I do, you pay." (registered, 45+ years old)*

"I only accept money. Sometimes they might buy me a drink or bring an apple." (unregistered, 36-40 years old)

"Ah it's all bargaining ... It depends. There are some you ask for 10,000 CFA or 15,000CFA and they will pay you. It depends on your luck. But the prominent price is 5,000CFA or 4,000CFA." (unregistered, 45+ years old)

Regarding the locale of finding their business, some FSWs solicited outside at bars or clubs, while others kept in touch with past clients and scheduled their sex work by phone.

"I just go to one bar that is where I work… Now my going to the bar is infrequent, I have my phone. The ones I knew before, those are the ones that call me. I then go meet them and we do what we have to do." (registered, 41-45 years old)

"Unless it's a guest who does not have time like someone who comes from far and they need you. Like they are staying at a hotel or something. So, they will call you on your phone and say meet me here." (unregistered, 36-40)

6.4.2 THEME 1: THE EXPERIENTIAL CHARACTERISTICS OF ECONOMIC HARDSHIP

Participants described economic hardship as a feeling of weakness, characterized by the lack of choice, loss of help and struggling on one's own with constant worries about economic expenses. From the various life stories told by the participants, the common structure of the focal

phenomenon, economic hardship, emerged with the following elements: firstly, FSWs felt the pressure from economic burden and impoverishing expenses; then, in response to the pressure, FSWs exerted their resilience, sought for solutions, and leveraged all possible resources to cope with those expenses; lastly, FSWs felt there was contextual barriers to escaping when they fought the battle against economic hardship.

6.4.2.1 Deprivation of assistance and survival means

"No choice" and "no help" emerged as two central themes to describe the experience of economic hardship by participants in this study. Some considered the entry to sex work as a passive choice after their attempts to make a living with other jobs turned futile. Participants generally felt unprepared at the job market in terms of skills, resources, or psychological readiness. While "no choice" referred to the lack to other viable economic opportunities, "no help" referred to none or insufficient help available from familial or social ties.

> *"I can't do another job… And when it comes to business it's unpredictable. And I don't have anyone to help me. If you don't have someone to lean on, how can you go further?" (registered, 45+ years old)*

> *"I would have to pray for someone to give me money. Today they would give you, and tomorrow they wouldn't". (unregistered, 36-40 years old)*

6.4.2.2 Most pronounced economic hardship during certain periods

The experience of economic hardship was concentrated around the time before entering sex work and during religious festivals. Many participants mentioned a period of struggling in distress

between the sudden loss of a primary breadwinner of the household and the entry to sex work. Shortly after widowhood or marriage dissolution, participants struggled to pay for "*dépense*" (including grocery, electricity and other expenses related to daily living), healthcare, or children's education.

> *"My husband passed away. He fathered six children with me. You know, the hardships and struggles of the world. When you don't have anyone to help you, you struggle." (unregistered, 36-40 years old)*

> *"But if you have some loans if you need to pay it with the profit from the selling… to put that money together to pay but still having to feed my family was difficult and long. That is why I took this as a solution to pay my debts." (registered, 41-45 years old)*

Several participants described that the extreme cases of economic hardship occurred to FSWs during major religious holidays and celebrations such as the months of Ramadan, *Korité* (the Islamic observation Eid al-Adha in Senegal which marks the end of Ramadan) when clients temporarily stopped requesting sex from them and the obligated expenses increased. One participant reflected on her experience of economic hardship during then:

> *"Korité, I didn't have any money. Because clients stay at home and go to pray. So, you know they wouldn't come for services…Because it was around the period of the Ramadan. You can't do certain things in that month… I didn't have anything. I even loaned money from the corner shop…Because as women, when you don't have money for your children and Eid, it's difficult." (unregistered, 36-40 years old)*

"I took care a of a lot of things… Like paying my overdue rent. Also, celebrations I needed to take care of." (registered, 41-45 years old)

6.4.3 THEME 2: THE ROLES OF SEX WORK IN ECONOMIC HARDSHIP

Most participants described the role of sex work in alleviating economic hardship. Income from sex work not only allowed some participants to pay for the necessities of their household, but also enabled most of them to provide to their family members who needed financial support. As a result, the meaning of sex work was expanded from an individual's survival means to the achievement of FSWs' financial autonomy, and the fulfilment of FSWs' role as caretakers to their elderly parents, younger siblings and children.

"… I'm working for myself and paying for my things so that no one can disrespect me." (registered, 45+ years old)

"I buy food and stuff. But I hope God forgives us but if you sell yourself and give it to your mom – God will forgive you… " (unregistered, 26-30 years old)

"After I started [sex work] is when I started getting more money… because I'm dealing with my affairs... I give a bit to my children and my mom. That's why." (registered, 45+ years old)

6.4.4 THEME 3: ECONOMIC BURDEN AND IMPOVERISHING EXPENSES

One element of the experience of economic hardship was the burdensome but necessary expenses that easily impoverished FSWs. Commonly reported expenses included the obligation

to pay for the entire household's expenses, medical visits and expenses that carried symbolic values.

6.4.4.1 Being the only breadwinner

Most study participants were also mothers with multiple children. In addition to raising their children, almost all participants also reported having to pay for the living of their other family members such as their mothers, siblings and extended family members who did not have income or a means of living. On one hand, FSWs replied heavily on sex work for their income; on the other hand, a group of people with family ties were often replying on one FSW for a living. Such expenses on supporting family members were seen by many participants as an inevitable responsibility.

> *"I live with my older sister, an older sister of mine passed away and left 3 children behind and I have them, I have all those people at my house. Including my older sister and her two children. I look after them all." (registered, 41-45 years old)*

> *"Ah my sibling's children treat me like their mother. They ask me for everything. 'Aunty give me 100 CFA', they ask for everything. I don't have children, but they are my children. Because what they can ask their father, they come to me instead. And the same goes for their mother...they ask me instead for everything." (registered, 45+ years old)*

> *"You know, pain is just that. You have to feed your family because you have no mother or father. You get up to help your family. You have nothing but 5,000 CFA or 6,000 CFA*

and they take it from your hand. You go home and lay down and stare at the wall, with nothing to drink or eat." (registered, 45+ years old)

6.4.4.2 Non-care seeking in the event of illness

Past and potential medical visits were mentioned by participants as contributors to the impoverishing expenses FSWs faced in their life. Many participants reported purchasing over-the-counter medicine to treat illness because they could not afford to seek care from health facilities. Sexually transmitted infections(STI) screening was offered free of charge by certain health facilities through public health programs and was charged 500 CFA (about one USD) for device fee. However, some participants reported the cost of transport to those locations could be challenging. Besides STI diagnosis and treatment, some participants reported living with chronic diseases such as diabetes and struggled to pay for their treatment expenses.

"Sometimes I sit at home. In fact, since day before yesterday, my stomach has been hurting, but I haven't gone to the hospital because I don't have money." (registered, 45+ years old)

"Yes, sometimes I don't have anything. Just recently my legs were swollen but I didn't have the money to get treatment" (registered.45+ years old)

"If it is in Neighborhood G, it is 500 CFA and the thing they use (speculum) it is 500 CFA. At Health Center X, it's 1000 CFA and the thing they use is 650 CFA … I had no transport fare or money for the ticket. So, I stayed at home." (registered, 45+ years old)

6.4.4.3 Expenses related to symbolic values

Religious festivals and attending weddings or funerals were mentioned by some participants which could incur expenses or count as unfulfilled necessary expenses due to economic hardship. Although those did not belong to expenses on necessities such as food and shelter, they signified FSWs' effort to maintain their social network or their adherence to the religious teaching and thus carried significant symbolic meanings.

> *"When people have ceremonies, I attend, or I still go visit my family members." (unregistered, 36-40 years old)*

> *"Yes, and weddings, I participate and come to cook for them. And when I do that, I look for respect for myself there. So, tomorrow no one will come and say "Eww that person that cooks for us". I have self-respect (or dignity) and pride … Being someone who goes out at night, a whore (derogatory word in Wolof for FSW: chaga) that does not make me a dirty person." (registered, 45+)*

> *"I socialize because if someone has an event, I attend, and I give money too. If you have 20 CFA, you go. I go. When I go, it's because that's what's nice. I don't need attitude from anyone. I don't need anyone borrowing that to me. I try to avoid not going." (registered, 45+ years old)*

"For example, I want to (go) for my cousin's wedding. I have to take something there. They can't give you transport...you have to take something. You know it gets difficult." (unregistered, 36-40 years old)

6.4.5 THEME 4: LEVERAGING POSSIBLE RESOURCES TO COPE WITH ECONOMIC HARDSHIP

In response to the impoverishing expenses, most participants mentioned that they used their wisdom to earn the income to mitigate the economic hardship, which characterized their resilience and agency. Some planned strategically during sex work while others sought for other income-earning opportunities on the side. Many of them participated in finance management groups in their communities with the goal to save money in case of future needs.

6.4.5.1 Sex work as the primary source of income

Some participants shared their thoughts on how to manage their business well so that they could constantly earn enough to cover their expenses. One participant mentioned limiting the time of sex with each client, so that she could maintain certain number of clients on a work night and thus earn steadily over time:

"Well you know, if I get a client, they call me and give me a time. Then I wait for them. I make sure I only spend maximum one hour per client so that I can get another client. I tend to have 2-3 clients a night. It's not every night that I go out but 2-3 clients per night." (unregistered, 36-40 years old)

Some participants also mentioned that they tended to select clients who appeared not vulgar, not violent or drunk. That way, they could potentially avoid risks of client violence or robbery.

> *"Sometimes you see someone who comes drunk...You know. Or someone who has a mischievous face. But for me, I try to see how to deal with you so that next time you don't come back to my house." (unregistered, 36-40 years old)*

> *"Yes, when you are doing something for a while you know who is a bandit, and who isn't. You will know they are true criminals." (registered, 41-45 years old)*

In the long run, some participants mentioned that they maintain contact with some regular clients who served as FSWs' social capital and could lend a helping hand in the event of severe economic hardship. Either through the immediate transactions to earn income, or through the long-term relationship and rapport building with regular clients, FSWs in this study shared their effort and strategies to take care of necessary expenses and minimize economic hardship using resources they had from the sex work business.

> *"Because I've known them for a long time. If I have things to do, I'll call them and tell I have problems and that I need money. They might give me 100,000 CFA or something." (registered, 45+ years old)*

> *"Time, we have known each other for long and I really know them. They call me I go their houses. Even sometimes I go and tell them I have this problem, and they give me something without us doing anything (having intercourse)." (registered, 40-45 years old)*

6.4.5.2 Trial and error: seeking additional economic opportunities

All participants in this study reported having tried or wanting to explore income-earning opportunities other than sex work, especially in informal sector such as retail business. Some participants had tried retail in the past but stopped; some participants were currently in other business during the months of the interviews; some participants were looking to start some retail business once sufficient startup fund was available. To many who already tried, the informal business such as selling fruits or incense, proved to be not a viable means to secure sufficient income due in part to the little profit, sporadic transactions and other unpredictable factors. Many participants who had never tried felt that retail business in general required start-up funds to purchase merchandise in bulk, which could be prohibitive to them when they barely recovered from impoverishment.

> *"… one must have money before one can start. Where will you get money from?" (registered, 45+ years old)*

> *"I was selling products in Market S. When you sell, you try to pay for everything. However, it doesn't always work out. This is why when my children go to sleep at night, I have two or three clients come over to my room" (unregistered, 36-40 years old)*

6.4.5.3 Financial management: from *Naata* to personal saving

In coping with the impoverishing expenses, participants mentioned their participation in "*naata"* (literal translation as "how much", French: *tontine*) which referred to a community-based saving group in Senegal. In *naata* groups, members, usually women in a community, contributed a small amount of money once a week to a collective fund. At the end of each month, the group

decided on one member to receive all the collective fund from the past month. The allocation scheme varied by specific groups and their financial goals. Commonly, the goal was to save money in preparation of religious festivals, such as *Tabaski*. Many participants were involved in those groups and some found it helpful in preparing for large foreseeable expenses.

> *"…I'm part of a women's micro-finance, whereby every Sunday you give a minimum of 250 CFA [0.5 USD] or more. We collect all that money until it's enough or until Tabaski. Then we give out everything that you provided…" (unregistered, 36-40 years old)*

> *"In my neighbourhood… I'm part of a micro-finance group. Every Wednesday, we pay 1,500 CFA and every Saturday, we pay 1, 500 CFA" (registered, 45+ years old)*

Most participants reported having no personal saving and inability to save money within the context where the price of sex work continued to decline.

> *"I'm sure some do. But I mostly know women who are like me...they aren't saving anything. We no longer get money, the money before and now it's changed. From what I think" (registered, 45+ years old)*

> *"I am saving a little but as soon as the month ends I use it to pay rent and start again" (registered, 41-45 years old)*

One participant mentioned that they would not be able to save money because they earned their income through sex work which went against religious values. As a result, the money would not

be blessed ("*barké*") or abundant to tend to their needs. In contrast, others shared different opinions on this matter:

> *"Whatever you have goes. With bad money whatever you have, you use. But what can you do." (registered, 45+ years old)*

> *"If you tell yourself you want to save money for the future, God will watch over you. But there are some types of money that are derived from dangerous situations and people still use that money (dirty money) to save for the future." (registered, 45+ years old)*

6.4.6 THEME 5: CONTEXTUAL BARRIERS TO ESCAPING FROM ECONOMIC HARDSHIP

Most participant felt there was contextual barriers to escaping from economic hardship when it came to future economic situation. Few participants felt optimistic of having positive change in their life. They shifted their hope to external help that may or may not be available to them. Access to loans with low or no interest to start up business, extra help from non-profit organizations with finance management skills, and increasing representation of FSWs in leadership positions in the community were brought up by participants when asked about long-term solutions to recover from the economic hardship. Some mentioned cultivating key family ties, such as finding a potential future husband, or having grown-up children who earn income, could eventually lead to the alleviation of economic hardship.

6.4.6.1 Prohibitive loans

Some participants had concerns about requesting loans from banks. Overall, loans were deemed inaccessible to FSWs due in part to the process it took. Moreover, some participants felt that they were not confident in obtaining loans from banks, and even if they could, they were unsure about their capability to pay back the money on time with their income from sex work.

> *"No, I don't have it. You have to deposit money (in order to take loans from the banks)" (registered, 45+ years old)*

> *"They ask you for a guarantee, then they're supposed to come look at your house, and your materials to guarantee… I heard if you don't pay them, they will come and take your possessions. And if you can't guarantee, they wouldn't loan you money… That's a bit too much for me" (unregistered, 31-35 years old)*

6.4.6.2 Stigma affecting sex workers in the job market

The difficulty was compounded by the overall low education and lack of skills among participants. One participant described seeking formal employment as *"*complicated*"* in that no jobs would accept women who were previously sex workers due to the stigma against sex work.

> *"…You can go out to a society. They look at you and look at them. If someone there knows that you go out, they say it. Those who don't go out have more rights. They will pick them … I doubt that the you (the sex worker) will get the job. They wouldn't take you. They will ruin your opportunity." (registered, 45+ years old)*

6.4.6.3 Hope for external help to decrease the reliance on sex work

The monetary gain from sex work is declining in recent years due to macroeconomic environment as is the case for both study participants and their clients. Most study participants, despite being impoverished, expressed strong will to seek change in terms of their economic situation. As described in the previous themes on alternative livelihood seeking, most of them tried to identify a few potential informal business options as a potential escape from poverty in the future. However, participants in the meantime noted that external help was in critical need to make it happen. Another marriage, if possible, was considered able to bring FSWs back to where they were prior to their marriage dissolution or widowhood without economic hardship.

> *"I tell them that I don't like the way I'm living life. I want to stop and get married. Stuff like that. I'm tired. I am tired. I am tired." (registered, 45+ years old)*

Some participants expected that their children would bring back money when they eventually grow up and find a job. Participants without children felt more pessimistic and hopeless about the future economic situation.

> *"I don't have a child to help me. If I have a child and they get older, would they be able to help me? But I think about it. When I get older who is going to take care of me. I think about it. All the time. When I get old and get sick. Who is going to take care of me? I think about. Maybe it will change. Maybe. Only God knows." (unregistered, 36-40 years old)*

6.4.7 THEME 6: ECONOMIC HARDSHIP ENTANGLING WITH HIV RISK

Sex work is associated with high HIV risk in terms of inconsistent condom use and large number of sex partners. Those two behavioral domains were explored in relation to economic hardship that faces FSWs day to day.

6.4.7.1 Rejecting condomless sex for the additional cash even in economic hardship

When asked whether certain types of sex were paid more, there was a consensus among participants that "*skin-to-skin*" sex (referring to using no barrier methods) and anal sex were paid about five to ten times more than vaginal sex with male or female condoms. While some clients were health-conscious and insisted on consistent condom use, most clients preferred condomless sex or anal sex and were willing to pay more for it according to participants of this study. In response to clients' request of condomless sex, various courses of actions were taken. While some participants mentioned having condomless sex with clients a few years ago when they knew nothing about the threat from STI, most of them mentioned that they had stopped doing so and consistently used condoms after learning about risks of STI. Many participants strongly opposed and condemned condomless sex on moral grounds. They reinforced the idea of protecting one's health as the top priority over monetary gain, using rhetorical claims that health protection and disease prevention weighed more than a "million" or "billion" regardless of economic hardship. Some participants borrowed phrases from Senegalese proverbs to support their stance against condomless sex in critical economic needs, such as "just because you are thirsty does not mean you should drink foam." Only one participant mentioned that she would accept additional cash payment to have condomless sex with her clients whom she considered as

low risk, i.e. usually men in wedlock with stable sex partners. Additionally, two participants mentioned that they would accept those high-payment proposition and clandestinely use female condom to protect themselves without the clients' awareness.

> *"Like I said before: just because you are thirsty does not mean you should drink foam. If I have sex skin-to-skin, I get an infection. I can get HIV. I am avoiding that at all costs." (unregistered, 26-30 years old)*

> *"…And he says he does not want to use a condom? You just take him to the place. When you get there, tell him you need to pee. Then put the female condom on in the bathroom. You just make sure he does not see it." (registered, 45+ years old)*

Interestingly, those Senegalese proverbs were also drawn by participants to vividly describe their choice of consistent condom use with their clients. The saying "just because you are thirsty does not mean you should drink foam" highlighted that even when one is in economic hardship ("thirsty"), she should not risk her health and bring in potential harm ("drinking foam") just because she's in a desperate situation. Another saying goes, 'the eye that doesn't get full, wouldn't burst', which spoke to a shared notion that greed is condemned and will only lead to destruction. Those proverbs spoke to the consensus among most participants that working for excessive money at the risk of one's health is unacceptable.

6.4.7.2 Non-use of barrier methods with romantic partners

A few participants reported currently having or had boyfriends. Although most romantic partners used to be their clients from the past, participants seemed to have clear distinction between

clients and boyfriends. With their boyfriends, some participants reported still using condoms despite the boyfriends' request for condomless sex.

> *"There is someone who I've been with for a while. He just called me. He is a doctor, but he wears a condom… He sometimes proposes sex without protection, but I tell him no. He said that he is a doctor, but I told him we must use protection." (registered, 45+ years old)*

On the other hand, some mentioned that they did not or would not use condoms with their romantic partners.

> *"But I had a few times we did not make a condom… because that's what we wanted. And you can be in a moment where you do not have time to take condoms…" (unregistered, 26-30 years old)*

> *"When it comes to going out, if it's just a client I don't want a child with them, but if it's someone I am dating then I would want a baby with them." (unregistered, 36-40 years old)*

6.4.7.3 No increase in number of partners during economic hardship

Most participants reported that the work load in sex work was largely determined by FSWs' availability as well clients' request. The financial goal for sex work earnings was usually set to provide enough to cover the very basic living expenses.

> *"You know I'm older now, so I can't do a lot. I can't go out every day. Yes. The Wolof people say, 'the eye that doesn't get full, wouldn't burst'." (registered, 45+ years old)*

Although in describing a typical day in sex work, participant reported varying number of clients they receive per week, no participant in this study reported intentionally increasing or decreasing the number of clients depending on their economic situation. When there were abundant requests for sex from the clients, participants mentioned that they scheduled what they could take, and then passed along additional client requests to other FSW friends.

> *"A lot of them, my friend helps me. Or I go there, and they see me and take my number and vice versa. And they call me. For the most part, I go out and meet someone and they give me their number. Or my friend calls me. I go there and see someone. That's how it goes. But, for her there are other women who give her numbers." (unregistered, 36-40 years old)*

However, in the event of insufficient number of client requests, some participants reported changing the locale of soliciting from passive phone communication at home to actively "going out" and hopping between bars and clubs to find potential clients. This may expose unregistered FSWs to potential arrest by the police.

6.5 DISCUSSION

6.5.1 THE ESSENCE OF ECONOMIC HARDSHIP

In this study, the essence of FSWs' experience of economic hardship was discussed with study participants. Economic hardship experienced by the FSW population in Senegal may represent its uniqueness in several aspects: the economic hardship temporarily concentrated in certain periods around religious observations; economic hardship also existed in various aspects in

FSWs' own life in relation to others' in an interdependent society. Besides the above-mentioned similarities in the experience of economic hardship across individuals, nuanced differences also existed from person to person. For example, regarding the economic burden and impoverishing expenses, the concept of necessary expenses was understood differently among participants, ranging from food security, rent payment, to children's education as well as the attendance and preparation of events that carried significant symbolic values in the society. The inclusion as necessary expenses of material need, such as food and shelter, as well as abstract needs that carried symbolic meanings, such as one's engagement in social and religious activities expanded the dimensions of traditionally defined economic hardship and elicited the situated meaning of economic hardship in FSWs' life in the local context.

6.5.2 SEX WORK AND ECONOMIC HARDSHIP

Consistent with research in other settings, sex work was used by FSWs as an immediate strategy to quickly gather financial resources and mitigate economic hardship. Sex work provides a viable income-generating source, which other informal business such as fruit retail failed to provide, when economic hardship disproportionately affects women versus men [121, 122]. In this study, despite the economic hardship, participants largely demonstrated a certain level of agency in seeking potential clients, negotiating prices, and averting potential risks for their health and safety. Moreover, with the income they earned from sex work, they were able to support their familial and social relationships and juggle the roles of motherhood, widowhood and the primary breadwinner of a household with multiple dependents. Interestingly, economic hardship initially motivated FSWs to start sex work and was then alleviated by the income from sex work. This finding corroborated Foley and Dramé's study on the emerging multiple- sexual relationships

(*Mbaraan*) in Senegal as an adaptive coping strategy with Senegal's decline in the economy [77].

6.5.3 ECONOMIC HARDSHIP'S IMPLICATION TO HIV PREVENTION

Overall, economic hardship did not prove to be a direct driver of inconsistent condom use with clients among the participants from this study. Among the 15 participants, only one reported accepting clients' offer of additional cash for condomless sex and those clients had to qualify for being low-risk in the participant's eyes. This finding is consistent with previous studies reporting high percentage of condom use with clients at above 95% among FSWs in Senegal [9, 93]. Findings from this study revealed that most participants thought it was shameful and unacceptable to have sex with clients without condoms from the lens of moral values. In discussing the topic of condomless sex, words such as "dignity" and "respect" emerged deliberately from most participants' narratives about their decision-making process, while their economic needs at the moments of those propositions were not considered as influential factors to their choice of condom use. Behind the reported high percentage of condom use among Senegalese FSWs was not only the increased knowledge on HIV thanks to various national public health campaigns [93], but also the moral and religious framework in which decisions were made on condom use with clients in sex work. In the past decades, Senegal has been a pioneer in sub-Saharan Africa in terms of legalizing sex work, promote the screening and diagnosis of STI among sex workers, and advocating for condom use [93]. Influential religious leaders joined in that effort and endorsed condom use to prevent STI [74, 123]. Participants' initiation of sex work was mostly driven by the survival of themselves and family members, instead of consumptions of conspicuous goods that manifest one's social identity as documented

in studies among FSWs from other sociocultural contexts [120]. Despite the marginalization, on one hand, they conformed to the mainstream societal norms including the expectation to take care of the elderly, the young, and the more disadvantage family members. On the other hand, to cope with extreme economic hardship, they tended to look to the Islamic teaching in Senegalese society which places values in giving to the poor, praying for help in economic despair, and receiving monetary aid from individuals during economic hardship.

Conversely, inconsistent condom use with one's boyfriend was commonly reported by participants in this study independent of their experience of economic hardship. This echoes previous findings that the nature of relationship type played an important role in the condom use behaviors among FSWs and non-FSWs within and outside Senegal [38, 41, 43, 93, 124, 125]. Specifically, the condom non-use with boyfriends reported by participants from this study was primarily driven by FSWs' intention and the intimacy of their relationships with the sexual partners, instead of the lack of behavior control using the conceptual framework on inconsistent condom use between FSWs and their boyfriends [105].

6.5.4 LIMITATIONS AND STRENGTHS

The study's results may be viewed in light of the following limitations: the study sample was drawn from an ongoing HIV prevention intervention as part of the parent study [64] which may not be entirely representative of the FSW population in Senegal in terms of HIV related knowledge and consistent condom use with clients. Participants of this study are expected to have stronger ability to act on the knowledge and use condom consistently with their clients as compared to other FSWs. However, the study was successful in enrolling a diverse sample with

both registered and unregistered FSWs, those from various income brackets and with different income sources. It was hoped to increase the representativeness of the sample. Additionally, the validity on self-reported condom use may be threatened by potential social desirability bias, where participants tended to report consistent condom use, because they thought that was the desirable answer, or for fear of the interviewer's judgement. This was minimized by their prolonged engagement with the study and the emphasis before each interview that there were no right or wrong responses.

The present study also enjoyed several strengths. Firstly, the use of phenomenology methods emphasized the elimination of researchers' preconceived notions when investigating a phenomenon. In the conception of this study and its interview questions, there was no presumed manifestation of economic hardship. The participants were encouraged to share what they themselves saw as economic hardship experiences. As a result, the tendency to conform to existing indicators of economic situations, such as income, food security, etc., was avoided. Consequentially, the essence of economic hardship presented in this study, to a maximum extent, reflected the study participants' perspectives and understandings. Secondly, the progressive probing over the course of three months with each study participant, solved the puzzle of economic hardship by eliciting the participants' life story little by little. Participants revealed more and more details and patches of economic hardship, which may not be fully captured by a single one-hour long interview. This not only ensured the richness of data to construct the thematic structure of FSWs' lived experience of economic hardship, but also allowed a holistic view of FSWs' individual stories, as shown in figure 6.1. Thirdly, the participants' narratives about the context, including their day-to-day activities, how they operated their business, how

they interacted with their family members at home, and how they interacted with their clients, illuminated the specific risk-environment of FSWs in Senegal. Moreover, it enhanced the quality of researchers' understanding and interpretation of the results.

6.6 CONCLUSIONS

FSWs experienced pronounced economic hardship at certain periods and overall. Their experience of economic hardship was characterized by impoverishing economic burden and expenses, as well as limited income generating activities and contextual barriers to escaping from economic hardship. Economic hardship was unlikely to directly drive condomless sex with clients during sex work.

6.7 Tables for Chapter 5

Table 6.1 The structure of FSWs' experience of economic hardship

Sub-ordinate themes	Themes	Description
Experiential characteristics of economic hardship	Deprivation of assistance and survival means	The extreme food insecurity and the exhausted familial and social network for economic help were two experiential units commonly reported
	Most pronounced during certain period of time	The aftermath of a marriage dissolution or the loss of a parent and during religious observations such as Ramadan and *Korité* represented the most pronounced experience of economic hardship
Roles of sex work in economic hardship	Financial autonomy through sex work	A certain degree of financial autonomy was finally achieved after FSWs started to engage in sex work on a regular basis
	Social functions of sex work	With earnings from sex work, FSWs re-claim their roles as caretakers of family members, and recover the lost dignity lost during economic hardship
Economic burden and expenses	Being the only breadwinner	Feeding an entire household of children, siblings and parents was expected as part of the norms
	Non-care seeking in the event of illness	Unpaid medical bills, unattended illness, and unfilled medical prescriptions represent the dimension of bodily suffering during economic hardship
	Expenses related to symbolic values	Expenses on the clothing and food for religious festivals, on relative's funerals and weddings were deemed necessary but often not fulfilled
Leveraging possible resources to cope with economic hardship	Sex work as the primary source of income	Sex work was a major income-generating source to FSWs. They weighed the risk and the economic gain while navigating through sex work
	Seeking alternative livelihood	Alternative livelihood such as retail, domestic work was frequently sought to substitute sex work or decrease the economic reliance on sex work
	Financial management	FSWs attempted to accrue personal saving, collective saving, or request loans to cope with the economic burden or large festive expenses
Contextual barriers to escaping from economic hardship	Prohibitive loans	Loans from banks were hard to access
	Job discrimination	Job opportunities were limited due to lack of skills and discrimination
	Hope exists but only from others	The lack of hope prevails. Economic prosperity is only expected through organizational aid, marriage or grownup children's support

Table 6.2 Demographic characteristics of the study participants

	N=15
Age	
<30	2
31-40	5
≥41	8
Marital status	
Single/never married	1
Divorced	9
Widowed	5
Education	
None	6
Primary or less	5
Secondary or more	3
Registered as sex worker	7
Literacy in Wolof or French	8
Weekly income from sex work†	
<94.5 USD	9
94.5 USD-189.0 USD	4
189.0 USD-283.5 USD	1

†Reported at baseline in local currency West Africa Francs (XOF) when participants firstly enrolled into the parent study.

Figure 6.1 Examples of FSWs' experience of economic hardship situated in life stories

Yaccine[a] (unregistered, 26-30) became a sex[b] worker after her husband passed away when she was young. Over years, she saw sex work as a means for survival[c]. She mentioned that as long as she's making money to provide enough food and cover living expenses for her family it's fine. Yaccine lived with her sister and her mother. Although she did not have any children, Yaccine had to provide for her sister and her mother. She received her clients at her home and made an average of 3000-5000 CFA (equivalent of 5.7 to 9.5 USD) per act[†]. While clients normally offered 50,000 CFA (94.5 USD) to have sex without condom for each time, she refused.

Adja (unregistered, 36-40) had six children and a sister who all lived with her in the family house and solely relied on her for a living. She earned an average of 2000 to 3000 CFA (3.8 to 5.7 USD) per act. Clients proposed 25,000 CFA (47.8 USD) per act without condoms but she did not accept it. She had a boyfriend who wanted to forego condoms with her, but she persuaded him not to for the sake of family planning. Before Adja started sex work three years ago, she used to purchase merchandise from the wholesale market for retail, from which she earned 1,000 CFA (1.9 USD) per day. After realizing the retail business would not afford her and her children's survival, she quit and entered sex work. Although Adja felt her current income from sex work is still insufficient to cover all expenses, she prioritized purchasing food for the family over other needs and made it so far. She reflected on one experience of economic hardship when she was invited to her relative's wedding ceremony but could not go because of lacking money. She also found herself caught up in economic hardship during the observation of *Korité* and felt bad that she could not afford to buy her children clothes or prepare the food for the religious festival. To cope with that she contacted a former client who gave her 90,000 CFA (172 USD).

Aminata (registered, 45+) lived with her little brother and her sister-in-law who themselves did not have jobs and replied on her for food, rent and daily expenses. Aminata did not see any hope for a future change in her economic situation because she did not have any children. Living with diabetes and recently suffering from leg pain, she could not afford the treatment which would cost her 9,000 CFA (17.2 USD). Aminata earned an average of 2,000- 4,000 CFA (3.8-7.6 USD) per act, or 25,000 to 30,000 CFA (47.8- 57.3 USD) for an entire night. Aminata's policy included no condom, no sex. Aminata's aunt encouraged her to continue sex work so that she could keep supporting the family financially. Aminata's initiation of sex work was a smooth transition from *Mbaraan*. Dating back to 2007 she had many boyfriends from whom she received financial assistance and she thought she might as well make it a living.

Ndiaye (unregistered, 31-35) lived with her brothers, sisters, parents and children. After her divorce and her father's death, she

was the only breadwinner of the entire household because her siblings did not work. She reflected on her experience of economic hardship when she reluctantly transferred her children from a private school to a public school because she could not afford the tuition and fees for the private school. Ndiaye usually had sex without condoms with her trusted clients, those who were in stable relationships with their wives or partners. She also did not use condoms with her boyfriend. The average income she earned from sex work was 15,000 CFA (28.7 USD) per act without condom.

Fatima (registered, 41-45) started sex work after her husband passed away. Despite receiving money each month from her husband's life insurance, Fatima had to earn more from sex work in order to raise her family including her daughter, her son and her older sister who used to be a sex worker and now retired. Fatima complained that with the increase in the number of FSWs in Dakar, the market price went down from previously 20,000 CFA (38 USD) per act to much lower price now.

Bintou (registered, 36-40) sought for shelter from her brother after her husband passed away and left her with their seven children. However, she was expelled by her sister-in-law. She managed to rent a place to live in with her children. Bintou recalled at one point spending a few days without eating anything. She was then introduced to sex work by a friend who saw her suffering like that. When she finally came home with food to her children, her children were so happy that Bintou decided to stay in sex work. Bintou said she did not have condomless sex or anal sex although those were paid more. She usually earned 3,000 to 5,000 CFA (5.7- 9.5 USD) per act and received five clients per night. Sometimes she took one day off. Raised in a religious family and fathered by a *marabout*, she felt deeply ashamed of her sex work and was persuaded by her mother multiple times to quit this job. However, Bintou said that her mother should not have a say in her job because Bintou financially supported her mother in addition to her seven children. Bintou felt life was hard with struggles to pay for food and her children's education and it would only be harder because some FSWs were sabotaging the business by charging very low price such as 2,500 CFA (4.8 USD) per act. With increased competition, it's hard for her to manage. Bintou had eye issues but had not sought medical care for fear of the potential cost. She felt another marriage would offer an escape from such economic hardship. However, from her experience, men tended to be scared away after knowing that she had seven children. Bintou told us a policeman was pursuing her and she wanted to wait and see what he could provide before committing.

Diarra (registered, 45+) was the only one in this study that reported enjoying sex work not only for the income from it but also the pleasure. She shared her experience of investing in her rented apartment and making it comfortable and accommodating so that her clients would like to visit and rest there. She rented in a high-end neighborhood which is far from the community where she was born, so that no one judged or shamed her for her sex work. She also made sure that she and her children have separate rooms. In addition to sex work, she also sold perfume and cosmetic creams; wherever she went she always brought

some products with her in case of opportunities to sell them. Diarra said she was very selective about her clients: they had to be well-dressed, well-behaved and looking clean to be her clients. She scheduled her work with her clients through phone communication. While she waited at her apartment for a new client, she usually judged him by looking through the window as he walked into the neighborhood to see how he was dressed. If the client appeared to be vulgar to her, she would call and cancel the appointment using some excuses. Diarra preferred having clients overnight, for which she earned from 15,000 CFA to 500,000 CFA (28.5- 95.0 USD) per night. She saw an improvement in her economic situation after starting the sex work. Now she was almost able to pay for all the rent, food, utilities and a domestic helper. However, she said she struggled to pay for her children's tuition and did not have saving anymore now that one of her children was sick day and night. She had a boyfriend who gave her money regularly and with him she did not normally use condoms. She reflected on her experience of economic hardship when it was during the month of Ramadan when she earned nearly nothing. Besides Ramadan, she sometimes earned little on those "bad days", for example, a whole day of only 2,000 CFA (3.8 USD) but she said she tried her best to make do with that earning.

Mariama (unregistered, 26-30) was quite unique among the study sample. She was the only person who chose to speak French for her interviews; she also reported hardly experiencing economic hardship. The only incidence she recalled was during the time when she started sex work. When her mother passed away and her father wedded another woman, she moved out of her home due to issues with her step-mother. Her father then stopped paying for her tuition and fees when she was at school. When a man told her that he could pay for her school fees in exchange of sex, she accepted it. Apart from sex work, she had a formal job as a secretary during the day. Mariama was also training for running a restaurant in preparation for starting her own business someday, which was her dream. Nowadays with two jobs Mariama said she was able to make the ends meet and no longer experienced any economic hardship. In addition, she provided to her younger siblings from the same mother. She had a boyfriend with whom she did not use condom and received money regularly from him. Mariama saw sex work as an opportunity. Mariama thought it was common for women to leverage sex as a resource to secure economic opportunities even not in sex work. For example, Mariama mentioned the French phrase "*promotion canapé*", where women sleep with their bosses to get promotion in workplace outside sex work.

[a]. All names used here are pseudonyms. [b]. Without otherwise specified, herein sex and sex act typically referred to vaginal sex with the use of male condom and with one client. [c]. Key messages reflecting the essence of economic hardship were underlined.

Chapter 7. Conclusions

7.1 Summary of results

7.1.1 AIM 1: UTILITY OF THE INTEGRATED STIGMA MITIGATION INTERVENTIONS IN ADDRESSING STIGMA RELATED TO SEX WORK

Aim 1 (chapter 4) demonstrated the potential utility of ISMI in addressing enacted and internal stigma among FSWs. The implementation research framework coined by Proctor et al provided a useful lens to understand the various aspects of the ISMI from the perspective of healthcare providers and FSW peer educators involved in the interventions.

Healthcare providers in this study largely considered the clinical training as acceptable. However, debates existed around who should be responsible for the enacted stigma in healthcare settings providing HIV care and services. Additionally, the perceived relevance of mitigating sex work-related stigma to healthcare providers' role varied among the study participants. Some reported perceived low relevance between stigma reduction among FSWs and the clinical role as providing HIV services and care, which can lead to the lack of motivation to provide stigma-free HIV care and services to FSWs.

FSW peer educators involved in this study discussed the utility and the implementation aspects. In addition, they specifically discussed the practical aspects and highlighted areas for

improvement, such as better addressing the location of the group talks as well as increasing the frequency of the group talks for sustained impact on stigma reduction.

Both groups of participants contributed to the understanding of the ISMI implementation. Those findings can guide the next steps of planning and implementing stigma reduction programs for FSWs with respect to specific implementation constructs.

7.1.2 AIM 2: CONDOM USE ASSOCIATED WITH PERCEIVED INSUFFICIENCY OF RESOURCES TO MEET NEEDS

Findings from the second aim of this dissertation (chapter 5) revealed the relationships between economic factors and condom use among FSWs. Firstly, weekly income from sex work was found not to be associated with the condom use with all types of sex partners. However, both the perceived financial insufficiency and affluency to meet needs are associated with decreased likelihood of condom use with clients as compared to the neutral state of financial resources (measured as reporting "a moderate amount" of money to meet needs).

Among those economic factors examined in relation to condom use during the last sex act with specific types of sexual partners, financial responsibility for one or more children was found associated with increased likelihood of condom use with all types of sexual partners, except for new clients. Other economic factors, including sharing sex work income with others, ability to borrow money from other FSWs, and having other income-generating opportunities, were found not associated with FSWs' condom use during the last sex act with any type of sexual partners.

In addition, condom use prevalence among specific types sexual partners was compared with the overall condom use percentage among Senegalese FSWs in 2017 by UNAIDS. The prevalence of condom use with clients during the last sex act approximates the UNAIDS reported prevalence (94%). However, the prevalence of condom use with regular and casual non-paying partners during the last sex act was far less than 94%.

7.1.3 AIM 3: THE EXPERIENCE OF ECONOMIC HARDSHIP IN HIV RISK ENVIRONMENT

Aim 3 (chapter 6) described that FSWs' experience of economic hardship shared common characteristics across cases. The experience of economic hardship was pronounced around the entry to sex work, as well as around major religious holidays such as *Korité*, after a month of sex work in recess. The essential experience of economic hardship was shaped by the following three dimensions.

Firstly, economic burden expenses can be impoverishing, such as day-to-day expenses on necessities, and obligation to provide resources to family members who financially depend on the FSWs. Secondly, FSWs reported leveraging possible resources to cope with the experience of economic hardship. Some of them tried or wanted to seek other employment opportunities to supplement or substitute the income from sex work. Some participated in community-based saving groups, Lastly, FSWs in this study felt that there were contextual barriers to escaping from economic hardship when it came to the prospect of their future. Those were manifested in lack of employment opportunities with low education, and also lack of hope to change the

economic status on one's own, but only counting on the support from grown-up children, or potentially (another) marriage.

7.2 A dialogue between Aim 2 and Aim 3 results

There is no simple answer to the question whether economic disadvantage really drives condomless sex among Senegalese FSWs. However, a dialogue between the findings from Aim 2 and 3 will shed light on how those findings can be integrated together and used to guide the next steps for future research and practices.

Firstly, in Aim 2, a high prevalence of condom use was reported for the sex with clients (>90%). Similarly, in Aim 3, most (14/15) FSWs in the sample reported that they insisted on condom use with their clients and rejected the proposition of condomless sex from their clients. They further explained why one should consistently use condom with clients in order to prevent diseases. Descriptive findings from Aim 2 also showed that the condom use prevalence was less than 70% with regular non-paying partners, which corroborate with the narratives from Aim 3 where some participants explained that with boyfriend condom use was not required. Grounded in those findings, conclusions can be drawn that there is a common understanding of and preference for condom use in the FSW community. The majority shared the collective notion that condom use was a norm in this profession. Outside the profession, though, FSWs' condom use behaviors may not be different, if at all, from adult women in general where relationship intimacy plays an important role. In Aim 2, financial responsibility for one or more children related to increased condom use. That may be explained by the narratives of the last section of Aim 3 results. FSWs counted on their children as their hope to escape from economic hardship. Thus, financial

responsibility for children, although may incur additional child-related expenses at the moment, can foster the hope for the future. It is possible that such responsibility urges FSWs to think about their health and well-being in the long run.

The relationship between financial insufficiency and condom use observed in Aim 2, seemed to be contrary to the findings from Aim 3 where most FSWs reported that accepting the proposition of condomless sex was not a common strategy to mitigate their economic hardship. However, such direct comparison is misleading given that the research questions for Aim 2 and Aim 3 are not entirely the same and it is not part of this thesis' aim to assess if findings from qualitative methods converge with statistical results from the quantitative method used. In Aim 2, financial insufficiency was measured into three categories in comparison with each other. The financial insufficiency's association with condom use was appraised by one-unit change of the perceived financial insufficiency and its correlation with the change in the likelihood of condom use. In contrast, Aim 3 focused on the manifestation of economic hardship, how it represented itself to FSWs at critical moments in life, and what common characteristics it had within different individuals' life stories. When FSWs in Aim 3 narrated about their situation where they felt choice was limited, some participants meant no food for the household if not working hard enough, some meant not being able to retire from sex work or make a living from other income-generating activities, etc.. Aim 3 by no means was suggestive of the statistical association between one unit-change in economic hardship and its effect on condom use probabilities. Aim 3's study design is not able to calibrate the dose-dependent response in condomless use probability to different degrees of economic hardship. Neither is it used for that purpose. Instead, Aim 3 was designed to describe the economic hardship experience, to explore what was done to

cope with the economic hardship. Among those coping strategies mentioned, possibly to one's surprise, striving for the extra money from condomless sex was not reported as one.

Although Aim 2 and Aim 3 do not address the exactly same research question, they can inform each other and guide the next steps of research. For Aim 2, the perceived financial insufficiency currently was measured by a single choice question. This cognitive concept related to HIV vulnerability can be further improved with more robust measurement, such as an index with multiple observable items relevant to FSWs' life as well as the local context. Then, results from Aim 3 can fully leverage their strengths and serve as a guidance on the specific manifestation of economic hardship to start with, in order to develop an index for quantifying the perceived financial insufficiency that carries HIV risk.

7.3 Overall conclusions

Firstly, the understanding of implementation outcomes is oftentimes thwarted by lack of nuanced details and programmatic information. This dissertation filled the gap on understanding a stigma mitigation program's outcome through qualitative assessment in Senegal. Qualitative evidence showed that healthcare providers and peer educators involved in the ISMI largely acknowledge the utility of the clinical and community interventions. According to HIV healthcare providers, the implementation of the clinical intervention can be further optimized by strengthening their perceived adoption, feasibility and appropriateness.

Secondly, the prevalence of condom use was far from consistent use between FSWs and their non-paying partners. Associations were observed between the perceived insufficiency of money

to meet needs and having child dependents with FSWs' condom use behavior with certain types of sex partners. Specifically, FSWs' subjective feeling of financial insufficiency and affluency were both inversely related to their condom use with certain types of partners. Financial responsibility for one or more children related to increased condom use with regular sexual partners. Future research may investigate the cognitive measurement of perceived financial insufficiency that potentiates HIV risk among FSWs and the mechanism of the relationship between financial responsibility for dependent children and condom use.

Lastly, FSWs experienced pronounced economic hardship at certain periods and overall. Their experience of economic hardship was characterized by impoverishing economic burden and expenses, as well as limited income generating activities and contextual barriers to escaping from economic hardship. Economic hardship was unlikely to directly drive condomless sex with clients during sex work but might compound FSWs' vulnerability to HIV risk through indirect pathways.

7.4 Strengths and limitations

The findings from this dissertation should be understood in the light of several limitations.

Firstly, the data collection in Aim 1 occurred during the late phase of the intervention, which made it difficult to capture the initial phase of the implementation. An ideal study design would encompass a formative research phase, and a few time points during the implementation to document the dynamic changes of some implementation outcomes over time. Also, in the interviews and focus group discussions, we did not probe opinions on the specific modules of the

training material because the aim of this study was not to collect feedback on the modules for revising and improving the quality of training material, but rather to present a holistic description of the implementation outcomes as seen by healthcare providers and peer educators. In the original framework by Proctor et al. [85], implementation cost was another key construct in assessing the implementation outcomes, but was not addressed in the present study. The reason was that the researchers felt that quantitative evidence would add more value in capturing the cost and in fact, one separate analysis on cost-effectiveness of the parent study has been planned.

Next, the measures of economic variables in Aim 2 were selected based on available questions in the parent study's baseline questionnaire. The available information in the data on FSWs' income was not ideal with the risk of over-reduction. Additionally, the behavioral outcome, condom use, was measured by self-reported binary outcome at the last sex act. To measure consistent and correct condom use, more data points and details on the use of condom would be needed. Aim 2 also did not directly capture the offering and accepting extra money for not using condom between FSWs' clients and FSWs. Although those questions were asked in the questionnaire, a large portion of participants refused to respond, resulting in a large number of missing values for about half of the observations.

Lastly, for Aim 3, the study sample was drawn from an ongoing HIV prevention intervention (ISMI) as part of the parent study [64] which may not be representative of the FSW population in Senegal in terms of HIV-related knowledge and consistent condom use with clients. Participants of this study are expected to have stronger ability to act on the knowledge and use condom consistently with their clients as compared to other FSWs due to the implementation of ISMI.

Additionally, the validity on self-reported condom use may be threatened by potential social desirability bias, where participants tended to report consistent condom use, because they thought that was the desirable answer, or for fear of the interviewer's judgement.

7.5 Recommendations for future research

Future study might want to consider: (i) further exploring the possibility of scaling up ISMI clinical and community interventions to reach more healthcare providers in the health system who interact with FSW patients, and increasing the frequency of group talks led and delivered by FSW peer educators to their peers; (ii) collecting income data in continuous form, which allowed more modelling options during the assessment of the association between FSWs' income and their condom use behaviors; and (iii) developing psychometric tools to measure the subjective experience of economic hardship among FSWs, to complement the objective economic indicators in the discourse of economic determinants of HIV.

Chapter 8. Appendices

8.1 Interview guides for FSW interviews

Interview Guide for Female Sex Workers Cohort Members

PI: Stefan Baral

Study Title: Using molecular, statistical, and economic evaluation to describe the ability of integrated stigma mitigation interventions (ISMI) to potentiate the effectiveness of existing HIV prevention, treatment, and care services for key populations including men who have sex with men (FSW) and female sex workers (FSW) in Dakar, Senegal

PI Version/Date: **V1/ 19 January 2017**

IRB No.: IRB00005832

CHECKLIST FOR THE INTERIVEWER:

- ☐ Familiarize yourself with the interview questions before hand
- ☐ Introduce yourself to the interviewee
- ☐ Read the consent form and answer questions that the interviewee may have
- ☐ Ask permission to record interview and signing the consent form
- ☐ Complete the demographic information page before starting the interview
- ☐ Turn on the recorder, if permission was granted. If permission was not granted, thank the interviewee and address any questions they may have regarding this research project.
- ☐ Start interview and take copious notes as you go
- ☐ When interview is complete, thank the interviewee

GUIDELINES

1. Build rapport early on during your introduction
2. Listen carefully and express interest in what the participant is telling you
3. Use probing techniques to help participant expand on their answers (repetition, silence, "tell me more", "give me an example", "walk me through the details", etc)
4. Let the participant determine the pace of the interview and be attentive to her mood and needs
5. Let the participant determine the conversation's direction if it's within the topic interest. The probing questions only serve as an aid for the interviewer and thus do not have to be asked if the participant already shares the relevant information
6. Make sure interview recorder is on and close to the participant

INTRODUCING YOURSELF:

Hello, my name is _____. I am one of the project staff on this research study. Thank you for meeting with me today. I'll be having a conversation with you to talk about some challenges you may face in your day-to-day life. I also want to hear about the experiences you've had in participating in the study cohort so that we can better re-orient our program to meet your needs. Please there are no right or wrong answers. I just want to hear your opinion.

PARTICIPANT DEMOGRAPHIC INFORMATION	
UNIQUE ID	☐☐☐☐☐☐☐☐

AGE GROUP	☐ 18- 25 ☐ 25- 30 ☐ 31- 35 ☐ 36- 40 ☐ 41- 45 ☐ 45+
REGISTRATION	☐ Never registered ☐ Registered before but currently not registered ☐ Currently registered
INVOLVEMENT	a. Previously participated in _____ workshop(s) b. Previously participated in _____ study visit(s)
INTERVIEW INFORMATION	
INTERVIEW DATE	_____DD_____MM_____YYYY
INTERVIEWER CODE	☐☐
CITY	☐ Dakar ☐ Mbour ☐ Thiès
CONSENT	☐ Yes *(Make sure the consent form is signed)* ☐ No *(Stop if not granted)*

MAIN LANGUAGE OF THE INTERVIEW	☐ French ☐ Wolof ☐ Other (Specify: _____)
START TIME	_____hh _____mm

Module A. General Daily Activities and Perceived Norms in Sex Work

[Let's get to know each other by telling me a little about yourself, what do you do for work and for fun]

1. **Maybe we can start by you telling me about what a typical day looks like for you?**

   Probe:

   a. What are the normal hours when you work? What are the normal hours when you rest? Other than those, what else do you do during a typical day?

2. **What is your relationship like with your family, extended family members, or husband if you have one, or friends?**

   Probe:

   a. How close are you with them?

   b. What kind of support do you feel you can you get from them, if any?

   c. What kind of support do think you usually give to you them, if any?

3. **Coming back to the place where you live, how do you feel about living in that neighborhood?**

   Probe:

   a. How safe or not do you feel living in that neighborhood?

   b. How accepted or not do you feel by your neighborhood where you live?

c. What's your engagement with that community?

[Please take a moment to think about how sex is exchanged for money or goods in general in this city and your opinions about it. Remember, you DON'T have to draw on your own experience if you don't feel comfortable doing so.]

4. **As far as you are aware, how is sex sold or exchanged here in this city?**

   Probe:

   a. Who manages sex work (e.g. pimps, gatekeepers, bar owner)? Can you describe any person involved other than those selling or buying sex? In your opinion, how does that affect you or other sex workers?

   b. How do women usually find the clients? How safe are those ways?

   c. Where/in what types of places do women usually sell sex?

5. **How's the relation like among women who sell sex? Can you give me examples?**

   Probe:

   a. To what extent do women help each other? or trust each other?

   b. To what extent do women compete?

   c. How do they communicate with each other?

[Let's talk about the male clients involved. Please take a moment to think about your experience or other women's experience of interacting with the male clients.]

6. **What are the clients like? Can you give me examples?**

   Probe:

   a. Are there different types of clients? Can you give me some examples?

   b. For example, do you have regular clients who come frequently?

c. How do you interact with your clients differently? Please give an example.

7. **As far as you know, how is sex paid here in this city?**

   Probe:

   a. Who usually decide the price? Is it usually before or after sex?

   b. What kind of payment is acceptable? (cash, gifts, or others?)

   c. Are there certain types of sex that get paid more for? Can you give me some examples?

Module B: Perceived Implementation Barriers and Facilitators

[Now let's talk about the study visit and the workshop those peer-educator held in the community.]

8. **Tell me what your overall experience has been participating in the study activities?**

   Probe:

   a. How pleasant or unpleasant was it?

   b. What motivated you to join us?

   c. What has been helpful and what not?

   d. What are your opinions on the content and information from the workshops?

[Now let's talk about the <u>study visits</u> we had so far. Study visits are those when you come every three months and chat with our staff and they typed the answers on a digital tablet.]

9. **Were there times when coming to <u>a study visit</u> was difficult for you? If so, could you give me examples of those difficult times?**

   Probe:

   a. Can you describe the situation?

b. Related to time, transportation, health, other competing priority, etc.

10. Are there things that could have been done to make it easier for you to come to the <u>study visit</u>? If so, can you give some examples?

Probe:

a. Related to the time, length and frequency of the study visit

b. Related to the interaction with the study staff

c. Related to the location of the study visits

[Now let's talk about the <u>group talks</u> we had so far in the community. Group talks are those held by the peer-educators in the community where you talked about issues concerning sex workers.]

11. In your opinion, what are the major issues women face when participating in the <u>group talks</u> led by peer-educators in their communities? Please explain.

Probe:

a. Can you give some examples?

12. Are there things that could have been done to make <u>attending a group talk</u> easier for you?

Probe:

a. Related to the content of the group talk

b. Related to the time, length and frequency of the group talk

c. Related to the interaction with the study staff

d. Related to the location of the group talk

13. **Would you like to share any <u>other</u> thoughts about how the study activities are organized?**

    Probe:

    a. What do you like about participating in the study activities?

    b. What do you not like about participating in the study activities?

    c. Please give some examples.

Module C. Perceived Effectiveness and Impact of Interventions

[I am going to ask you some questions about your experience of disclosure and stigma. Some of these questions may make you feel uncomfortable. You can skip any question you do not like.]

1. **How are sex workers perceived by people of the community where you live in Senegal?**

    Probe:

    a. Do people know that you are a sex worker? If so, have you ever felt that someone treated you differently based on the perception of your profession in the past three months? Please describe the last time in the last three months when that happened to you.

    b. How do you deal with this stress/cope in general? Who do you rely on for support?

    c. Have you noticed any change in the social situation (for example, socio-economic status of sex workers, and what the community thought about the sex workers) over time? If so, can you describe the change?

2. **Compared to women not in sex work, what challenges or opportunities do you think women in sex work face in particular?**

   Probe:

   a. Do you think women in sex work have the same rights or freedom as other women? Can you describe similarities or differences? Can you tell me some examples of either yourself or others?
   b. In your opinion, how does sex work impact your economic situation (such as direct monetary gain, or employment opportunities)? And how does it impact your social interaction with family, friends or partner?

[I am going to ask you some questions about your experience of health care. Some of these questions may make you feel uncomfortable. You can skip any question you do not like.]

3. **What was your experience like when you sought health care in the past three months, or the last time (if it was even earlier)? Can you describe the situation?**

   Probe:

   a. Where/what type of health facilities did you seek care from (public/private)?
   b. What happened that prompted you to go see a health professional?
   c. How was the treatment? And how was the interaction with the doctors/nurses?
   d. How was the cost?
   e. How satisfied were you about the visit?
   f. Was the health provider who took care of you aware of the type of work you do?

4. **Have you felt the need to see a doctor/nurse, but did not go because of some concern in the past three months? If so, can you describe that situation?**

   Probe:

a. What happened that prompted you to go see a health professional?

b. What was the reasons that stopped you from going to see the doctor/nurse?

c. How did you manage the symptoms in the end?

5. **If you had the chance to make changes in how doctors/nurses treat you, what would you change?**

   Probe:

   a. Could you tell me what you think women in sex work expect when they seek care at the facility for general health care? And for reproductive health related care (including HIV testing and counseling)?

   b. What do you think women in sex work need when they seek care at the facility?

   c. Do you think that their expectations and needs are met? Please explain.

Module D. Financial Situations and Coping with Economic Hardship

[Let's start with how you make a living and deal with daily costs]

1. **Tell me on what you spend most of your money or resources?**
2. **Tell me how you manage to find resource or money to cover those expenses?**
3. **How confident are you about reconciling what you need and what you can make?**

4. **How satisfied are you with what you currently earn and receive from others? Explain**

   Probe:

   a. How do you think this would change in the future, if so?

b. How confident would you say you are about the amount of money you make, or resource you could find through other ways?

c. What does your financial plan look like, if there is any?

[Think about the memorable moments when you face economic hardship.]

5. **Take a moment to think about the last time when you ran out of money to pay for what you need. What was the situation like?**

   Probe:

   a. When and in what circumstance did that happen?

   b. How did you feel?

   c. How did it impact your life?

   d. How did you find ways to secure additional income or resource to alleviate that?

   e. How did sex work relate to those situations?

Module E: Health Behaviors and Reproductive Health Needs

[Now we will move on to the topic of condoms.]

1. **Now let's talk about condoms in your working environment. How has been your experience with condoms?**

   Probe:

   a. How easy could you obtain them? Give some examples?

   b. Would carrying condoms be a problem for you? If so, describe how?

2. **How is condom use usually decided between you and the clients? Please give some examples?**

   Probe:

   a. How is it agreed and decided?

   b. Who makes the final decision?

   c. When the agreement breaches, what's next?

3. **Some women in sex work have mentioned that sometimes sex can be sold for more money if a condom is not used. Have you heard about this?**

   Probe:

   a. How was your experience with it? Please give some examples.

   b. In your opinion, how do you think about it?

[We talked about condoms. Let's talk about other reproductive health needs and services?]

4. **What reproductive health services are available to you? Please explain.**

   Probe:

   a. Related to birth limiting and spacing

   b. Related to HIV prevention

   c. Related to other STI prevention

5. **How satisfied are you about those services? Please explain.**

   Probe:

   a. What could have been changed/added?

   b. What would be helpful to make things easier for you?

   c.

Module F. Entry to Sex Work And Lived Experience Of Financial Strain

[Now let's take some time to think about when you started working as an FSW.]

1. **Take a moment to think about when you firstly started working in sex work, what was it like?**

   Probe:

   a. Describe the situation/environment in detail

   b. What motivated you to make the choice, if that's your own choice?

   c. How does it affect your income and expenses? Explain.

2. **Take a moment to think about the last time when you ran out of money to pay for what you need. What was the situation like?**

   Probe:

   a. When and in what circumstance did that happen?

   b. What was your feeling like being in such a situation?

   c. How do you think it has affected your life?

   d. How did you find ways to secure additional income or resource to alleviate that?

   e. How do you think selling sex is related to those situations?

8.2 Interview guides for healthcare providers

Interview Guide for Healthcare providers

PI: Stefan Baral

Study Title: Using molecular, statistical, and economic evaluation to describe the ability of integrated stigma mitigation interventions (ISMI) to potentiate the effectiveness of existing HIV prevention, treatment, and care services for key populations including men who have sex with men (FSW) and female sex workers (FSW) in Dakar, Senegal

PI Version/Date: V1/ 19 January 2017

IRB No.: IRB00005832

CHECKLIST FOR THE INTERIVEWER:

- ☐ Familiarize yourself with the interview questions before hand
- ☐ Introduce yourself to the interviewee
- ☐ Read the consent form and answer questions that the interviewee may have
- ☐ Ask permission to record interview and signing the consent form
- ☐ Complete the demographic information page before starting the interview
- ☐ Turn on the recorder, if permission was granted.
- ☐ Start interview and take copious notes as you go
- ☐ When interview is complete, thank the interviewee

GUIDELINES

1. Build rapport early on during your introduction
2. Listen carefully and express interest in what the participant is telling you
3. Use probing techniques to help participant expand on their answers (repetition, silence, “tell me more”, “give me an example”, “walk me through the details”, etc)

4. Let the participant determine the pace of the interview
5. Let the participant determine the conversation's direction if it's within the topic interest
6. Make sure interview recorder is on and close to the participant

INTRODUCING YOURSELF:

Hello, my name is _____. I am one of the project staff on this research study. Thank you for meeting with me today. I'll be having a conversation with you to talk about providing health care to key population. Please there are no right or wrong answers. I just want to hear your opinion.

PARTICIPANT DEMOGRAPHIC INFORMATION	
1. UNIQUE ID	☐☐☐☐☐☐☐☐
2. AGE GROUP	☐ 18- 25 ☐ 25- 30 ☐ 31- 35 ☐ 36- 40 ☐ 41- 45 ☐ 45+
3. EXPERIENCE	a. Have been providing care for _____ year(s). b. Have been working at this facility for _____ year(s).
4. CADRE	☐ Doctor ☐ Nurse ☐ Other (Specify: _____)
INTERVIEW INFORMATION	
1. INTERVIEW DATE	_____dd_____mm_____yyyy
2. INTERVIEWER CODE	☐☐

3. CITY	☐ Dakar ☐ Mbour ☐ Thiès
4. CONSENT	☐ Yes *(Make sure the consent form is signed)* ☐ No *(Stop if not granted)*
5. MAIN LANGUAGE FOR THIS INTERVIEW	☐ French ☐ Wolof
6. START TIME	_____hh _____mm

SECTION A. EXPERIENCE OF PROVIDING HEALTH CARE TO FSW

1. **In the past 12 months, has any of your female clients <u>disclose to you</u> that they had sex in exchange for money or goods? If so, describe the situation.**

   Probe:

   a. *How did they tell you? Or, how did you ask them?*
   b. *How did you feel after hearing or knowing that?*
   c. *How did you react to it after you got to know that they had sex in exchange of money or goods?*

Now let's talk about the care and services you provided to those clients (female clients who exchange sex for money or goods). It would be helpful if you could give me examples when answering those questions.

2. **In the past 12 months, how was the last time where <u>you provided care or services</u> to your female clients who exchanged sex for money or goods?**

   Probe:

   a. *What type of services did you provide to them? (primary care, sexual health care, contraception, cervical screening and antenatal care, etc.).*
   b. *What did you feel about communicating to those clients?*
   c. *How satisfied were those clients about the care and services that you provided?*

3. **In your opinion, compared to other women, what <u>health needs</u> do FSW clients have in particular?**

   Probe:

   a. *How is the care or service provided to FSW different from that provided to non-FSW?*
   b. *How do you <u>interact with</u> your FSW clients and non-FSW clients differently?*
   c. *How competent do you feel about addressing their health needs?*

4. **In your opinion, compared to other men, what do FSW clients <u>expect</u> when they seek care and services from your facility?**

   Probe:

   a. *In your opinion, how is quality care defined for FSW clients?*
   b. *How competent do you feel that you could meet those expectations?*

SECTION B. CLINICAL INTERVENTION- 1ST TRAINING SESSIONS

1. **Have you even attended a training on the unique healthcare and HIV prevention, care and treatment for FSW? If so, describe that experience:**

   Probe:

   a. When was it organized? Who organized it? How long did it last?

   b. What did you learn from it? What was the main content?

   c. What topics did you hope to learn but did not during that training?

   d. How did that influence your practices in regard to providing unique healthcare and HIV-related services to those clients?

2. **What information is important to you that you hope to learn more about during the upcoming training we will organize?**

   Probe:

   a. *For example: sexuality, and sexual health, mental health and general health promotion*

   b. *Barriers to healthcare access by FSW*

   c. *Creating a friendlier environment for FSW*

   d. *Drugs and alcohols use*

   e. *Interventions for HIV and STI prevention, clinical care for HIV and STIs for FSW*

3. **How will learning about the healthcare needs of key populations be helpful to you <u>as a provider</u>?**

   Probe:

   a. *How helpful do you think it is for improving the quality of care?*

   b. *How helpful do you think it is for improving the provider- patient communication?*

   c. *How helpful do you think it is for containing HIV epidemic?*

4. **How will learning about the healthcare needs of key populations be helpful for <u>your clients</u>?**

   Probe:

   a. *How helpful do you think it is for addressing the unique health needs of key populations?*

   b. *How helpful do you think it is for encouraging those clients to seek care from facilities? What type of care (HIV testing and counseling, STI screening and HIV treatment, ART adherence, etc)?*

SECTION C. CLINICAL INTERVENTION- 2nd TRAINING SESSIONS

1. **In your opinion, what part of the healthcare providers training do you like the best?**

   Probe:

   a. *What are the most helpful content information for you?*

   b. *How would it assist you with your clinical work?*

   c. *How would it assist you with interacting with your patients?*

2. **In your opinion, what part of the healthcare providers training do you think is less helpful to you?**

   Probe:

   a. *Why was it not helpful?*

   b. *How could it be improved?*

3. **Are there topics you would like to know about, but not covered in the training?**

   Probe:

   a. *What are the topics?*

   b. *How important is it to you? Why is it important to you? Please describe.*

4. **If you are to make changes to such training for healthcare providers in the future, how would you improve it?**

   Probe:

   a. *For example, the content? The format of the training? The length of the training?*

   b. *The location of the training?*

   c. *Related to the trainers?*

8.3 Focus group discussion guide

Focus Group Discussion Guide – FSW Peer Educators

PI: Stefan Baral

Study Title: Using molecular, statistical, and economic evaluation to describe the ability of integrated stigma mitigation interventions (ISMI) to potentiate the effectiveness of existing HIV prevention, treatment, and care services for key populations including men who have sex with men (FSW) and female sex workers (FSW) in Dakar, Senegal

PI Version/Date: V1/ 19 January 2017

IRB No.: IRB00005832

CHECKLIST FOR THE MODERATOR AND THE NOTETAKER:

- ☐ Familiarize yourself with the discussion questions before hand
- ☐ Introduce yourself to the focus group members
- ☐ Read the consent form and answer questions that the group members may have
- ☐ Ask permission to record interview and signing the consent form
- ☐ Complete the demographic information page before starting the interview
- ☐ Introduce the ground rules for the focus group discussion
- ☐ Encourage participants to have varying opinions
- ☐ Explains that opinions will not make him/her feel bad or affect him/her in any way
- ☐ Distribute the name tents to the group participants for number or their preferred pseudonyms
- ☐ Turn on the recorder, if permission was granted
- ☐ Start interview and take copious notes as you go
- ☐ When focus group discussion is complete, thank the participants

GUIDELINES

1. Build rapport early on during the introduction
2. Listen carefully and express interest in what the participants are telling you
3. Use probing techniques to help participant expand on their answers (repetition, silence, “tell me more”, “give me an example”, “walk me through the details”, etc)
4. Let the participant determine the pace of the interview
5. Make sure each participant has an opportunity to speak and the discussion is well balanced
6. Make sure that participants are respectful to each other even when disagreement occurs

INTRODUCING YOURSELF:

Hello, my name is _____. I am one of the project staff on this research study. Thank you for meeting with me today. I’ll be having a conversation with you to talk about the community intervention, or group talks you have hosted. There are no right or wrong answers. I just want to hear your opinion.

FOCUS GROUP DISCUSSION INFORMATION

DATE:	START TIME:	CITY AND PLACE:

PARTICIPANT INFORMATION

	Participant No./ Pseudonym	Age Range	Consent *(mark "X" if received)*	Compensation *(mark "X" if received)*	Note
1					
2					
3					
4					
5					
6					
7					
8					

DATA COLLECTOR INFORMATION

Moderator:	
Notetaker:	

File name:	

FOCUS GROUP DISCUSSION TOPICS

Topic 1: Content/Input:

Before you started hosting group talks with your peer in the community, how well do you think that you are prepared?

Probe:

a. *How do you feel about the training you received on those topics?*
b. *How confident or not do you feel about giving the talks on those topics?*
c. *What areas did the training not cover but might be helpful for you as a peer-educator?*

Topic 2: Fidelity (to design):

When you were hosting group talks with the peer, to what extent do you think you have carried out the talks as originally planned?

Probe:

a. *What are the differences between how the group talks were actually implemented as compared to what was originally planned?*
b. *What were the reasons that you made those adaptions?*

Topic 3: Dose Delivered (completeness)

To what extent were the group talks delivered to the peer in community?

Probe:

a. *Did the group talks happen at the originally planned frequency? Explain.*
b. *Did you manage to complete all the modules for the group talks? If not, explain what were the barriers to achieving that?*

Topic 4: Dose Received

To what extent do you think those group talk participants received or used the messages you were trying to convey at the group talks?

Probe:

a. *How was the content received and adopted by your peer in the community?*
b. *If you have heard feedback from the participants, what did they tell you about their thoughts on the group talks?*

Topic 5: Reach/Coverage:

Do you think the group talks have reached all the targeted cohort members? Explain.

Probe:

a. *How many participants participated in the group talks usually?*
b. *Are they all from the HP2 cohort?*
c. *Among the participants assigned to you, what do you think about the attendance?*

Topic 6: Recruitment

What procedures did you use to contact the participants and organized them into the group talks?

Probe:

a. *How difficult was it to get in touch with participants?*
b. *How difficult was it to confirm a time and location with the participants?*
c. *What were the main barriers in following up with the participants?*

Topic 7: Contextual barriers and enablers

What are the factors in place that may have influenced the implementation of the community intervention component of HP2?

Probe:

a. *What were the major obstacles in working as a peer-educator?*
b. *What were the major challenges you face while delivering the group talks?*
c. *What were the facilitators/enablers?*

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EDUCATION

Johns Hopkins Bloomberg School of Public Health, Department of International Health

September 2013 – May 2018, Baltimore, MD, USA

Doctor of Philosophy (PhD), Social and Behavioral Interventions Program. Advisor: Larissa Jennings, PhD

Duke University, Duke Global Health Institute

September 2011– May 2013, Durham, NC, USA

Master of Science in Global Health (MSc-GH), Global Health. Mentor: David Walmer, MD

Peking University, Health Sciences Center, School of Pharmaceutical Sciences

September 2007– July 2011, Beijing, China

Bachelor of Science (B.S), Applied Pharmacy and Pharmaceutics.

RESEARCH EXPERIENCES

Johns Hopkins University, Department of Epidemiology

October 2016 – present, Baltimore USA & Dakar, Senegal

Student Investigator, the qualitative phase of the study "using molecular, statistical, and economic evaluation to describe the benefit of integrated stigma mitigation intervention (ISMI) to potentiate the effectiveness of existing HIV prevention, treatment, and care services for key populations" (PI: Dr. Stefan Baral)

- Developed the qualitative protocols and interview and focus group discussion guides

- Conducted fieldwork including 45 in-depths interviews and seven focus group discussions
- Analyzed qualitative data guided by interpretative phenomenological methods
- Currently writing PhD dissertation on the economic factors and HIV prevention in Senegal

ENDA Santé -Johns Hopkins Joint Program on Research and Policies West Africa

June 2015 – September 2017, Dakar, Senegal

Research Assistant, the "People Living with HIV Stigma Index 2.0: a survey to measure stigma and discrimination experienced by people living with HIV/AIDS in Senegal and Cameroon" (PI: Dr. Stefan Baral)

- Coordinated and prepared study material for IRB submission
- Supervised the survey data collection on site and regularly checked data quality
- Performed data tabulations and statistical analyses in preparation for the program report
- Prepared the first draft of a manuscript on HIV stigma intersectionality among key populations which was recently submitted to the Journal of International AIDS Society

World Health Organization headquarter, Department of Reproductive Health and Research, Maternal and Perinatal Health and Preventing Unsafe Abortion (MPA) team

July 2016 – September 2016, Geneva, Switzerland

Qualitative Research Intern, Project "Better Outcomes in Labor Difficulty (BOLD)"; and study "a systematic review on reasons for opting for Caesarean section without medical indication" (Supervisors: Dr. Meghan Bohren, and Dr. Qian Long)

- Synthesized the qualitative evidence on challenges and opportunities during labor monitoring practices as part of obstetric care in Nigeria and Uganda and prepared the first draft of a peer reviewed manuscript
- Contributed to the title and abstract screening, full-text screening, data extraction and the manuscript preparation for the study "systematic review on caesarean section without medical indication in China"

Johns Hopkins Bloomberg School of Public Health, Department of Population, Family and Reproductive Health, The Gates Institute for Population and Reproductive Health

February 2014 – November 2016, Baltimore, MD, USA

Research Assistant, the Family Health and Wealth Study (FHWS) secondary data analyses on economic determinants of skilled birth attendants (SBA) use in Nigeria and Ghana (Supervisor: Dr. Larissa Jennings)

- Performed bivariate and multivariate regression analyses using the cross-sectional data collected from the FHWS
- Contributed to the preparation of a peer-reviewed manuscript on the association between economic variables and the utilization of SBA services in Nigeria and Ghana

Grameen Foundation, Ghana Country Office

July 2014 – January 2015, Accra, Ghana & Baltimore, MD, USA

Monitoring and Evaluation Consultant, Mobile Technology for Community Health (MoTeCH) process evaluation

- Developed program evaluation strategies to assess a mobile health(mHealth) initiative implemented in Ghana
- Conducted interviews with the community health workers and key informants from Ghana Health Services
- Transcribed interviews in English and coded the transcriptions
- Contributed to the preparation of a peer-reviewed manuscript on the implementation of MoTeCH

Duke University, Duke Global Health Institute

August 2012 – May 2013, Dar es Salaam, Tanzania & Durham, NC, USA

Research Assistant, a pilot study on the health of Chinese migrants in Tanzania using questionnaire (PI: Dr. M. Giovanna Merli)

- Reviewed and translated the questionnaire from English to Mandarin Chinese
- Conducted the formative research among the two subgroups of Chinese migrants in Das es Salaam using participatory observation methods and took copious field notes

Duke Global Health Institute & Family Health Ministries

October 2011– May 2013, Léogâne, Haiti & Durham, NC, USA

Student Investigator, master's thesis research "health beliefs and women's decision making on contraception use in Léogâne, Haiti" (Mentor: Dr. David Walmer)

- Developed thesis research proposal and qualitative guides on the health beliefs and contraceptive behavior informed by the extended Health Belief Model
- Completed 10 weeks data collection of 16 in-depth interviews and six focus group discussions in Haiti
- Analyzed qualitative data and wrote master's thesis based on the study findings

Chinese Academy of Social Sciences, Institute of Sociology

December 2009 – April 2011, Beijing, China

Student Interviewer, a study on the experiences of families with children diagnosed with autism spectrum disorder (ASD) in Beijing, China (PI: Jing Li)

- Coordinated the participant recruitment and informed consent forms preparation
- Conducted in-depth interviews with the caretakers of children with ASD in metropolitan Beijing
- Analyzed qualitative data and completed a final report on the diagnostic practices of early ASD in Beijing

TEACHING EXPERIENCES

Teaching assistant for the following courses between 2015 and 2016 at Johns Hopkins Bloomberg School of Public Health:

340.600.01 STATA Programming.

Department: Epidemiology

221.624.81 Urban Health in Developing Countries.

Department: International Health

221.606.81 Training Methods and Continuing Education for Health Workers.

Department: International Health

221.688.81 Social and Behavioral Foundations of Primary Health Care.

Department: International Health

Invited lecture at Department of Mental Health, Johns Hopkins Bloomberg School of Public Health:

"Stigma among key populations in Senegal", Jan 2018

Course name: Department of Mental Health seminar (required course for all master's students)

Course instructor: Dr. Sarah Murray

THESIS AND DISSERTATIONS

2013 Master's thesis: health beliefs and contraception use in Léogâne, Haiti: a qualitative study.

2011 Bachelor's thesis: the reduction of blood calcium (Ca^{2+}) effect of salmon calcitonin CS/GP thermosensitive hydrogel via subcutaneous injection

PUBLISHED ARTICLES ON PEER-REVIEWED JOURNALS

1. **Yang, F.**, Bohren, M. A., Kyaddondo, D., Titiloye, M. A., Olutayo, A. O., Oladapo, O. T., ... & Fawole, B. (2017). Healthcare providers' perspectives on labor monitoring in Nigeria and Uganda: A qualitative study on challenges and opportunities. *International Journal of Gynecology & Obstetrics*, *139*(S1), 17-26.

2. Jennings, L., **Yang, F.**, Otupiri, E., Akinlo, A., Okunlola, M., & Hindin, M. (2017). Association of Household Savings and Expected Future Means with Delivery Using a Skilled Birth Attendant in Ghana and Nigeria: A Cross-Sectional Analysis. *Maternal and child health journal*, *21*(1), 85-95.

3. Rothstein, J. D., Jennings, L., Moorthy, A., **Yang, F.**, Gee, L., Romano, K., ... & LeFevre, A. E. (2016). Qualitative Assessment of the Feasibility, Usability, and Acceptability of a Mobile Client Data App for Community-Based Maternal, Neonatal, and Child Care in Rural Ghana. *International journal of telemedicine and applications*, *2016*.

4. Kalbarczyk, A., Leontsini, E., Combs, E., **Yang, F.**, Ahmadi, A., & Charron, K. (2015). Evaluation and Support Mechanisms of an Emerging University-wide Global Health Training Program. *Annals of global health*, *81*(5), 602-610.

CONFERENCE ABSTRACTS

1. **F. Yang**, B. Liestman, F.M. Dramé, A.K. Diop, C. Lyons, K. Coly, A. Diallo, K. Diop, A. Kane, N. Leye Diouf, C. Toure Kane, G. Turpin, S. Ketende, L. Jennings, S. Baral. Describing the price differential for condom-less sex into HIV prevention programming for female sex workers in Senegal. *International AIDS Conference* 2017 in Paris, France

2. C. Lyons, B. Liestman, S. Ketende, F. Dramé, D. Diouf, I. Njindam, G. Turpin, K. Coly, S. Schwartz, A. Rao, **F. Yang**, S. Baral. Unmet stigma mitigation needs among female sex workers in six countries across sub-Saharan Africa. *International AIDS Conference* 2017 in Paris, France

3. B. Liestman, A. Rao, F.M. Dramé, A.K. Diop, D. Diouf, C. Lyons, K. Coly, A. Diallo, K. Diop, A. Kane, C. Toure Kane, N. Leye Diouf, **F. Yang**, S. Ketende, G. Turpin, S. Baral. Forced sex and physical violence affecting men who have sex with men in Senegal: associations with HIV and HIV related outcomes and perceived and enacted stigma. *International AIDS Conference* 2017 in Paris, France

4. L. Parmley, A. Rao, S. Ketende, C. Lyons, D. Diouf, F. Drame, B. Liestman, **F. Yang**, K. Coly, G. Turpin, D. Castor, N. Leye-Diouf, S. Baral. Engagement in HIV prevention services among registered and non-registered female sex workers in Senegal. *AIDS Impact* 2017 in Cape Town

BOOK CHAPTER

The Screening and Diagnosis of Child Autism in Beijing, China, collected in the symposium *An In-Depth View of Autism: Global vs. Local (Toushi Zibizheng: Bentu Jiating Shizhengyanjiu yu Haiwai Jingyan)*, 2011. ISBN: 9787801686374

HONORS AND AWARDS

International AIDS Society, Member, 2017-2019

International AIDS Society Conference Scholarship, 2017

JHSPH Student Assembly Fall Student Conference Fund Award, 2016 -2017

Johns Hopkins Center for Global Health, global health established field placement (GHEFP) Award, 2016

China Scholarship Council (CSC) tuition support and stipend for doctoral student, 2014-2018

Johns Hopkins Department of International Health Tuition Scholarship, 2013-2018

Duke Global Health Institute merit-based scholarship, 2011-2012 and 2012-2013

Duke Global Health Institute fieldwork travel grant, 2012

SKILLS AND LANGUAGES

- Languages: Chinese (native), English (proficient), French (elementary) and Haitian Creole (elementary)
- Software: ATLAS.ti, MAXQDA, STATA 15, Mplus, and ArcGIS
- Others:
    - HIV testing and counseling, certified by Maryland Department of Health and Mental Hygiene

- Programming and design digital questionnaire using SurveyCTO platform
- Fieldwork experiences: Cameroon, China, Ghana, Haiti, Senegal and Tanzania

EXTRACURRICULAR ACTIVITIES

2016-2017 HIV counselor, Generation Tomorrow program at Johns Hopkins Hospital Emergency Department

2014-2015 Volunteer, Youth Opportunity (YO!), Baltimore, MD

2014-2015 Volunteer, People's Community Health Clinic, Baltimore, MD

2008- 2011 Reporter, online journal Peking University Youth (website: www.youth.pku.edu.cn), Beijing, China

2008 Volunteer Team Lead, INCLUDED (formerly Compassion for Migrant Children), Beijing, China