

**UNDERSTANDING FACTORS ASSOCIATED WITH PREGNANCY DESIRE,
EXPERIENCE AND CARE AMONG FEMALE SEX WORKERS LIVING WITH
HIV IN SANTO DOMINGO, DOMINICAN REPUBLIC.**

by,
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General abstract

Introduction: Female sex workers (FSWs) are at significantly increased risk for HIV as well as a number of health concerns, however research on living with HIV is severely lacking, particularly in relation to pregnancy and reproductive health.

Methods: This study utilizes data from the cross-sectional baseline survey of a longitudinal study named *Abriendo Puertas* (opening doors) aiming to assess the feasibility of a multi-layered intervention program in Santo Domingo, Dominican Republic (DR). This study aims to assess factors related to pregnancy desire, having been pregnant since diagnosis and having communicated to a health provider about pregnancy among a cohort of FSWs living with HIV in the DR.

Results: For the total population, almost all FSWs had children, had been pregnant with a majority having experienced a pregnancy loss. Manuscript one revealed that about 30% of FSWs of reproductive age wanted more children. Significant associations were seen between participants who desire more children and higher HIV related internalized/self stigma, a history of pregnancy loss, lower number of current children, and partner support. Manuscript two revealed that a little more than a third of FSWs have been pregnant since HIV diagnosis. Significant associations were found between having been pregnant since HIV diagnosis and reporting an interruption in anti-retroviral treatment (ART), knowledge of mother-to-child transmission, disclosure of serostatus to a sex partner and a more negative perception of their health provider. Lastly, manuscript 3 illustrated that a little less than half of FSWs who were of reproductive age when diagnosed with HIV have not had a conversation about HIV in pregnancy with any health provider. Significant associations were seen between having had a conversation about

HIV and pregnancy with a health provider and a more positive perception of their health provider, no history of drug use and little to no reported alcohol use in the past 30 days.

Conclusions: This study highlights the significant need for more research on this understudied population. Health services and conversations with health providers are central for comprehensive and tailored care for this population and for prevention of MTCT. Within this multi-level approach to understanding pregnancy among this high-risk population, health services factors, community level, interpersonal and intrapersonal level factors all play a role in the reproductive health care of this most at risk population.

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Dedication

To my father, James Dante Cernigliaro, who taught me the importance of kindness, patience and showed me the meaning of unconditional love. You are missed every day but continue to shape and inspire all that I do.

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1. Conceptual framework

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Introduction

About thirty years after the first clinical evidence of AIDS was reported, it has become one of the most widespread and devastating diseases that the world has faced. Over the course of the disease, key advancements have changed the face of the epidemic and have contributed to a recent decline in new infections overall by 33% since 2001.¹ The most notable of these advancements was the discovery of antiretroviral treatment (ART) in the 1990's, which was shown to extend the length and improve the quality of life for people living with HIV as well as prevent the transmission of HIV from mother to child during pregnancy and delivery.²⁻⁵ Today, with ART and proper precautions, such as an elective c-section, refraining from breastfeeding and administering ART to the newborn, mother to child transmission (MTCT) can be considerably reduced- from about 20% to 35% in the absence of treatment to about 1% or 2% with ART and other precautions.^{4,5} This drastic reduction in MTCT was proven to be crucial from both a preventative as well as a treatment lens. From a treatment perspective, women, who have been shown to be more at risk for HIV than men,^{6,7} were increasingly screened at antenatal clinics, providing an opportunity for education and care for their infection. From a prevention perspective, HIV infected mothers with treatment and other precautions could prevent transmission to their infants. Further, HIV is still the leading cause of death for women of reproductive age, and young women globally are twice as likely to become infected with HIV than young men of the same age.¹ For women of reproductive age who were found to be HIV positive, ART also allowed them to consider having children, significantly impacting decisions about contraception and factors related to pregnancy.^{8,9}

Women living with HIV, pregnancy and motherhood

Historically, emphasis has been on the biomedical and clinical aspects of pregnancy in women living with HIV, due to the dramatic reduction in HIV transmission with ART. However, with advancements in the progression and knowledge surrounding prevention of MTCT, research began focusing on a woman's desires and intent for pregnancy and motherhood among women living with HIV, which had been largely absent from the literature.¹⁰ The reason for this shift was the increasing awareness that many women living with HIV, from about 26% to 69% in different regions globally, have been shown to want more children.¹¹⁻¹⁵ In fact, depending on the region, some studies showed that the desire for more children did not significantly differ from women in the general population. For settings where desire decreased due to HIV infection, reasons included fear that they will not be able to care for their children due to sickness caused by HIV or fear that their child will be infected.^{9,16,17} While research on motherhood and living with HIV is scarce, there is evidence that it can play an important protective role for women living with HIV, providing a sense of fulfillment, increased self-esteem and be a reason to keep living, particularly in populations that are marginalized.^{15,18-20}

Research that has focused on factors relating to the desire for more children among women living with HIV has uncovered a number of significant influences. One of the most salient across studies is the influence of social, cultural religious and familial factors. Women are more likely to want more children in cultures that place a high importance, a large social expectation and value on fertility and childbearing as well as in settings where women who do not have children face social and familial stigma and discrimination.^{13,21-24} Religiosity also seemed to play a role in many studies, where

women who were more religious were more likely to desire more children in different settings.²⁵⁻²⁸ Aside from contextual influences, other reasons for wanting children included a myriad of factors. A systematic review on women living with HIV and desire for children highlighted significant influences on desire for more children including age, number of children living, prospective motherhood, availability and duration of ART and subjective feelings of health and stigma. Stigma and disclosure also seemed to mitigate against desire or intent to have children, both in the form of internalized stigma due to HIV and stigma from health worker/ provider attitudes.¹³

While the majority of research has focused on the desire for more children, other studies have investigated factors related to pregnancy among women living with HIV. At a time when HIV testing is available in most settings of the world and women diagnosed earlier and living longer more likely to become pregnant, understanding factors relating to pregnancy is of great importance.²⁴ Key factors that have been found in the associations between desiring more children also played a significant role among women who had become pregnant. The most salient of these factors included the influence of a partner, influence of family and religiosity^{19,24,29-31} as well as knowledge and use of ART for prevention of MTCT.^{24,31-33} Other related factors included number of current children, length of known HIV-status and subsequent pregnancies.³⁰

Even with the advancements of ART to reduce mother to child transmission and evidence that women living with HIV desire more children and become pregnant, women living with HIV who are pregnant still face many challenges. Even on treatment, women living with HIV are more susceptible to a number of adverse pregnancy outcomes than women who are not HIV infected.^{34,35} In a multi-country study of Latin America and the

Caribbean,³⁵ found that women infected with HIV on treatment still had high prevalence of preterm delivery (19.8%), low birth weight (14.2%), small for gestational age (12.6%), stillbirth (1.9%) and neonatal death (0.4%). Further, a systematic review of mental health outcomes of pregnant and postpartum women living with HIV found that depression, inadequate coping skills, general distress and other psychiatric symptoms was prevalent and these issues are associated with a decreased quality of life and increased risk of negative pregnancy outcomes.³⁶ In addition, a systematic review and meta-analysis on ART adherence and pregnancy found that women living with HIV had sub-optimal adherence to treatment, particularly postpartum due to physical, economic and emotional stress, alcohol or drug use and depression.³⁷ Due these increased adverse outcomes and the potential for mother to child transmission, the importance of adherence to ART during pregnancy and consistent and comprehensive care through pregnancy and delivery is crucial for both mother and child. However many challenges still exist, with one of the most salient being stigma and discrimination. Health provider attitudes have been seen to play a role in pregnancy related decision-making.²³ Women, particularly of lower socioeconomic standing living with HIV and who are pregnant have reported discrimination or even refusal of service in maternity wards, health centers and obstetric services in many different settings.³⁸⁻⁴³

Role of health providers in pregnancy care among women living with HIV

Of extreme importance to treatment adherence of ART for people living with HIV is the role of their health provider in order to educate, support without judgment, ensure retention in care, monitor health progress and refer the patient to other specialists and health information if necessary.⁴⁴⁻⁴⁹ This care and attention is particularly important for

women living with HIV of reproductive age who are, are at risk for, or would like to become pregnant. Women represent about 50% of people living with HIV/AIDS⁵⁰ and pregnancy rates among women living with HIV have increased over the last 10 years by varying amounts dependent on region.^{51,52} Evidence from many different settings worldwide suggest that many women living with HIV have been pregnant or desire more children¹¹⁻¹⁵ and in some areas the desire for more children was found to be the same in women who are not living with HIV.^{12,19} Socio-cultural norms, partner influence, personal and socially valued identity linked to motherhood and social expectations for childbearing have all been seen as the strongest influences on the desire for more children, more so than knowledge of MTCT or HIV serostatus.⁵³⁻⁵⁵ However women may still be anxious about potential repercussions both for themselves as well as for their children.⁵⁴⁻⁵⁶ Pregnant women living with HIV are at risk for a number of health concerns on multiple levels, including negative pregnancy and birth outcomes,^{34,35,57} greater risk of interruption in ART³⁷ and compromised mental health outcomes,³⁶ particularly in resource poor settings.

Prior to the introduction or access to prevention of MTCT, health providers discouraged women living with HIV from having children in order to avoid new infections in children, though many women continued to have children even with the knowledge of risks.⁵⁸⁻⁶² Even after ART, there is evidence that health providers have advised women living with HIV not to get pregnant due to their HIV status.^{54,63} However, it is clear through a number of studies that many women living with HIV have children and desire or intend to have more children in the future,¹¹⁻¹⁵ emphasizing the need for comprehensive care for this population who can have a safe and healthy pregnancy.

While care throughout pregnancy and delivery is crucial for women living with HIV, conversations with a health provider about pregnancy in women living with HIV of reproductive age is particularly important. For those who do not wish to have children, discussing pregnancy and family planning can prevent unwanted pregnancies and potential associated negative health outcomes. For those who desire more children or intend to have children, preconception care and communication with their health provider is extremely important as well. Preconception care and counseling by a health provider can be an opportunity to promote planned pregnancies, educate women on MTCT prevention, support safe conception and delivery practices and to ensure safe outcomes for the mother and child,⁴⁸ however in many settings a large majority of HIV-positive women who desire more children have not discussed reproductive health and childbearing with their providers.⁴⁴⁻⁴⁷

Studies have typically focused more on health provider communication and care for women living with HIV in order to prevent HIV transmission from women to their sex partners or children, but many times do not focus on care for the women herself.^{17,18} Communication with their provider is essential in numerous ways and has been seen to mitigate against desires or intents to have children.¹³ Health workers attitudes, involving both verbal and non-verbal cues have been seen in numerous studies to affect a woman's ideas, proactive communication with providers and decisions surrounding pregnancy and fertility.^{54,55,64} A conversation with a health provider can not only dispel fears about pregnancy and HIV, it can provide information on the importance of adherence of ARTs, provide an understanding of tailored health risks for the mother and child and can refer women to proper treatment, resources and specialists if needed.

Patient provider communication for women living with HIV and pregnancy

While there is limited research surrounding the effect that health providers have on pregnancy among women living with HIV, studies that do exist highlight there are gaps in communication surrounding pregnancy and childbearing between women and their primary health providers.^{19,44,46} Recently, a study in the United States found that of 181 women living with HIV, about 67% mentioned having discussed pregnancy with their primary care providers, and 31% mentioned having a more tailored discussion surrounding the desire or intent for more children, most of which were initiated by the patient.⁴⁴ In another study from the United States of 227 women who had been pregnant and living with HIV, about half were never asked by their health provider about children in pregnancy and of those who were thinking about pregnancy and had been pregnant (n=239), more than half did not have a discussion with their provider prior to getting pregnant.⁴⁶ A study in Brazil and Baltimore also highlighted this lack of communication between patient and provider, where although many women desired more children, the majority of women who were engaged in care had not discussed childbearing with their providers and having spoken to providers about childbearing were more likely to be younger, white and currently in a relationship. Further, in the same study, 15% of women in Brazil alone (n=180) reported that their providers advised them against becoming pregnant.⁶³

However beneficial communication and conversation with health providers surrounding pregnancy has been shown to be, there are also a number of barriers that women face to having this conversation with their providers. Hoyt et al.⁶⁵ highlights potential barriers to preconception care and counseling for women living with HIV,

including competing priorities and immediate concerns, provider reluctance to discuss reproduction and fertility, provider assumptions that women living with HIV do not want to become pregnant, stigma associated with HIV, lack of empowerment related to sexual behaviors or issues, lack of knowledge either by the patient or provider, and lack of defined roles for multiple providers that the patient may see throughout their care. Additionally, studies have found in lower income countries that although provider or clinic satisfaction was relatively high, many women actually understood the messages surrounding MTCT from their providers.⁶⁶

Aside from general discussions surrounding pregnancy desire and intentions among women living with HIV, patient-provider challenges in communication have been seen to continue through care and treatment after pregnancy in a number of different settings and contexts.⁴⁹ Some of the most salient influences seen in the patient-provider interaction during pregnancy and ART initiation and adherence have been shown to include negative interactions between patient and provider,^{54,67} provider discussion with a biomedical focus with failure to discuss social factors⁶⁸ and power dynamics in clinic that affect a woman's ability to ask questions.¹⁷

Stigma, discrimination and mental health

While a number of challenges and barriers to care for women living with HIV are highlighted, some of the most salient issues surround stigma, discrimination and mental health. Even if women feel that they could conceive with the appropriate care, they may still feel societal stigma at having children and living with HIV.⁴⁶ Further, women who had perceived or experienced stigma or negative attitudes from their health care providers had more negative attitudes towards childbearing⁶⁵ and even if counseled by providers,

some women avoided the topic of fertility due to perceived judgment by the provider.^{54,65,69}

In addition to stigma, a second salient issue related to barriers in care during pre and post-conception is the mental health of women who are pregnant and living with HIV, particularly depression.³⁶ While an issue in of itself, depression, from preconception to the postpartum period, has been associated with a number of negative health outcomes during pregnancy including non-adherence to ART, missed visits during prenatal care, violence, substance use and mortality^{37,70-73} and has been found to often be accompanied with social isolation and interpersonal disengagement.⁷² Depression and anxiety during the prenatal period has also been linked to negative health outcomes of the infant, including developmental delay, behavioral and emotional problems and increased preterm low birth weight.⁷³

However, having children has also been seen to play a role in improving mental health outcomes as well such as increasing feelings of self esteem, self worth, regaining a sense of normalcy, being a symbol of new beginnings and be a reason to keep living.^{15,18,19,54,74} In cultures that place a high importance on family and childbearing, where having children is normalized into the culture, having children may also play a role in avoiding judgment and criticism if the woman has not disclosed her status.^{13,58} Qualitative studies Kenya and Nigeria have found that childbearing was discussed as of the utmost importance to women living with HIV. Having children was seen as essential for a full and happy life, crucial for a woman's identity in society, and being a normal part of society.^{18,75} Barnes,⁵³ in a U.S. based study found that even through negative social messages surrounding pregnancy and women living with HIV, children were seen

as a motivation for living, and motherhood gave a sense of personal and social importance, particularly among women who felt marginalized.

Female sex workers and pregnancy

While most of the existing research on pregnancy and childbearing has focused on women living with HIV, there is a paucity of information on the reproductive health of FSWs, a population with significant increase for HIV, STI, violence, stigma and discrimination among other health concerns.⁷⁶⁻⁷⁹ Existing evidence suggests that many FSWs have children, with estimates ranging from about 27% of FSWs in Russia⁸⁰ to 90% of FSWs in India.⁸¹ Estimates of pregnancy among FSWs are similar, ranging from ranged from about 27% in Madagascar⁸² to about 91% in India⁸³. There is also evidence that pregnancy and children play an important role in the lives of FSWs. Some FSWs seek pregnancy as a way to leave sex work, while others seek pregnancy in work.⁸³⁻⁸⁵ Many FSWs may begin sex work because they are mothers or have children to support.⁸⁵⁻⁸⁷ More recently, research has uncovered that challenges of being a mother is not only linked to initiation into sex work, but may also increase vulnerability for HIV among sex workers. A study of 850 FSWs in India uncovered that demands associated with being a mother, primarily linked to financial pressures, seem to influence risky sexual decision making with sex clients.⁸¹ One qualitative study surrounding motherhood and sex work in Tanzania similarly found that due to the responsibility of motherhood FSWs had limited choices with regard to protecting themselves against health risks and decision-making and behaviors related to HIV were linked to the welfare of children and their families.⁸⁸ Given the increased risk for STIs and HIV, FSWs are at greater risk for complications associated with reproductive health, pregnancy and childbearing.⁸⁹⁻⁹¹ Due to the high risk

of HIV infection, as well as other serious health concerns together with the high number of FSWs desiring children and pregnancy, there has been a call for more attention to FSWs living with HIV as well as the sexual and reproductive health of FSW.⁹

Female sex workers living with HIV

Among women, those who sell sex for money are at even higher risk for HIV than women in the general population. Female sex workers (FSWs) are seen to have approximately 13.5 times the risk for acquiring HIV than women in the general population in low and middle income countries, and an increased risk for HIV has been shown in nearly every country in the world.⁹² UNAIDS has stated that access to non-judgmental health services is fundamental for HIV prevention for sex workers,⁹³ however they are higher risk for numerous other health concerns and inequities on multiple levels including other sexually transmitted infections (STIs), violence, discrimination, unstable work conditions, marginalization, abuse and stigma.⁷⁶ Due to the complex and transitory nature of sex work, it is difficult to assess the size of the FSW population at a given time, however sex work is thought to exist in almost every country in the world. Attempts to estimate prevalence of FSWs through a compilation of existing estimates have uncovered numbers ranging from 0.2% to 2.6% in Asia, 0.1% and 1.5% in the ex-Russian Federation and between 0.4% to 1.4% in Western Europe⁹⁴. In Latin America, prevalence of FSWs are estimated to be between 0.2% to 7.4%.⁹⁴ Additionally, the global prevalence of HIV among FSWs is about 11.8% with significant variations seen by region.⁹² The high number of sex workers together with the increased risk for HIV among the FSW population make this population at one of the highest risk populations in the world, however, there is surprisingly little research regarding this population.

Emerging research on FSWs living with HIV has shown that this population is at significant risk for health challenges and concerns than the general population.^{83,95,96} Stigma still acts as a barrier to accessing health services worldwide for FSWs despite the call for non-discriminatory services by UNAIDS.^{93,97,98} A study of 139 sex workers in Russia, about a third mentioned that doctors wouldn't see them because they were sex workers, and about half had never discussed their involvement in sex work.⁹⁹ This is compounded through the multi-level layers of stigma that FSWs living with HIV face and heightens the need for non-discriminatory, comprehensive services.^{93,100,101} A qualitative study of FSWs living with HIV in Zimbabwe uncovered experiences of humiliation and feeling demeaned by health workers.¹⁰² In the study by King et al.⁹⁹ FSWs who were living with HIV were more likely to experience discrimination in health care settings, more likely to report feelings of social isolation post-diagnosis and more likely to have been refused medical care or be afraid to go to the doctor than FSWs who did not have HIV.

The Dominican Republic

The Caribbean has the highest HIV prevalence in the Western Hemisphere with about 250,000 people living with HIV/AIDS.¹⁰³ Within the Caribbean, the island of Hispaniola, comprised of Haiti and the Dominican Republic (DR), is one of the most affected regions in Latin America and the Caribbean. About 75% of all people living with HIV in Latin America and the Caribbean reside in Hispaniola.^{104,105} While Haiti holds a greater HIV burden in the population, the DR has an HIV prevalence rate of approximately 0.7%,¹⁰⁶ with a 2% prevalence rate among pregnant women reported in 2003.¹⁰⁷ In the DR, the primary mode for HIV transmission is heterosexual unprotected

sex with the rate of HIV infection increasingly disproportionate in women.¹⁰³ Within the DR, as is echoed globally, concentrations of the HIV epidemic falls disproportionately on most at risk populations, with one of the most affected populations being female sex workers (FSWs). Sex work is legal in the DR and there are an estimated 100,000 FSWs in the country,⁸⁴ or about 1.8% of the population in urban areas.⁹⁴ However, due to the transience of sex work, an exact number is difficult to assess and existing numbers are most likely underestimates. Sex work in the DR is mainly establishment-based, meaning that many sex workers work within bars and clubs as staff (i.e. dancers, waitresses) and engage in sex work with clients at those locations as compared to brothel or street based sex work.⁸⁴ In major cities such as Santo Domingo, the largest and capital city of the DR, organizations exist with the aim of empowering, educating and promoting social cohesion among FSWs, such as Movimiento de Mujeres Unidas (MODEMU) and Centro de Orientacion e Investigacion Integral (COIN). While these organizations serve to educate and empower FSWs, FSWs still bear a higher burden of HIV, ranging from 3.3% to 6.4% varied by location.⁹⁶ A more recent study in the Caribbean estimated that about 9% of the HIV prevalence in the general adult population (age 15 years and older) could be attributable to FSW.¹⁰⁸

Motherhood and maternity care in the Dominican Republic

Motherhood and family play a central role for women in many cultures and societies. In many cultures, motherhood defines what it means to be a woman; women who are mothers are respected, revered and blessed with giving life, and those who experienced infertility in familial societies are more subject to social stigma.^{109,110} In Latin American and Caribbean cultures, family is central, including the DR, where

women in the general population having an average number of about 3 children in their lifetime at a mean young age at first birth of about 20 years of age.¹⁰⁶ Motherhood is a source of pride for many Dominican women and both immediate and extended families are typically geographically close and provide multiple forms of support for each other.¹¹¹ Women in lower income populations seek pregnancy for a number of reasons and family is seen as the basis for stability and support in times of need.¹¹¹ In a qualitative study of culture and care in rural Dominican populations, participants explicitly stated that family was “the most important and central thing to this culture ...Family is the basis of our society.”¹¹² Family in the Dominican culture is seen as important for social support, for achieving a sense of wellness and a sense for being “cared for” while the absence of family was described as inhibiting health and healing.¹¹² This echoes previous literature that focused in the central and important role of family in Dominican society.^{113,114}

While family and childbearing are a central part of the culture, maternal and infant care during pregnancy and delivery has been historically lacking. The DR had one of the highest maternal and infant mortality rates of the Latin American and Caribbean countries, however recent estimates have shown a reduction of maternal mortality from 130 to 100 deaths per 100,000 live births in the DR from 2005 to 2013.⁵⁰ Infant deaths remains high at 22 infant deaths per 1,000 births.¹⁰⁴ These high levels are surprising since the DR is considered a middle-income country with a high percentage of prenatal care coverage (98.9%), deliveries attended by a qualified health personnel (97.8%) and institutional deliveries (97.5%).¹⁰⁴ There have been a number of explanations for this discrepancy, with arguments mainly surrounding the poor quality of reproductive health

services offered in the DR, particularly the public sector where 76% of all institutional deliveries take place.¹¹⁵⁻¹¹⁸ The conditions in public hospital maternity wards have repeatedly reported as poor. One study of institutionalized deliveries of the public maternity wards in the DR found severe issues in quality of care including over-worked providers, unsanitary environments, lack of assistance during labor, unskilled attendants or inappropriate clinical management.¹¹⁵ Following the Miller¹¹⁵ study, non-governmental organizations as well as government initiatives began to address this issue. However, upon a photojournalist's visit to a public referral hospital in 2006 and again in 2007, she found appalling conditions. No running water, soap, health professionals making discriminatory or accusatory remarks to certain women, lack of privacy, resource poor and even observed that patients had to bring their own drinking water.¹¹⁹ Recently, however, the Dominican Republic was reported as significantly having reduced maternal mortality since 1990, a reduction of about 40%.

Further, women in the DR who wish to terminate a pregnancy face a number of challenges as well. The DR is one of the few countries where laws on abortion have been amended to remove all grounds on which abortion might be performed legally, however the law is not clear whether defense of abortion to save the life of a woman may be allowed.¹²⁰ The legal barriers to an abortion together with stigma related to HIV and abortion have been seen to influence reproductive health decision making among women living with HIV, sometimes leading to unsafe practices for termination^{19,58,121-124} including the use of misoprostol, an over-the-counter drug for stomach ulcers that causes abortion in order to avoid any legal repercussions, which has been seen in many countries and considered, where unregulated, to contribute to both maternal and infant mortality.¹²¹

This creates a sociopolitical context that may put already stigmatized women more at risk for health complications.

Alignment with global health goals

In low and middle-income countries, HIV transmission from MCT accounted for an estimated 430,000 new infections in children in 2009.¹²⁵ It is estimated that since 1995 more than 350,000 children have avoided HIV infection due to ARVs provided to pregnant women living with HIV.¹²⁵ The prevention of MTCT is outlined by the World Health Organization (WHO) along with other global organizations as a clear goal for eliminating MTCT (defined as reducing MTCT infections to less than 5%, a low enough level that it would not be considered a public health problem) and reducing the number of HIV-associated deaths to women during pregnancy, childbirth or puerperium by 50% in all middle and low-income countries by 2015.¹²⁶ Further, the focus on maternal and child prevention of HIV morbidity and mortality is aligned with multiple Millennium Development Goals (MDGs), particularly MDG 6 (halting and reversing the spread of HIV, malaria and other diseases), MDG 4 (reducing mortality of children under five years) and MGD 6 (reducing maternal mortality).¹²⁷

Summary of key aims

This paper aims to explore key factors related to pregnancy among FSWs living with HIV in the DR. FSWs are an alarmingly understudied population, and there is a severe lack of research and information on the population, in particular, reproductive health. These women are at highest risk for many health concerns and due to both serostatus and occupational hazards face barriers to care. Although there is a lack of research on pregnancy and reproductive health of this population, it is clear that both

FSWs and women living with HIV, desire and continue to get pregnant and have children. Yet they are most at risk for pregnancy complications and both maternal and child health concerns. The manuscripts included in this dissertation will explore factors relating to the desire for more children for FSWs living with HIV of reproductive age, characteristics related to those who were pregnant after diagnosis and whether women who were of reproductive age during their diagnosis are communicating with their providers about pregnancy. Understanding more about a population that is faced with a myriad of health concerns, both due to serostatus as well as through occupational health and how these may relate to pregnancy concerns has the potential to improve both mother and child health, and prevent new childhood infections.

Specific study aims

This study aims to inform gaps in understanding experiences with pregnancy among a population that in great need of care and services, particularly in the area of pregnancy and childbearing. The overarching research question asked was, what are the experiences of FSWs living with HIV and pregnancy? This question was addressed through the three manuscript aims:

- 1) To describe and identify factors associated with the desire for more children.
- 2) To understand characteristics of FSWs who have been pregnant since diagnosis.
- 3) To determine whether communication about pregnancy has occurred with health providers, and which factors are related to having had this conversation.

These aims are organized through three separate manuscripts and are organized as a whole and individually through a central conceptual framework as described below:

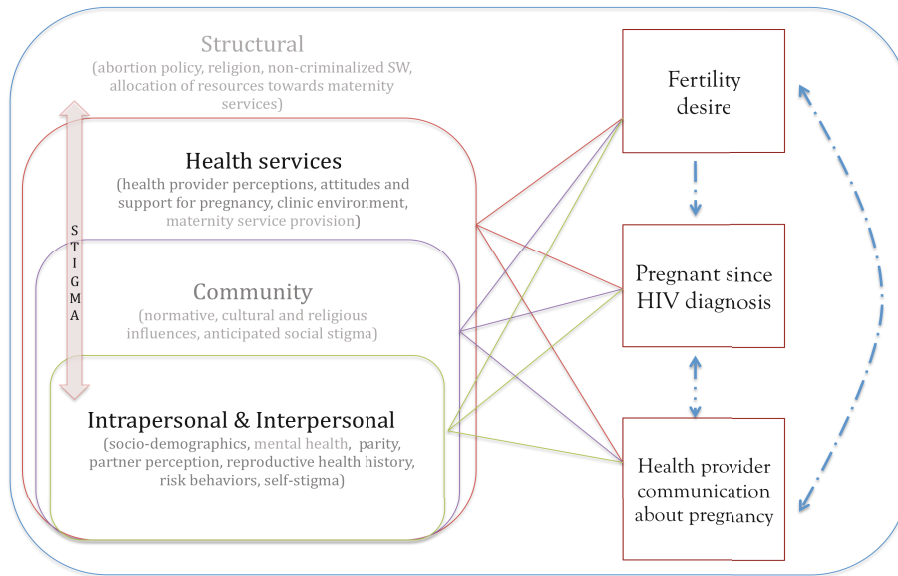


Figure 1: Conceptual framework based on the social-ecologic model.^{128,129}

Theoretical frameworks and conceptual development

The social-ecologic perspective

In analyzing pregnancy related factors, particularly among a population with multiple stigmatized identities, it is important to acknowledge the influences and existence of a number of factors on individual decision-making. A lens or framework that would be most appropriate to view these complex influences, would be through a social ecologic model (SEM),^{128,129} This approach gives a multifaceted and dynamic look at complex influences from a social and environmental sphere that impact and individual, with acknowledgment of the reciprocal nature of these influences. With regard to the current study, there are significant influences at every level that should be considered, if not measured, in order to understand the broader context within which the current analysis is nested. As outlined by McLeroy et al. (1988) this perspective encompasses individual or intrapersonal factors, interpersonal factors, institutional or organizational factors, community factors and public policy factors. While this does not hypothesize

formalized assumptions about an individual experience, it does recognize multiple factors that might be influential.

Conceptual framework

The conceptual framework for this study (Figure 1), illustrates the relation of these theories and frameworks to the current study. More specific selection and organization of variables were subsequently selected through existing literature for each aim. Using the SEM as a guiding framework, the conceptual model relates each study aim to the multiple levels of influence. The framework was adjusted to highlight the more specific influence of health services as part of the SEM's original institutional level of influence. Specific variables or topics are included under each level of influence. The variables or topics in darker grey were specifically measured or included in analysis, while variables in lighter grey include influences that should be considered as influential, however were not directly measured.

Structural level

While many elements on the structural level were not measured, it is important to recognize the influence of socio-political influence on decision-making and experiences with pregnancy. The effect of religion has been shown to influence desire for more children,²⁵⁻²⁷ and with 95% of the DR identifying as Catholic,¹⁰⁶ this is a considerable social-cultural influence. The Catholic religion has historically not support contraception or pregnancy termination, which has direct influence on a woman's decision in relation to family planning and childbearing. Structural level influences are also extremely influential on other levels of influence. For example, legal barriers to abortion and certain contraception practices may influence a health provider's advice surrounding pregnancy

to the individual. This may not only influence individual decisions surrounding pregnancy but also may set social precedent on what is deemed acceptable if these individuals discuss their advice surrounding pregnancy with friends and family, particularly if medical providers advice is held in high esteem.

Health services level

Health providers and service characteristics play an important role in the health and provision of care, particularly for individuals living with HIV. Evidence suggests that perceptions of health provider and health provider attitudes, behaviors and communication characteristics can be a strong influence on patient decision-making about their health care and engagement in health services.^{54,55,64,130,131} As discussed, health providers may influence social attitudes surrounding a particular topic, particularly if health providers are respected. Among women living with HIV, whether or not they disclose their sex work, a provider's opinion and communication style may be even more pertinent, since women are more likely to be dealing with social isolation and fear of stigma, particularly if pregnancy is seen as an irresponsible decision when living with HIV. At this level, maternity services also play a crucial role. While this study did not address satisfaction with maternity wards and services, public wards have been criticized in recent history for poor services and maternal child health outcomes^{115,119} and may influence a FSWs experience as a woman living with HIV and delivery.

Community level

There is strong evidence to support the influences of culture, family and tradition on health behaviors and decision-making, particularly related to pregnancy.^{15,18,19,132} Within the larger structural context of the dominant religious beliefs linked to

Catholicism, the social-cultural norms of large families in the DR and a young mean age at first birth, there may be social pressure for childbearing. As described, issues of stigma, pregnancy and normative influences seem to affect a woman's thoughts surrounding pregnancy if living with HIV.¹³⁰ Women who have disclosed their status publically were less likely to desire or intend to have more children for fear of public stigma, while those who did not disclose broadly were more likely to want children in order to maintain a degree of normalcy in cultures where having many children is normative.¹³⁰

Intrapersonal and interpersonal

Individual and interpersonal influences are most proximate to the decision or experience of pregnancy. Social, family and gender norms, along with cultural determinants may place more pressure on having children younger and cultural-religious influences to be in a partnership before conception. A partner's desire for children, even if there is high risk, may be influential on decision-making for more children even with known risks. For pregnancies that are unplanned, fear of further isolation may occur, particularly among women who have disclosed their status and are already dealing with multiple stigmatized identities. If these pregnancies are unwanted, strict abortion laws or health provider perceptions at the structural and institutional levels also play a role in decision-making and behavior surrounding pregnancy.

Methods

Study background and development

The three manuscripts that comprise this dissertation are quantitative analysis that stem from the same baseline dataset of an intervention for FSWs living with HIV in Santo Domingo, Dominican Republic, named *Abriendo Puertas* (opening doors). *Abriendo Puertas* is a multi-level intervention over a 10-month period with FSWs living with HIV in order to address an identified unmet need for tailored services for this population. A baseline and a follow-up questionnaire was designed to assess the feasibility and initial effects of this integrated intervention program to promote HIV care, healthy behaviors and foster adherence to care for FSWs living with HIV in Santo Domingo. The intervention was comprised of counseling sessions with a psychologist, a peer navigation system, support group meetings, health clinic staff trainings specific to the needs of FSWs and key populations, male partner engagement and HIV counseling and testing services.

Abriendo Puertas, including the study questionnaires and the intervention itself, was developed utilizing years of research in the area, together with formative research findings using the study population together with local collaborative partners. Formative research for the study included in-depth interviews with key informants, including clinicians, staff from related non-governmental organizations and other key individuals with experience working with the most-at-risk populations in Santo Domingo. In-depth interviews and focus groups were conducted with FSWs, men who have sex with men and transsexuals living with HIV to understand experiences and tailor questions to be most useful and appropriate for the experiences of the study team. A study team at Johns

Hopkins Bloomberg School of Public Health as part of Project SEARCH: Research to Prevention project collaborated with partners in Santo Domingo, including a local research unit, the HIV Vaccine Research Unit (HVRU), health clinics that serve FSWs, and sex worker rights organizations to conduct formative research, develop the final questionnaire and unroll the intervention. Enrollment for the baseline study occurred from November 2012 to February 2013. This dissertation utilizes the results from the baseline questionnaire.

Study sample and recruitment

Female sex workers were defined as women who report having exchanged sex for money in the last month. Participants were at least 18 years of age, spoke Spanish, and reported that they were HIV-positive confirmed prior to enrollment by a HIV rapid test. Recruitment occurred in Santo Domingo, through HIV clinics, peer navigators and referral by other participants in the study. A total of 318 women were approached or inquired about the study, however 26 never presented to the study site and 24 were found not to be eligible, resulting in a final sample size of 268 participants.

Data collection and management

This baseline socio-behavioral survey was conducted by trained Dominican field staff in Spanish within private offices of the HVRU. Blood samples for HIV viral load were assessed at the Dominican National Reference Laboratory in Santo Domingo using polymerase chain reaction (PCR) testing. Vaginal swabs for STI testing were obtained by a physician during a clinical exam and processed at a laboratory at Johns Hopkins School of Medicine. All copies of the surveys were de-identified and kept in a locked cabinet within an office at the Instituto Dermatológico y Cirugía de Piel Dr. Humberto Bogart

Diaz (IDCP). The survey data was subsequently entered into an electronic database by trained field workers, protected on a password secured computer and external hard drive.

Survey description

The baseline survey for this study was made up of 22 sections that include overarching themes of demographics, employment, HIV testing experience, disclosure, health care services and barriers, clinic and provider dynamics, ART, sexual behavior, social support, reproductive and sexual health, HIV knowledge, exposure to HIV interventions, alcohol and drug use, violence, community engagement, stigma and discrimination. This dissertation focuses on the reproductive health section of the survey.

Ethics and quality control

This study partnered with a number of organizations in Santo Domingo, Dominican Republic including the HVRU at the IDCP and the NGO organizations, Movimiento de Mujeres Unidas (MODEMU) and Centro de Orientacion e Investigacion Integral (COIN), all of which have years of experience with sex workers in Santo Domingo. Interviewers trained in both ethical practices and quantitative data collection conducted the study in private rooms to ensure confidentiality and patient comfort. Participants provided oral consent that they understood the nature of the study, had reviewed the consent form, did not have additional questions, understood that they could discontinue the study at any time. Trained interviewers recorded participant consent responses and signed for the participants if they agreed to participate in the study. The survey instruments used validated scales and informed questions through formative research and the surveys were piloted prior to the start of the study. The study was approved by the Johns Hopkins Bloomberg School of Public Health as well as the IDCP Institutional Review Board.

Exploratory data analysis

Data was collected by trained interviewers and uploaded into a SQL Server database, then converted into Stata version 11 for all analysis. After initial upload, data was examined for outliers, missing information and any discrepancies. Inconsistencies that were identified were checked against original surveys and corrected to ensure integrity of the data. Exploratory data analysis was conducted to understand the nature of the data using data graphics and exploratory functions. As conceptual and theoretical development for the study aims were explored along with information from prior studies, variables of interest were identified and categories were developed when appropriate. Missing data was identified and checked, however missing values were minimal due to the identification and re-checking of values after data collection. Descriptive characteristics, including frequencies and percentages were explored for the sample, specifically demographics, biological, clinical, reproductive health and HIV related variables. Key variables identified were explored in depth, including stigma and provider perception scales, as described in detail below.

Aggregate measures

Consistent condom use: Consistent condom use was an aggregate of three separate questions asking the participants 1) if they have ever had sex from beginning to the end of penetration without a condom in the last 30 days (yes/no) (2) how often they have had sex with a condom in the last 30 days (always, mostly, sometimes, rarely, never) and 3) if they had vaginal or anal sex with a condom the last time they had sex (yes/no). These questions were asked for each type of partner that the participant recorded having (regular partner, casual partner, client). If the participant answered no to question 1,

always to question 2 and yes to question 3 for every type of partner named they were considered as using condoms consistently in the last 30 days.

Stigma and provider scales: This study utilized three separate scales, two stigma scales and one perceptions of health provider scale. Each scale was adapted through existing validated measures. The internalized stigma scales were measured using adapted measures from those developed by Berger et al.,¹³³ Zelaya et al.,^{134,135} and Baral et al.,¹³⁶ and with guidance from Earnshaw’s HIV Stigma Framework.¹³⁷ The provider satisfaction scale was adapted from the validated Patients Reactions Assessment scale.¹³⁸ All stigma scales were Likert scales and included options of 1 to 4, with a response of 1 being the least amount of stigma and 4 the most stigma. The provider satisfaction scale differed in that a higher score meant a greater satisfaction with their providers. All answers of “don’t know” and “refuse to answer” responses were coded as 2.5 in order to keep those participants in the final sample size but neutralize their weight in the scales. The mean and range were then compared with and without weighting to ensure that there were no significant differences seen. During regression analysis, the sex work internalized stigma scale, with the largest discrepancy due to the inclusion of the neutralized weight was checked in the final model to ensure no significant differences. This comparison is reflected in table 1:

Table 1: Stigma and provider scales with and without weighting.

Scale name	Without weighting		With weighting	
	N	mean (range)	N	mean (range)
HIV related self-internalized stigma scale	266	2.40 (1, 4)	268	2.40 (1, 4)
Sex work internalized stigma scale	256	3.12 (1, 4)	268	2.38 (1, 4)
Perception of provider scale	240	3.33 (1, 4)	268	3.24 (1, 4)

Coding was reversed for certain questions to ensure standardization of directionality for all questions. Data reduction occurred through principal components analysis. First scree and parallel factor analysis was conducted to graphically determine the dimensionality of each scale, followed by a test for normality to determine analytic approach. Factors were rotated using varimax and items were chosen through theory and background literature. If factor loadings were low (less than 0.4) with a high uniqueness (greater than 0.5), the factors were dropped. The final scales were checked iteratively to determine scale improvement, while still maintaining conceptual relevance. Once items were chosen for removal, Cronbach alpha tests were conducted in order to measure internal consistency of the final scale. When scales were finalized, the items included were averaged across participant to create each final variable, creating a proportional averaged scale of 1 through 4. Details of the final scale items and Cronbach alpha scores are in table 2:

Table 2: Cronbach alpha scores and scale item numbers.

Scale name	Number of final items/ original number of scale items	Cronbach alpha score
HIV related internalized stigma scale	7/8	0.8819
Sex work related internalized stigma scale	12/15	0.9089
Provider satisfaction scale	8/10	0.9550

HIV related internalized stigma scale: The HIV related internalized stigma scale assessed a participants' agreement with if they personally feel badly about issues surrounding living with HIV. The details of the finalized items are below:

Table 3: HIV related self/internalized stigma scale items.

- 1 Having HIV makes you feel like a bad person
- 2 You feel like you're not as good as others because you have HIV
- 3 People's attitudes about HIV make you feel worse about yourself
- 4 You feel guilty due to HIV
- 5 You feel ashamed that you have HIV
- 6 You feel completely worthless

- 7 You feel that you brought trouble on your family b/c of HIV

Sex work related internalized stigma scale: The sex work related internalized stigma scale closely followed the HIV related internalized stigma scale, however addressing self-stigma surrounding being a sex worker. The details of the finalized items are below:

Table 4: Sex work related internalized stigma scale items.

- 1 Working as a SW makes you feel like a bad person
- 2 You feel like you're not as good as others because of sex work
- 3 Peoples attitudes about SW make you feel worse about yourself
- 4 You feel guilt because you are a SW
- 5 You feel ashamed of SW
- 6 It's easier to avoid friendships than worry about telling others you are a SW
- 7 You feel completely worthless b/c you are a SW
- 8 You feel you have brought trouble to your family because you are a SW
- 9 You like your job as a SW (rev)
- 10 You feel ok about being a SW (rev)
- 11 You feel comfortable telling others that you are a SW (rev)
- 12 You see SW as work, just like any other job (rev)

Perception of provider scale: The perception of provider scale measured participants' perceptions of their provider. The details of the finalized items are below:

Table 5: Perception of provider scale items.

- 1 Your doctor is considerate of your needs and concerns
- 2 Your doctor takes the time to explain your treatment and follow-up slowly and clearly
- 3 You feel comfortable asking your doctors questions about your care
- 4 You trust your doctors judgments and decisions about your medical care
- 5 You feel your doctor does everything they can about your care
- 6 Your doctor is well qualified to manage medical problems like yours
- 7 You feel respected by your doctor
- 8 Your doctor takes the time to ask how you are feeling.

Regression analysis

Upon completion of exploratory analysis, scale development and appropriate categorization of selected variables, two sided t-tests and chi-square tests were calculated

as appropriate to assess associations between variables. Bivariate logistic regression was conducted to determine odds ratios and confidence intervals separately for each independent variable against the outcome. The model for multiple logistic regression were built partially in response to outcomes from these crude relationships, those with less than a 0.1 p-value level were considered for the model as well as those variables known to be of theoretical importance or have been significant in past research. Multicollinearity was assessed for final models, and if two variables were correlated and statistically significant with the outcome, the variable with the greater conceptual relevance was chosen for the final model. The final model was built using multiple iterations through a traditional stepwise approach, after inclusion of each variable the Akiake information criterion (AIC) was calculated for each nested model and log likelihood tests were assessed. Models with the most parsimonious fit between AIC, log-likelihood and conceptual relevance. Lastly for each model, a Hosmer-Lemeshow goodness of fit test was conducted on the final model to determine final fit. All analysis was conducted in STATA version 11.

Dependent variables

The dependent variables for each manuscript are described in table 6.

Table 6: Description dependent variables for each manuscript.

	Dependent variable	Specific question	Response options	Subset of entire study sample	Final sample size
<i>Manuscript 1</i>	Desire (more) children	Would you like to have (more) children in the future?	Binary (yes or maybe /no)	FSWs of reproductive age (ages 18 to 49)	n= 247
<i>Manuscript 2</i>	Have been pregnant since HIV diagnosis	How many times have you become pregnant since you were diagnosed with HIV? (When I say "pregnant" I mean any pregnancy that the result was miscarriage or termination of pregnancy (TOP), stillbirth or born alive).	Dichotomized into ever been pregnant (yes/no)	Entire study sample	n= 268
<i>Manuscript 3</i>	Have spoken to a health provider about pregnancy among women living with HIV	Have you and any health provider ever talked about pregnancy in HIV-infected women?	Binary (yes/no)	FSWs who were of reproductive age when they were diagnosed with HIV	n= 253

Manuscript 1: The outcome for the first manuscript was whether the participant would like more children in the future. Response options were binary- yes and no. Only 2 participants responded maybe and were therefore collapsed into the yes category. This analysis was only conducted on those who were of reproductive age at the time of the study, 18 to 49 years of age. Since eligibility criteria for this study was 18 years of age or older, participants ranged from 18 years to 49 years for a total of 247 participants.

Manuscript 2: The outcome for this manuscript was having been pregnant since HIV diagnosis. Interviewers specified that pregnancy included those that may have been miscarried, terminated, stillborn or born alive when interviewing participants. Responses were then dichotomized as yes or no. All respondents were included in this outcome, a total of 268 participants.

Manuscript 3: The outcome for this manuscript was having ever spoken to a health provider about pregnancy in HIV positive women. Response options were binary, yes or no and the sample size was out of those who were of reproductive age when diagnosed with HIV. The final sample size for this paper was 253.

References

1. Henry J. Kaiser Family Foundation (KFF). The global HIV/AIDS epidemic. . 2013.
2. Connor EM, Sperling RS, Gelber R, et al. Reduction of maternal-infant transmission of human immunodeficiency virus type 1 with zidovudine treatment. pediatric AIDS clinical trials group protocol 076 study group. *N Engl J Med*. 1994;331(18):1173-1180.
3. Sperling RS, Shapiro DE, Coombs RW, et al. Maternal viral load, zidovudine treatment, and the risk of transmission of human immunodeficiency virus type 1 from mother to infant. pediatric AIDS clinical trials group protocol 076 study group. *N Engl J Med*. 1996;335(22):1621-1629.
4. Thorne C, Newell ML. Hiv. *Semin Fetal Neonatal Med*. 2007;12(3):174-181.
5. Coutsooudis A, Kwaan L, Thomson M. Prevention of vertical transmission of HIV-1 in resource-limited settings. *Expert Rev Anti Infect Ther*. 2010;8(10):1163-1175.
6. Nicolosi A, Leite MLC, Musicco M, Arid C, Gavazzeni G, Lazzarin A. The efficiency of male-to female and female-to-male sexual transmission of the human immunodeficiency virus: A study of 730 stable couples. *Epidemiology*. 1994;5(6):570-575.
7. Quinn TC, Overbaugh J. HIV/AIDS in women: An expanding epidemic. *Science*. 2005;308(5728):1582-1583.
8. Boonstra H. Meeting the sexual and reproductive health needs of people living with HIV. *Issues Brief (Alan Guttmacher Inst)*. 2006;(6)(6):1-4.
9. MacCarthy S, Rasanathan JJ, Ferguson L, Gruskin S. The pregnancy decisions of HIV-positive women: The state of knowledge and way forward. *Reprod Health Matters*. 2012;20(39 Suppl):119-140.

10. Sandelowski M, Barroso J. Toward a metasynthesis of qualitative findings on motherhood in HIV-positive women. *Res Nurs Health*. 2003;26(2):153-170.
11. Loutfy MR, Hart TA, Mohammed SS, et al. Fertility desires and intentions of HIV-positive women of reproductive age in ontario, canada: A cross-sectional study. *PLoS One*. 2009;4(12):e7925.
12. Ogilvie GS, Palepu A, Remple VP, et al. Fertility intentions of women of reproductive age living with HIV in british columbia, canada. *AIDS*. 2007;21 Suppl 1:S83-8.
13. Nattabi B, Li J, Thompson SC, Orach CG, Earnest J. A systematic review of factors influencing fertility desires and intentions among people living with HIV/AIDS: Implications for policy and service delivery. *AIDS Behav*. 2009;13(5):949-968.
14. Loutfy MR, Blitz S, Zhang Y, et al. Self-reported preconception care of HIV-positive women of reproductive potential: A retrospective study. *J Int Assoc Provid AIDS Care*. 2013.
15. Kennedy VL, Serghides L, Raboud JM, et al. The importance of motherhood in HIV-positive women of reproductive age in ontario, canada. *AIDS Care*. 2014;26(6):777-784.
16. Smee N, Shetty AK, Stranix-Chibanda L, et al. Factors associated with repeat pregnancy among women in an area of high HIV prevalence in zimbabwe. *Womens Health Issues*. 2011;21(3):222-229.
17. Gruskin S, Firestone R, Maccarthy S, Ferguson L. HIV and pregnancy intentions: Do services adequately respond to women's needs? *Am J Public Health*. 2008;98(10):1746-1750.

18. Smith DJ, Mbakwem BC. Life projects and therapeutic itineraries: Marriage, fertility, and antiretroviral therapy in nigeria. *AIDS*. 2007;21 Suppl 5:S37-41.
19. Cooper D, Harries J, Myer L, Orner P, Bracken H, Zweigenthal V. "Life is still going on": Reproductive intentions among HIV-positive women and men in south africa. *Soc Sci Med*. 2007;65(2):274-283.
20. Kanniappan S, Jeyapaul MJ, Kalyanwala S. Desire for motherhood: Exploring HIV-positive women's desires, intentions and decision-making in attaining motherhood. *AIDS Care*. 2008;20(6):625-630.
21. Yeatman S. HIV infection and fertility preferences in rural malawi. *Stud Fam Plann*. 2009;40(4):261-276.
22. Bankole A, Biddlecom AE, Dzekedzeke K, Akinyemi JO, Awolude O, Adewole IF. Does knowledge about antiretroviral therapy and mother-to-child transmission affect the relationships between hiv status and fertility preferences and contraceptive use? new evidence from nigeria and zambia. *J Biosoc Sci*. 2013:1-20.
23. Maccarthy S, Rasanathan JJ, Crawford-Roberts A, Dourado I, Gruskin S. Contemplating abortion: HIV-positive women's decision to terminate pregnancy. *Cult Health Sex*. 2014;16(2):190-201.
24. Kirshenbaum SB, Hirky AE, Correale J, et al. "Throwing the dice": Pregnancy decision-making among HIV-positive women in four U.S. cities. *Perspect Sex Reprod Health*. 2004;36(3):106-113.
25. Sowell RL, Misener TR. Decisions to have a baby by HIV-infected women. *West J Nurs Res*. 1997;19(1):56-70.

26. Richter DL, Sowell RL, Pluto DM. Factors affecting reproductive decisions of african american women living with HIV. *Women Health*. 2002;36(1):81-96.
27. Siegel K, Schrimshaw EW. Reasons and justifications for considering pregnancy among women living with HIV/AIDS. *Psychol Women Q*. 2001;25(2):112-123.
28. Natalie G, Davies SL, Stewart KE. Religion, relationships and reproduction: Correlates of desire for a child among mothers living with HIV. *AIDS and Behavior*. 2011;15(6):1233-1242.
29. da Silveira Rossi A, Fonsechi-Carvasan GA, Makuch MY, Amaral E, Bahamondes L. Factors associated with reproductive options in HIV-infected women. *Contraception*. 2005;71(1):45-50.
30. Bah'him YM, Oguntibeju OO, Lewis HA, Mokoena K. Factors associated with pregnancies among HIV-positive women in a prevention of mother-to-child transmission programme. *West Indian Med J*. 2010;59(4):362-368.
31. Kumar A, Bent V. Characteristics of HIV-infected childbearing women in barbados. *Rev Panam Salud Publica*. 2003;13(1):1-9.
32. Blair JM, Hanson DL, Jones JL, Dworkin MS. Trends in pregnancy rates among women with human immunodeficiency virus. *Obstet Gynecol*. 2004;103(4):663-668.
33. Temmerman M, Moses S, Kiragu D, Fusallah S, Wamola IA, Piot P. Impact of single session post-partum counselling of HIV infected women on their subsequent reproductive behaviour. *AIDS Care*. 1990;2(3):247-252.
34. Brocklehurst P, French R. The association between maternal HIV infection and perinatal outcome: A systematic review of the literature and meta-analysis. *Br J Obstet Gynaecol*. 1998;105(8):836-848.

35. Kreitchmann R, Harris DR, Kakehasi F, et al. Antiretroviral adherence during pregnancy and postpartum in latin america. *AIDS Patient Care STDS*. 2012;26(8):486-495.
36. Kapetanovic S, Dass-Brailsford P, Nora D, Talisman N. Mental health of HIV-seropositive women during pregnancy and postpartum period: A comprehensive literature review. *AIDS and behavior*. 2014;18(6):1152-1173.
37. Nachega JB, Uthman OA, Anderson J, et al. Adherence to antiretroviral therapy during and after pregnancy in low-income, middle-income, and high-income countries: A systematic review and meta-analysis. *AIDS*. 2012;26(16):2039-2052.
38. Jean-Baptiste R. Operations research results. HIV/AIDS related stigma, fear and discriminatory practices among health care providers in rwanda. . 2008;2014(March 15).
39. Misiri HE, Tadesse E, Muula AS. Are public antenatal clinics in blantyre, malawi, ready to offer services for the prevention of vertical transmission of HIV? *Afr J Reprod Health*. 2004;8(2):64-70.
40. Subramaniyan A, Sarkar S, Roy G, Lakshminarayanan S. Experiences of HIV positive mothers from rural south india during intra-natal period. *J Clin Diagn Res*. 2013;7(10):2203-2206.
41. Reis C, Heisler M, Amowitz LL, et al. Discriminatory attitudes and practices by health workers toward patients with HIV/AIDS in nigeria. *PLoS Med*. 2005;2(8):e246.
42. Bond V, Chase E and Aggleton P. Stigma, HIV/AIDS and prevention of mother-to-child transmission in zambia. *Evaluation and Program Planning*. 2002;25(4):347-356.

43. Brickley DB, Le Dung Hanh D, Nguyet LT, Mandel JS, Giang le T, Sohn AH. Community, family, and partner-related stigma experienced by pregnant and postpartum women with HIV in ho chi minh city, vietnam. *AIDS Behav.* 2009;13(6):1197-1204.
44. Finocchiaro-Kessler S, Dariotis JK, Sweat MD, et al. Do HIV-infected women want to discuss reproductive plans with providers, and are those conversations occurring? *AIDS Patient Care STDS.* 2010;24(5):317-323.
45. Mindry D, Wagner G, Lake J, et al. Fertility desires among HIV-infected men and women in los angeles county: Client needs and provider perspectives. *Matern Child Health J.* 2013;17(4):593-600.
46. Squires KE, Hodder SL, Feinberg J, et al. Health needs of HIV-infected women in the united states: Insights from the women living positive survey. *AIDS Patient Care STDS.* 2011;25(5):279-285.
47. Schwartz SR, Mehta SH, Taha TE, Rees HV, Venter F, Black V. High pregnancy intentions and missed opportunities for patient-provider communication about fertility in a south african cohort of HIV-positive women on antiretroviral therapy. *AIDS and Behavior.* 2012;16(1):69-78.
48. Steiner RJ, Finocchiaro-Kessler S, Dariotis JK. Engaging HIV care providers in conversations with their reproductive-age patients about fertility desires and intentions: A historical review of the HIV epidemic in the united states. *Am J Public Health.* 2013;103(8):1357-1366.
49. Ferguson L, Grant AD, Watson-Jones D, Kahawita T, Ong'ech JO, Ross DA. Linking women who test HIV -positive in pregnancy -related services to long -term HIV

care and treatment services: A systematic review. *Tropical Medicine & International Health*. 2012;17(5):564-580.

50. World Health Organization, UNICEF. Trends in maternal mortality: 1990 to 2013: Estimates by WHO, UNICEF, UNFPA, the world bank and the united nations population division: Executive summary. . 2014.

51. Westreich D, Maskew M, Rubel D, MacDonald P, Jaffray I, Majuba P. Incidence of pregnancy after initiation of antiretroviral therapy in south africa: A retrospective clinical cohort analysis. *Infect Dis Obstet Gynecol*. 2012;2012:917059.

52. Huntington SE, Thorne C, Bansi LK, et al. Predictors of pregnancy and changes in pregnancy incidence among HIV-positive women accessing HIV clinical care. *AIDS*. 2013;27(1):95-103.

53. Barnes DB, Murphy S. Reproductive decisions for women with HIV: Motherhood's role in envisioning a future. *Qual Health Res*. 2009;19(4):481-491.

54. Sofolahan YA, Airhihenbuwa CO. Cultural expectations and reproductive desires: Experiences of south african women living with HIV/AIDS (WLHA). *Health Care Women Int*. 2013;34(3-4):263-280.

55. Nduna M, Farlane L. Women living with HIV in south africa and their concerns about fertility. *AIDS and Behavior*. 2009;13(1):62-65.

56. Segurado AC, Paiva V. Rights of HIV positive people to sexual and reproductive health: Parenthood. *Reprod Health Matters*. 2007;15(29):27-45.

57. Thorne C, Patel D, Newell ML. Increased risk of adverse pregnancy outcomes in HIV-infected women treated with highly active antiretroviral therapy in europe. *AIDS*. 2004;18(17):2337-2339.

58. Craft SM, Delaney RO, Bautista DT, Serovich JM. Pregnancy decisions among women with HIV. *AIDS Behav.* 2007;11(6):927-935.
59. Bedimo-Rung AL, Clark AR, Dumestre J, Rice J, Kissinger P. Reproductive decision-making among HIV-infected women. *J Natl Med Assoc.* 2005;97(10):1403-1410.
60. Sowell RL, Murdaugh CL, Addy CL, Moneyham L, Tavokoli A. Factors influencing intent to get pregnant in HIV-infected women living in the southern USA. *AIDS Care.* 2002;14(2):181-191.
61. Nobrega AA, Oliveira FA, Galvao MT, et al. Desire for a child among women living with HIV/AIDS in northeast brazil. *AIDS Patient Care STDS.* 2007;21(4):261-267.
62. Nebie Y, Meda N, Leroy V, et al. Sexual and reproductive life of women informed of their HIV seropositivity: A prospective cohort study in burkina faso. *J Acquir Immune Defic Syndr.* 2001;28(4):367-372.
63. Finocchiaro-Kessler S, Bastos F, Malta M, et al. Discussing childbearing with HIV-infected women of reproductive age in clinical care: A comparison of brazil and the US. *AIDS and Behavior.* 2012;16(1):99-107.
64. Harries J, Cooper D, Myer L, Bracken H, Zweigenthal V, Orner P. Policy maker and health care provider perspectives on reproductive decision-making amongst HIV-infected individuals in south africa. *BMC Public Health.* 2007;7:282.
65. Hoyt MJ, Storm DS, Aaron E, Anderson J. Preconception and contraceptive care for women living with HIV. *Infect Dis Obstet Gynecol.* 2012;2012:604183.

66. Asefa A, Mitike G. Prevention of mother-to-child transmission (PMTCT) of HIV services in adama town, ethiopia: Clients' satisfaction and challenges experienced by service providers. *BMC pregnancy and childbirth*. 2014;14(1):57.
67. Duff P, Shoveller J, Zhang R, Alexson D, Montaner JS, Shannon K. High lifetime pregnancy and low contraceptive usage among sex workers who use drugs- an unmet reproductive health need. *BMC Pregnancy Childbirth*. 2011;11:61-2393-11-61.
68. Levy JM. Women's expectations of treatment and care after an antenatal HIV diagnosis in lilongwe, malawi. *Reprod Health Matters*. 2009;17(33):152-161.
69. Sofolahan Y, Airhihenbuwa C. Childbearing decision making: A qualitative study of women living with HIV/AIDS in southwest nigeria. *AIDS research and treatment*. 2012;2012.
70. O'Hara MW. Postpartum depression: What we know. *J Clin Psychol*. 2009;65(12):1258-1269.
71. Rubin LH, Cook JA, Grey DD, et al. Perinatal depressive symptoms in HIV-infected versus HIV-uninfected women: A prospective study from preconception to postpartum. *Journal of Women's Health*. 2011;20(9):1287-1295.
72. Blaney NT, Fernandez MI, Ethier KA, et al. Psychosocial and behavioral correlates of depression among HIV-infected pregnant women. *AIDS Patient Care STDS*. 2004;18(7):405-415.
73. Smith MV, Shao L, Howell H, Lin H, Yonkers KA. Perinatal depression and birth outcomes in a healthy start project. *Matern Child Health J*. 2011;15(3):401-409.

74. Kanniappan S, Jeyapaul MJ, Kalyanwala S. Desire for motherhood: Exploring HIV-positive women's desires, intentions and decision-making in attaining motherhood. *AIDS Care*. 2008;20(6):625-630.
75. Ujiji OA, Ekström AM, Ilako F, Indalo D, Rubenson B. 'I will not let my HIV status stand in the way.' Decisions on motherhood among women on ART in a slum in kenya-a qualitative study. *BMC Women's Health*. 2010;10(13):1-10.
76. Tang J, Nour NM. HIV and pregnancy in resource-poor settings. *Rev Obstet Gynecol*. 2010;3(2):66-71.
77. Richter ML, Chersich MF, Scorgie F, Luchters S, Temmerman M, Steen R. Sex work and the 2010 FIFA world cup: Time for public health imperatives to prevail. *Global Health*. 2010;6:1-8603-6-1.
78. Allen CF, Edwards M, Williamson LM, et al. Sexually transmitted infection service use and risk factors for HIV infection among female sex workers in georgetown, guyana. *J Acquir Immune Defic Syndr*. 2006;43(1):96-101.
79. Samet JH, Pace CA, Cheng DM, et al. Alcohol use and sex risk behaviors among HIV-infected female sex workers (FSWs) and HIV-infected male clients of FSWs in india. *AIDS Behav*. 2010;14 Suppl 1:S74-83.
80. Decker MR, Yam EA, Wirtz AL, et al. Induced abortion, contraceptive use, and dual protection among female sex workers in moscow, russia. *Int J Gynaecol Obstet*. 2013;120(1):27-31.
81. Reed E, Silverman JG, Stein B, et al. Motherhood and HIV risk among female sex workers in andhra pradesh, india: The need to consider women's life contexts. *AIDS Behav*. 2013;17(2):543-550.

82. Elmore-Meegan M, Conroy RM, Agala CB. Sex workers in kenya, numbers of clients and associated risks: An exploratory survey. *Reprod Health Matters*. 2004;12(23):50-57.
83. Wayal S, Cowan F, Warner P, Copas A, Mabey D, Shahmanesh M. Contraceptive practices, sexual and reproductive health needs of HIV-positive and negative female sex workers in goa, india. *Sex Transm Infect*. 2011;87(1):58-64.
84. Kerrigan D, Ellen JM, Moreno L, et al. Environmental-structural factors significantly associated with consistent condom use among female sex workers in the dominican republic. *AIDS*. 2003;17(3):415-423.
85. Murray L&M. *Laughing on the outside, crying on the inside* [rien mis labios llora mi alma]. *Santo Domingo, Dominican Republic: Movimiento de Mujeres Unidas*. 2002.
86. Rivers-Moore M. But the kids are okay: Motherhood, consumption and sex work in neo-liberal latin america. *Br J Sociol*. 2010;61(4):716-736.
87. Basu A, Dutta MJ. 'We are mothers first': Localocentric articulation of sex worker identity as a key in HIV/AIDS communication. *Women Health*. 2011;51(2):106-123.
88. Beckman SW. *"Like any other woman"? pregnancy, motherhood and HIV among sex workers in southern tanzania. doctoral dissertation*. [PhD]. Baltimore, MD: Johns Hopkins Bloomberg School of Public Health; 2014.
89. Chacham AS, Diniz SG, Maia MB, Galati AF, Mirim LA. Sexual and reproductive health needs of sex workers: Two feminist projects in brazil. *Reprod Health Matters*. 2007;15(29):108-118.
90. Swain SN, Saggurti N, Battala M, Verma RK, Jain AK. Experience of violence and adverse reproductive health outcomes, HIV risks among mobile female sex workers in india. *BMC Public Health*. 2011;11:357-2458-11-357.

91. Decker MR, McCauley HL, Phuengsamran D, Janyam S, Silverman JG. Sex trafficking, sexual risk, sexually transmitted infection and reproductive health among female sex workers in thailand. *J Epidemiol Community Health*. 2011;65(4):334-339.
92. Baral S, Beyrer C, Muessig K, et al. Burden of HIV among female sex workers in low-income and middle-income countries: A systematic review and meta-analysis. *Lancet Infect Dis*. 2012;12(7):538-549.
93. United Nations. Joint United Nations Programme on HIV (UNAIDS). UNAIDS guidance note on HIV and sex work. 2009.
94. Vandepitte J, Lyerla R, Dallabetta G, Crabbe F, Alary M, Buve A. Estimates of the number of female sex workers in different regions of the world. *Sex Transm Infect*. 2006;82 Suppl 3:iii18-25.
95. Donastorg Y, Barrington C, Perez M, Kerrigan D. Abriendo puertas: Baseline findings from an integrated intervention to promote prevention, treatment and care among FSW living with HIV in the dominican republic. *PLoS One*. 2014;9(2):e88157.
96. Kerrigan D, Wirtz A, Baral S, et al. *The global HIV epidemics among sex workers*. World Bank Publications; 2012.
97. Cohan D, Lutnick A, Davidson P, et al. Sex worker health: San francisco style. *Sex Transm Infect*. 2006;82(5):418-422.
98. Scambler G, Paoli F. Health work, female sex workers and HIV/AIDS: Global and local dimensions of stigma and deviance as barriers to effective interventions. *Soc Sci Med*. 2008;66(8):1848-1862.

99. King EJ, Maman S, Bowling JM, Moracco KE, Dudina V. The influence of stigma and discrimination on female sex workers' access to HIV services in st. petersburg, russia. *AIDS Behav.* 2013;17(8):2597-2603.
100. Jeal N, Salisbury C. Self-reported experiences of health services among female street-based prostitutes: A cross-sectional survey. *Br J Gen Pract.* 2004;54(504):515-519.
101. Spire B, de Zoysa I, Himmich H. HIV prevention: What have we learned from community experiences in concentrated epidemics? *J Int AIDS Soc.* 2008;11:5-2652-11-5.
102. Mtetwa S, Busza J, Chidiya S, Mungofa S, Cowan F. "You are wasting our drugs": Health service barriers to HIV treatment for sex workers in zimbabwe. *BMC Public Health.* 2013;13:698-2458-13-698.
103. Rojas P, Malow R, Ruffin B, Rothe EM, Rosenberg R. The HIV/AIDS epidemic in the dominican republic: Key contributing factors. *J Int Assoc Physicians AIDS Care (Chic).* 2011;10(5):306-315.
104. Caribbean Epidemiology Centre (CAREC). The Caribbean HIV epidemic and the situation in member countries of the Caribbean Epidemiology Centre, 2007.
105. International AIDS Society (IAS). The XVII international AIDS conference impact report: From evidence to action. . 2009.
106. Central Intelligence Agency. The world factbook: Dominican republic. <https://www.cia.gov/library/publications/the-world-factbook/geos/dr.html>. Updated March 11, 2014. Accessed March 20, 2014.

107. Perez-Then E, Peña R, Tavaréz-Rojas M, et al. Preventing mother-to-child HIV transmission in a developing country: The dominican republic experience. *JAIDS J Acquired Immune Defic Syndromes*. 2003;34(5):506-511.
108. Pruss-Ustun A, Wolf J, Driscoll T, Degenhardt L, Neira M, Calleja JM. HIV due to female sex work: Regional and global estimates. *PLoS One*. 2013;8(5):e63476.
109. Kielmann K. Barren ground: Contesting identities of infertile women in pemba, tanzania. *CAMBRIDGE STUDIES IN MEDICAL ANTHROPOLOGY*. 1998:127-163.
110. Akujobi R. Motherhood in african literature and culture. *CLCWeb: Comparative Literature and Culture*. 2011;13(1):2.
111. Foucault DC, Schneider BH. Parenting values and parenting stress among impoverished village and middle-class small city mothers in the dominican republic. *International Journal of Behavioral Development*. 2009;33(5):440-450.
112. Schumacher G. Culture care meanings, beliefs, and practices in rural dominican republic. *J Transcult Nurs*. 2010;21(2):93-103.
113. Sabogal F, Marín G, Otero-Sabogal R, Marín BV, Perez-Stable EJ. Hispanic familism and acculturation: What changes and what doesn't? *Hispanic Journal of Behavioral Sciences*. 1987;9(4):397-412.
114. Santisteban DA, Muir-Malcolm JA, Mitrani VB, Szapocznik J. Integrating the study of ethnic culture and family psychology intervention science. . 2002.
115. Miller S, Cordero M, Coleman AL, et al. Quality of care in institutionalized deliveries: The paradox of the dominican republic. *Int J Gynaecol Obstet*. 2003;82(1):89-103; discussion 87-8.

116. Ruminjo J, Cordero C, Beattie KJ, Wegner MN. Quality of care in labor and delivery: A paradox in the dominican republic; commentary. *Int J Gynaecol Obstet*. 2003;82(1):115-119.
117. Pérez-Then Eea. Evaluación de la calidad de atención a la embarazada y al niño sano en centros de primer nivel de atención de las regiones de salud III, IV, V y VI de la república dominicana: Resultados de la segunda fase. *Boletín CENISMI*. 2010;20(2).
118. Miric M, Pérez-Then E. *Caracterización de la primera infancia: Cuidados infantiles y servicios que se le ofrecen en comunidades seleccionadas de la república dominicana*. Centro Nacional de Investigaciones en Salud Materno Infantil (CENISMI), Consejo Nacional para la Niñez y la Adolescencia (CONANI), Fondo de las Naciones Unidas para la Infancia (UNICEF); 2011.
119. Proujansky AE. A dominican maternity ward. *Am J Nurs*. 2008;108(12):40-43.
120. United Nations. Department of Economic and Social Affairs Population Division. World abortion policies 2013. 2013:May 23, 2014.
121. Miller S, Lehman T, Campbell M, et al. Misoprostol and declining abortion-related morbidity in Santo Domingo, Dominican Republic: A temporal association. *BJOG: An International Journal of Obstetrics & Gynaecology*. 2005;112(9):1291-1296.
122. Kavanaugh ML, Bessett D, Littman LL, Norris A. Connecting knowledge about abortion and sexual and reproductive health to belief about abortion restrictions: Findings from an online survey. *Womens Health Issues*. 2013;23(4):e239-e247.
123. Orner P, de Bruyn M, Cooper D. 'It hurts, but I don't have a choice, I'm not working and I'm sick': Decisions and experiences regarding abortion of women living with HIV in cape town, south africa. *Culture, health & sexuality*. 2011;13(7):781-795.

124. Orner P, De Bruyn M, Harries J, Cooper D. A qualitative exploration of HIV-positive pregnant women's decision-making regarding abortion in cape town, south africa. *SAHARA J (Journal of Social Aspects of HIV/AIDS Research Alliance)*. 2010;7(2).
125. UNAIDS. Global report: UNAIDS report on the global AIDS epidemic (2010). . 2010.
126. World Health Organization. Global monitoring framework and strategy for the global plan towards the elimination of new HIV infections among children by 2015 and keeping mothers alive (EMTCT). . 2012.
127. World Bank Group. *World development indicators 2012*. World Bank Publications; 2012.
128. McLeroy KR, Bibeau D, Steckler A, Glanz K. An ecological perspective on health promotion programs. *Health Education & Behavior*. 1988;15(4):351-377.
129. Bronfenbrenner U. The ecology of human development Experiments by nature and design Harvard university press. *Cambridge, MA*. 1979.
130. Nattabi B, Li J, Thompson SC, Orach CG, Earnest J. A systematic review of factors influencing fertility desires and intentions among people living with HIV/AIDS: Implications for policy and service delivery. *AIDS Behav*. 2009;13(5):949-968.
131. Jones D, Chakhtoura N, Cook R. Reproductive and maternal healthcare needs of HIV infected women. *Curr HIV/AIDS Rep*. 2013;10(4):333-341.
132. Oosterhoff P, Anh NT, Hanh NT, Yen PN, Wright P, Hardon A. Holding the line: Family responses to pregnancy and the desire for a child in the context of HIV in vietnam. *Cult Health Sex*. 2008;10(4):403-416.

133. Berger BE, Ferrans CE, Lashley FR. Measuring stigma in people with HIV: Psychometric assessment of the HIV stigma scale. *Res Nurs Health*. 2001;24(6):518-529.
134. Zelaya CE, Sivaram S, Johnson SC, Srikrishnan AK, Solomon S, Celentano DD. HIV/AIDS stigma: Reliability and validity of a new measurement instrument in chennai, india. *AIDS Behav*. 2008;12(5):781-788.
135. Zelaya CE, Sivaram S, Johnson SC, Srikrishnan AK, Suniti S, Celentano DD. Measurement of self, experienced, and perceived HIV/AIDS stigma using parallel scales in chennai, india. *AIDS Care*. 2012;24(7):846-855.
136. Baral S, Adams D, Lebona J, et al. A cross-sectional assessment of population demographics, HIV risks and human rights contexts among men who have sex with men in lesotho. *J Int AIDS Soc*. 2011;14:36-2652-14-36.
137. Earnshaw VA, Smith LR, Chaudoir SR, Amico KR, Copenhaver MM. HIV stigma mechanisms and well-being among PLWH: A test of the HIV stigma framework. *AIDS Behav*. 2013;17(5):1785-1795.
138. Galassi JP, Schanberg R, Ware WB. The patient reactions assessment: A brief measure of the quality of the patient-provider medical relationship. *Psychol Assess*. 1992;4(3):346.
139. Palella FJ, Jr, Delaney KM, Moorman AC, et al. Declining morbidity and mortality among patients with advanced human immunodeficiency virus infection. HIV outpatient study investigators. *N Engl J Med*. 1998;338(13):853-860.
140. Lima VD, Harrigan R, Bangsberg DR, et al. The combined effect of modern highly active antiretroviral therapy regimens and adherence on mortality over time. *J Acquir Immune Defic Syndr*. 2009;50(5):529-536.

141. Craft SM, Delaney RO, Bautista DT, Serovich JM. Pregnancy decisions among women with HIV. *AIDS Behav.* 2007;11(6):927-935.
142. Maier M, Andia I, Emenyonu N, et al. Antiretroviral therapy is associated with increased fertility desire, but not pregnancy or live birth, among HIV+ women in an early HIV treatment program in rural uganda. *AIDS Behav.* 2009;13 Suppl 1:28-37.
143. Sharma A, Feldman JG, Golub ET, et al. Live birth patterns among human immunodeficiency virus-infected women before and after the availability of highly active antiretroviral therapy. *Am J Obstet Gynecol.* 2007;196(6):541.e1-541.e6.
144. Alan Guttmacher Institute. *Hopes and realities; closing the gap between women's aspirations and reproductive experiences.* New York: The Alan Guttmacher Institute; 1995:56.
145. Berhan Y, Berhan A. Meta-analyses of fertility desires of people living with HIV. *BMC Public Health.* 2013;13(1):409.
146. Wesley Y, Smeltzer SC, Redeker NS, Walker S, Palumbo P, Whipple B. Reproductive decision making in mothers with HIV-1. *Health Care Women Int.* 2000;21(4):291-304.
147. Kearney MH, Murphy S, Rosenbaum M. Mothering on crack cocaine: A grounded theory analysis. *Soc Sci Med.* 1994;38(2):351-361.
148. Feldman R, Maposhere C. Safer sex and reproductive choice: Findings from "positive women: Voices and choices" in zimbabwe. *Reprod Health Matters.* 2003;11(22):162-173.

149. Baral S, Beyrer C, Muessig K, et al. Burden of HIV among female sex workers in low-income and middle-income countries: A systematic review and meta-analysis. *Lancet Infect Dis*. 2012;12(7):538-549.
150. Lazarus L, Deering KN, Nabess R, Gibson K, Tyndall MW, Shannon K. Occupational stigma as a primary barrier to health care for street-based sex workers in canada. *Cult Health Sex*. 2012;14(2):139-150.
151. Kerrigan DL, Wirtz AL, Baral S, Decker MR, Murray L.
The global HIV epidemics among sex workers. . 2009.
152. Kerrigan D, Wirtz A, Baral S, et al. *The global HIV epidemics among sex workers*. World Bank Publications; 2012.
153. Chege MN, Kabiru EW, Mbithi JN, Bwayo JJ. Childcare practices of commercial sex workers. . *East African Medical Journal*. 2002;79(7):382-389.
154. Moreno L, Kerrigan DL.
The evolution of HIV prevention strategies among female sex workers in the dominican republic. . *Research for Sex Work*. ;3:8-10.
155. Casterline JB, Mendoza JA. Unwanted fertility in latin america: Historical trends, recent patterns. . 2008.
156. Ruminjo J, Cordero C, Beattie KJ, Wegner MN. Quality of care in labor and delivery: A paradox in the dominican republic; commentary. *Int J Gynaecol Obstet*. 2003;82(1):115-119.
157. Zullinger R. *Experiences of female sex workers along the HIV care continuum in santo domingo, dominican republic*. [PhD]. Baltimore, MD: Johns Hopkins Bloomberg School of Public Health; 2014.

158. Kennedy C, Barrington C, Donastory Y, et al. Exploring the positive health, dignity and prevention needs of female sex workers, men who have sex with men and transgender women in the dominican republic and swaziland. . . 2013.
159. Ajzen I. The theory of planned behavior. *Organ Behav Hum Decis Process*. 1991;50(2):179-211.
160. Miller WB. Childbearing motivation and its measurement. *J Biosoc Sci*. 1995;27(04):473-487.
161. da Costa Leite I, Gupta N, do Nascimento Rodrigues R. Female sterilization in latin america: Cross-national perspectives. *J Biosoc Sci*. 2004;36(6):683-698.
162. Loaiza E. Sterilization regret in the dominican republic: Looking for quality-of-care issues. *Stud Fam Plann*. 1995;26(1):39-48.
163. Human Rights Watch (HRW). A test of inequity: Discrimination against women living with HIV in the dominican republic. . *Human Rights Watch*. 2004;16(4(B)):May 10, 2014.
164. Chen JL, Philips KA, Kanouse DE, Collins RL, Miu A. Fertility desires and intentions of HIV-positive men and women. *Fam Plann Perspect*. 2001;33(4):144-52, 165.
165. Nakayiwa S, Abang B, Packel L, et al. Desire for children and pregnancy risk behavior among HIV-infected men and women in uganda. *AIDS Behav*. 2006;10(4 Suppl):S95-104.
166. Miller WB, Rodgers JL, Pasta DJ. Fertility motivations of youth predict later fertility outcomes: A prospective analysis of national longitudinal survey of youth data. *Biodemography and social biology*. 2010;56(1):1-23.

167. Bain-Brickley D, Hanh D, Nguyet L, Giang L, Sohn A. Qualitative study of the challenges to seeking health care among HIV-positive pregnant women in ho chi minh city. . 2006.

168. Finocchiaro-Kessler S, Mabachi N, Dariotis JK, Anderson J, Goggin K, Sweat M. “We weren't using condoms because we were trying to conceive”: The need for reproductive counseling for HIV-positive women in clinical care. *AIDS Patient Care STDS*. 2012;26(11):700-707.

169. Kerrigan D, Wirtz A, Baral S, et al. *The global HIV epidemics among sex workers*. World Bank Publications; 2012.

Manuscript 1

Assessing factors related to the desire for children among female sex workers living with HIV in the Dominican Republic.

Abstract

Context: Female sex workers (FSW) are at increased risk for a number of negative health outcomes, particularly HIV. However, there is a surprising dearth of research on FSWs living with HIV and even less focused on pregnancy and reproductive health.

Methods: Data from a cohort of 247 FSWs of reproductive age living with HIV in Santo Domingo, Dominican Republic was analyzed using bivariate and multivariate logistic regression to assess factors associated with the desire for children.

Results: Most participants had children (93.12%; mean: 2.8; range: 1, 8) and 28.34% reported wanting (more) children. Bivariate logistic regression analysis uncovered that participants who desired children were less likely to currently be on antiretroviral treatment and more likely to have a detectable viral load. Multivariate logistic regression results showed significant associations between desire for children and older age (AOR: 0.92; 95% CI: 0.86, 0.98), higher HIV-related internalized stigma (AOR: 3.10; 95% CI: 1.39, 6.88), history of pregnancy loss (AOR: 0.44; 95% CI: 0.19, 0.99), current number of children (AOR: 0.62; 95% CI: 0.44, 0.86), and perception of partners reaction to pregnancy (upset (AOR: 0.12; 95% CI: 0.02, 0.67), or unsure (AOR: 0.17; 95% CI: 0.05, 0.55)) compared to perception of partner support.

Conclusions: These findings highlight the crucial need for more research on reproductive health for FSWs living with HIV. Emphasis on addressing HIV-related stigma, assessment of HIV-related treatment and the role of partners in relation to the desire for children is important for maternal and child health within this particularly vulnerable population.

Key words: HIV, female sex work, reproductive health, fertility desire.

Introduction

Throughout the history of the HIV epidemic, significant advancements have been made for the treatment and care for those infected with the virus. Of these advancements, the introduction of antiretroviral treatment (ART) has been most influential for people living with HIV (PLHIV), both extending quality and length of life.^{139,140} Additionally, ART together with other precautions throughout pregnancy and delivery was found to drastically reduce mother-to-child transmission (MTCT) of HIV, providing women living with HIV the opportunity for a healthy pregnancy.^{4,5} Prior to the introduction and access to prevention of MTCT, health providers discouraged PLHIV from having children in order to avoid new infections, though many women continued to have children even with the knowledge of risks.^{59-62,141} Since prevention of MTCT, the number of women living with HIV who desire more children has increased significantly, both because they feel healthy enough to have children and with the knowledge that they can have a healthy pregnancy with proper precautions.^{19,142,143} In fact, in some settings fertility intentions and childbearing did not substantially differ between women living with HIV and women in the general population.^{12,19,144} With this in mind, increased attention was given towards understanding more about pregnancy and women living with HIV to ensure that they are given every chance for a safe and healthy pregnancy.

Pregnancy desires and intent among women living with HIV

As access and adherence to prevention of MTCT has increased, pregnancy rates and desire for children among women living with HIV have as well.^{51,52} In fact, about 26% to 69% in different regions globally desire more children^{11,12,14,15,130} transforming the focus on pregnancy among women living with HIV from a biomedical lens to a socio-

medical lens. While availability of ART has played a substantial role in reducing MTCT, the influence of ART on pregnancy desire has differed by setting. In a pooled meta-analysis on fertility desire among women living with HIV, Berhan & Berhan¹⁴⁵ found no association between desire and ART or education level, however being young and childless had significant associations. Other contributing factors to wanting more children were identified in a systematic review, where Nattabi et al.¹³⁰ found age, number of living children, prospective motherhood, health worker attitudes, experiences with child mortality and subjective feelings of health and stigma to be prominent influences. More consistently, however, culture, social expectation and the importance of a woman's identity as a mother were found as strongly influential factors across settings, although regional differences exist.^{15,18,19,132} Women are more likely to want more children in cultures that place a high importance, social expectation and value on fertility and childbearing or where women without children face social and familial stigma and discrimination.^{21-24,74,130}

Motherhood has also been seen to be a strong influence on the desire to have children in varied settings and different populations.^{15,18,19,74,146} For women who are marginalized, motherhood may be a way to feel valued, both by the woman herself and within her social or familial context.^{53,147} Women living with HIV who are mothers have described that having children gave them a sense of fulfillment, increased self-esteem, and was a reason to keep living.¹⁵ In settings where desire decreased due to HIV infection, reasons included fear that they will not be able to care for their children due to HIV-related sickness or fear that their child will be infected.^{9,16} Therefore, as Barnes & Murphy⁵³ describes, women many times find themselves making decisions about

childbearing amidst tension between self-image, culture, social expectation and fears about health for themselves and future children.

Another salient issue found to be consistently associated with fertility desire is stigma, in the forms of self/internalized stigma and social stigma.^{19,58,132,148} Women with a higher degree of HIV related self/internalized stigma were more likely to want and intend to have children, which would both conceal their positive status and improve self-worth, while those with higher HIV related social or public stigma were less likely to want children to avoid judgment and criticism of others who may see a pregnancy as an irresponsible and unapproved decision.^{13,58}

Female sex workers and pregnancy

One of the most affected groups for sexually transmitted infections (STI), including HIV, are female sex workers (FSWs). Although varied by region, it is estimated that overall global prevalence of HIV among FSWs is about 11.8% and HIV prevalence among FSWs was estimated at 13.5 times that of the general female population (women aged 15-49) in low and middle-income countries.¹⁴⁹ One of the most salient issues for FSWs is stigma, related to both their occupation and their association with HIV transmission, which still acts as a barrier to accessing health services worldwide for FSWs despite the call for non-discriminatory services by UNAIDS.^{95,97,98,150-152} While there is an increasing amount of research on FSWs, particularly in terms of prevalence estimates and secondary infections, there is far less evidence focusing on pregnancy and reproductive health of this population.

Studies on pregnancy and motherhood among FSWs are scarce, but are beginning to emerge. It is clear that pregnancy and motherhood play an important role in the lives

of many FSWs. Pregnancy estimates among FSWs range from about 27% in Madagascar⁸² to about 91% in India.⁸³ Pregnancy also seems to play a role in sex work, with some studies finding that FSWs seek pregnancy through sex work or as a way to leave sex work.⁸³⁻⁸⁵ Many FSWs also have children, support children or are plan to have more children in the future.^{82,153} Estimates of FSWs with children range from about 27% in Russia⁸⁰ to 90% in India.⁸¹ Children of FSWs have been seen to affect sex work and risk behavior in various ways. Some FSWs begin sex work to support their children,⁸⁵⁻⁸⁷ while other FSWs who were mothers felt they had limited choices with regard to protecting themselves against health risks in order to protect the welfare of their children and families.^{81,88}

HIV and sex work in the Dominican Republic

The Caribbean bears one of the highest HIV seroprevalence (1.2%) in the Western Hemisphere, with about 75% of PLHIV in Latin America and the Caribbean living in the Dominican Republic (DR) or Haiti- with Haiti bearing a majority of PLHIV.^{104,105} Women and girls living with HIV outnumber men and boys in this region, with heterosexual sex being the primary mode of transmission.¹²⁵ In the DR, the burden of HIV falls heavily on specific populations including FSWs, a population that is estimated at up to 100,000 women,⁸⁴ or about 1.8% of the population in urban areas.⁹⁴ Sex work, or the exchange of sex for money among those over 18 years of age is not explicitly criminalized in the DR. In fact, FSWs in some areas have organizations that aim to support, educate and empower FSWs such as Movimiento de Mujeres Unidas (MODEMU)- a sex worker rights organization, and the Centro de Orientacion e Investigacion Integral (COIN)- an NGO that had significant involvement in HIV

prevention efforts in the DR. Estimates of HIV seroprevalence for FSWs in the DR ranges depending on location, however overall HIV prevalence among FSWs is estimated at 4.8%, ranging from 3.3% in Santo Domingo, the capital city, to 6.4% in locations with less exposure to HIV interventions.¹⁵² In Santo Domingo many women are Haitian and of low socio-economic status, which puts them even more at risk for HIV and negative health outcomes.¹⁵⁴

Family and childbearing in the Dominican Republic

Socio-cultural influences have shown to play an important role in the decision to have more children for women living with HIV.^{13,21-24} In the DR, a predominantly Catholic country, family and childbearing is an important part of the culture, where family forms the basis of stability and is the source for social support in times of need, particularly in low-income populations.¹¹¹⁻¹¹⁴ Women first have children young, at a mean age of 20 years¹⁰⁶ and families are typically large, with the average number of children at about 2.67¹⁰⁶ and an ideal number of children among women aged 15-24 at about 2.6.¹⁵⁵ Extended families are typically are close knit and collective, living in the same vicinity. Motherhood is a source of pride for Dominicans and pregnancies are often discussed as desired for both for support and for emotional reasons in lower income Dominican populations.¹¹¹ While family and childbearing are a central part of the culture, maternal and infant care during pregnancy and delivery is lacking. Though maternal mortality has been declining over the past 15 years⁵⁰, the DR has had one of the highest maternal and infant mortality rates of the Latin American and Caribbean countries, but also has a high percentage of prenatal care coverage, attended deliveries by health personnel and institutional deliveries, which has called into question the quality of

reproductive health services^{104,115,117,156} as well as questioning the strict abortion laws in the country.¹²⁰ Poor conditions in public maternity wards were observed on a few separate occasions, highlighting severe issues in occupational hygiene and care in maternity wards.^{115,119} These negative experiences may be heightened for women living with HIV and female sex workers if status is disclosed.

Female sex workers living with HIV

While significantly lacking in the literature, research is beginning to emerge on FSWs living with HIV, uncovering significant health concerns including HIV/STI prevalence, violence, mental health issues, increased risk for breakage in care and discrimination.^{9,76-79,83,95,152} Studies have shown that FSWs living with HIV have experienced humiliation and been demeaned by health workers¹⁰² and were more likely to feel social isolated, been refused medical care or be afraid to go to the doctor than FSWs without HIV.⁹⁹ Knowing that both women living with HIV and FSWs have and desire more children, it is essential that we understand more about pregnancy and childbearing among FSWs living with HIV. Considering their higher risk for STI and considerable barriers to access and adherence to care and ART, including increased stigma and discrimination,^{95,99,102,157} there is a surprising dearth of existing literature on FSWs living with HIV. Further, there are no known studies focusing on pregnancy characteristics of this population. The aim of this study is to understand factors associated with desire for more children among FSWs living with HIV in Santo Domingo, Dominican Republic.

Methods

This paper utilizes baseline data from a longitudinal intervention research study in the Dominican Republic, named *Abriendo Puertas*. The aim of the overall study is to

assess the feasibility and initial effects of a multi-level integrated intervention to promote engagement in HIV care, healthy behaviors and foster adherence care for FSWs living in Santo Domingo, DR- the details of which have been described elsewhere.⁹⁵ This study was guided by formative research on FSWs living with HIV, which indicated that major barriers in access exist for this population to prevention, care and support services.¹⁵⁸

Study sample & recruitment: Female sex workers living with HIV were enrolled in the study. Female sex workers (FSW) were defined as adult women who report having exchanged sex for money in the last month. Participants were at least 18 years of age, spoke Spanish, and reported that they were HIV-positive, confirmed prior to enrollment by a HIV rapid test (Retrocheck). Recruitment occurred in Santo Domingo through HIV clinics, peer navigators and referral by other participants. Enrollment occurred from November 2012 to February 2013, resulting in a final sample size of 268 participants. Analysis for this paper included only those who were of reproductive age-between 15 to 49 years of age- resulting in a final sample size of 247.

Data collection: This baseline socio-behavioral survey was conducted in Spanish within private offices of the HIV Vaccine Research Unit (HVRU) by female Dominican field staff. STI testing using vaginal swabs were processed at the Johns Hopkins School of Medicine laboratory using nucleic acid amplification testing (APTIMA Combo2 for gonorrhea and chlamydia and a separate assay for trichomoniasis). Blood samples for HIV viral load were assessed at the Dominican National Reference Laboratory using

polymerase chain reaction (PCR) testing. All participants who tested positive for an STI received free treatment specific to their infection.

Survey: The baseline survey for this study was made up of 22 sections that include overarching themes of demographics, employment, HIV testing experience, disclosure, health care services and barriers, clinic and provider dynamics, ART, sexual behavior, social support, reproductive and sexual health, HIV knowledge, exposure to HIV interventions, alcohol and drug use, violence, community engagement, stigma and discrimination. This paper focuses on the reproductive health section of the survey.

Ethics and collaborative partners: This study partnered with a number of organizations in Santo Domingo including the HVRU at the Instituto Dermatológico y Cirugía de Piel Dr. Humberto Bogart Diaz (IDCP), the non-governmental organization (NGO) sex worker rights group, Movimiento de Mujeres Unidas (MODEMU) and the local HIV prevention NGO that has worked closely with the sex worker community, Centro de Orientación e Investigación Integral (COIN). Participants provided oral consent that they understood the study, had reviewed the consent form, understood that they could discontinue the study at any time and agreed to enroll. Participants were offered 10 dollars for completion of the survey. The study was approved by the Johns Hopkins Bloomberg School of Public Health as well as the IDCP Institutional Review Board.

Measures

Dependent variable: The outcome measure was if the FSW desired more children. This question asked, “Would you like to have (more) children in the future?”. Possible

responses were “yes”, “no” or “maybe”. This variable was categorized as dichotomous (yes/maybe or no). Only 2 respondents indicated they might want another child (responding maybe), therefore these respondents were grouped with those who indicated that they wanted another child.

Independent variables: Independent variables were chosen for theoretical and conceptual relevance and with respect to past research. Variables were categorized with respect to the distribution of the observations and nature of the data. Internalized stigma scales for both sex work and HIV were measured using adapted measures from those developed by Berger et al.,¹³³ Zelaya et al.,^{134,135} Baral et al.,¹³⁶ and with guidance from Earnshaw’s HIV Stigma Framework¹³⁷. All items from the stigma scales included the following response options: 1= totally disagree, 2=disagree, 3=agree, 4=totally agree, 88=don’t know and 99=refuse to answer. All answers of “don’t know” and “refuse to answer” responses were coded as 2.5 in order to keep those participants in the final sample size but neutralize their weight, though analysis was run with an without the inclusion of the neutral coding to ensure that there were not large differences with inclusion. Coding was reversed on certain questions to ensure standardization of directionality. The perception of provider scale, adapted from the validated Patients Reactions Assessment scale¹³⁸ differed in that a higher score meant a higher perception of their providers. Data reduction occurred through principal components analysis. Once items were chosen for removal, Cronbach alpha tests were conducted in order to measure internal consistency of the final scale (table 1). When scales were finalized, the items included were averaged across participant to create each final composite score.

Table 1: Stigma and perception of provider scale characteristics.

Scale name	Number of final items/ original number of scale items	Cronbach alpha score
HIV related self-internalized stigma scale	7/8	0.8819
Sex work related self/ internalized stigma scale	12/15	0.9089
Perception of provider scale	8/10	0.9550

Data analysis: Data was examined for any outliers, missing information and discrepancies. Any inconsistencies that were identified were checked against original surveys and corrected to ensure integrity of the data. Exploratory data analysis was conducted to understand the underlying structure of the data and with this in mind, categories were created. Descriptive characteristics were explored for the total study sample. Variables of interest were initially selected with regard to prior research and theoretical and conceptual guidance. T-tests and chi-square tests, as appropriate, were calculated for each association between independent variables and the outcome. Bivariate logistic regression was conducted to determine odds ratios and confidence intervals for each independent variable against the outcome. The model for multiple logistic regression were built partially in response to outcomes from these crude relationships, with inclusion indicated by those with less than a 0.10 p-value level and variables known to be of theoretical importance or significance in past research. Multicollinearity was assessed for final models, and if two variables were correlated and relevant, the variable with the greater conceptual relevance was chosen for the final model. While missing observations were minimized through multiple checks of the data, values that were missing were not included in the multivariate regression analysis, though missing values were check to ensure randomness. The final model was built using multiple iterations through a traditional stepwise fashion, after inclusion of each variable the Akiake

information criterion (AIC) was calculated for each nested model and log likelihood tests were assessed. The final model was chosen with the most parsimonious fit (lowest AIC and log likelihood with the greatest conceptual and theoretical relevance). A Hosmer-Lemeshow goodness-of-fit test was conducted on the final model to determine final fit.

Theoretical orientation and conceptual development

Two principle theoretical frameworks guided the analysis of this study. First, the Theory of Planned Behavior,¹⁵⁹ a well-established behavioral theory in the field of public health, which explores the relationship between health behavior and associated beliefs, attitudes and intentions and has been often cited in studies related to fertility intention.¹³ The second is based on a psycho-social framework developed by Warren B. Miller¹⁶⁰ that hypothesizes predictors of fertility desires, which in turn, predict fertility intentions, adapted by Finocchario-Kessler et al.⁴⁴ to look at fertility intentions of women living with HIV by including individual perceived control over the decision to have a child as an additional variable. These frameworks along with background literature guided variable selection.

Results

Descriptive characteristics are highlighted in table 2. The total number of study participants was 247 FSWs living with HIV. The mean age of participants was 34 years of age (range: 18 to 49 years) with most reporting some kind of partner (81.62%) and living in a rented or owned house (76.92%). Almost all participants had some education (98.38%) with most having only a primary education (60.32%). A majority also reported residing in Santo Domingo (77.73%).

Behavioral and biological characteristics are illustrated in table 3. There was a wide age range for entry into sex work, with the mean age at 20 years (range: 10 to 46 years). At the time of the survey a little more than half were engaged in street-based sex work (55.34%). The average cost for each salida, or sex work date with a client, was 800 Dominican pesos (approximately \$20), with range in cost from 200 to 4000 Dominican pesos/salida (about \$4.50 to \$90.00). About a third of the respondents reported a conflict with a partner in the last 6 months, with a little less than a third (27.67%) reporting that these conflicts were physically, mentally, verbally, emotionally and/or economically abusive in nature. More than half the sample (59.51%) rarely or never drank alcohol and a quarter (24.70%) reported ever using a drug, which included marijuana, crack, cocaine or heroin.

The number of years since diagnosis for participants was broad, averaging 6 years and a range of less than a year to 18 years. While most reported current ART use (71.95%), less than half (46%) had an undetectable viral load. In terms of sexual health, about a quarter (23.85%) of participants were clinically diagnosed with chlamydia, gonorrhea or trichomoniasis. A high number reported using anything to prevent a pregnancy in the past 6 months (81.30%), and consistent condom use with all sexual partners was about 64.08%. About half the sample (49.19%) had a permanent contraceptive procedure (sterilization 46%, hysterectomy 3%- not shown in table). Stigma scales revealed an elevated level of HIV related self-stigma (2.42/4.0) and sex work self-stigma (2.38/4.0). Lastly most of the sample had a more positive perception of their provider (3.23/4.0).

Fertility and childbearing descriptive results are highlighted in table 4. Almost all of the participants have been pregnant at least once (95.55%, mean: 4.4, range: 1,12) and 93.12% reported currently having at least one child (mean: 2.8, range: 1,8). About 63% of participants reporting at least one pregnancy not resulting in a live birth, which could be due to miscarriage, pregnancy termination or stillbirth. In addition, over a third of participants reported having been pregnant since HIV diagnosis (36.84%) ranging from 1 to 5 pregnancies since diagnosis.

Of those that were pregnant after HIV diagnosis, about a third (35.56%) reported a pregnancy loss. Eight women (3%) reported currently or possibly being pregnant at the time of the study. The dependent variable, those that reported wanting more children was almost 30% of the participants (n=70) and the number of children desired ranged from 1 to 5 with an average of 1 or 2 more children. Among those wanting more children, a high number (n=24/70; 34.29%) also reported having had a permanent contraceptive procedure. While many mentioned wanting more children, a little more than half of the participants (55.06%) disagreed with the statement, “If an HIV positive woman wants to get pregnant, it is good to try to get pregnant”. Among those that reported a partner, a small percentage felt their partner would be upset if a pregnancy occurred (14.92%).

Bivariate logistic regression results

Table 5 highlights results from both bivariate and multivariate logistic regression. In bivariate analyses, increased age (OR: 0.88; 95% CI: 0.84, 0.92), not having a partner (OR: 1.00; 95% CI: (0.49, 2.05), having more children (OR: 0.5; 95% CI: 0.39, 0.64), living with HIV for more years (OR: 0.89; 95% CI: 0.83, 0.96), having a detectable viral load (OR: 2.16; 95% CI: 1.21, 3.87) and current ART use compared to those not on ART

(OR: 0.45; 95% CI: 0.25, 0.82) were significantly associated with the desire for more children. Civil status, education, alcohol or drug use, MTCT knowledge and years in sex work did not have significant associations with the outcome. FSWs living with HIV who agreed that if an HIV positive woman wants to get pregnant it is a good idea to try were 6.14 times more likely to desire more children compared to those who did not (95% CI: 3.19, 11.27) and those who reported ever having a pregnancy loss were 0.40 times less likely to want more children than those that have not (95% CI: 0.23, 0.71). There was marginally non-significant association between having lost a child and desiring more children (OR: 0.67; 95% CI: 0.40, 1.1). Those who reported that their partners would be upset if they became pregnant had much lower odds of wanting more children compared to those who felt their partners would be supportive (OR: 0.10; 95% CI: 0.02, 0.45). Lastly, FSWs who reported higher HIV-related self/internalized stigma were 1.6 times more likely per unit increase in the scale to want more children (95% CI: 1.26, 5.7).

Multivariate logistic regression results

When all variables were entered into the final model the total sample size was 239. Factors which retained significance associated with wanting more children among FSWs living with HIV in multivariate analysis included age, number of children, perception that it is good for a woman living with HIV to get pregnant, history of at least one pregnancy loss, perceived partners feelings about pregnancy and HIV related self-internalized stigma. Participants who were older (AOR: 0.94; 95% CI: 0.88, 0.99) and who currently had more children (AOR 0.61; 95% CI: 0.44, 0.84) had decreased odds of wanting more children. Viral load use was chosen to be included in the final model instead of currently on ART due to prior research and conceptual relevance, although

there were significant associations seen with those who were currently on ART in the unadjusted relationship. Those that agreed that it is good for an HIV positive woman to get pregnant if she wants more children had 6.49 increased odds of wanting more children (95% CI: 2.27, 15.39), while participants who had experienced a pregnancy loss were much less likely to want more children than those who had not (AOR: 0.37; 95% CI: 0.17, 0.84). Participants who felt their partners would be upset (AOR: 0.12; 95% CI: 0.02, 0.66) or they weren't sure about a partner's reaction to a pregnancy (AOR: 0.40; 95% CI: 0.16, 0.96) as compared to those who felt their partners would be supportive were less likely to desire more children. Lastly, participants who reported a higher degree of HIV related self/internalized stigma had 3.19 times the odds of wanting more children (95% CI: 1.5, 6.78).

Discussion

Female sex workers living with HIV is a population that thus far has been largely ignored in the public health literature, however they are one of the most vulnerable populations for a myriad of public health concerns, as well as stigma and discrimination. Globally, many active FSWs are of reproductive age, and at significant risk for HIV, therefore it is surprising that there is such a lack of research existing on this population, particularly regarding reproductive health.

As this study shows, children and fertility play a key role for FSWs living with HIV. Most of these FSWs had children- in fact most women had multiple children. Reflective of cultural or social norms surrounding childbearing in the DR, FSWs living with HIV in this sample had a similar average number of children (2.6) than the general population in the DR (2.67),¹⁰⁶ however are at greater risk for many negative health

outcomes as compared to the general population. Even after HIV diagnosis, a significant number of FSWs reported having been pregnant and wanting more children. More common are the number of FSWs in this population that have been pregnant or have lost pregnancies- during their lifetime and after diagnosis with HIV. In a Catholic country with strict abortion laws, more than half the sample reported a pregnancy that did not result in a live birth. Although pregnancy loss could be due to a number of factors (e.g. stillbirth, miscarriage, termination of pregnancy) and could be intended or unintended, this high level of pregnancy loss is salient. It is also concerning that more than half of the women do not feel that if a woman with HIV wants to get pregnant they should try at a time where women can have healthy pregnancies if desired. This may be due to negative experiences with pregnancies and deliveries in the past, dated knowledge or information about HIV in pregnancy, lack of discussion about pregnancy and HIV with a health provider, or a reflection of general accepted knowledge or behavior for women living with HIV though further research is needed in this area.

About half of the population had undergone a permanent contraceptive procedure with a good portion still wanting more children. Sterilization rates are historically high in the DR, with the percentage of women sterilized in the general population reported by married women at 40.9%.¹⁶¹ While there is limited information on sterilization regret, one study did find that women in the general population in the DR did have a degree of misunderstanding surrounding the permanence of sterilization and some degree of regret over the decision.¹⁶² Further, Human Rights Watch found that a number of women living with HIV in the DR have been sterilized because of their HIV status without receiving full information about their choices and rights,¹⁶³ which has been found in other settings

as well.²³ This may explain the number of women who desire more children who also indicate permanent contraception, although more information is needed. It is clear, even through descriptive characteristics of fertility and reproductive health characteristics that more specific research is necessary for this population.

Bivariate and multivariate logistic regression results show similarities to a number of studies done on women living with HIV and their desire for more children. In the final model, being younger, having more children, support of pregnancy in HIV positive women and perceived partner support were all significantly related to wanting more children, which has been found in other studies.^{13,19,59,61,164,165} Those that had ever experienced a pregnancy loss had less than half the odds of wanting more children, which might indicate a history of unwanted, terminated pregnancies or having had a traumatic event at having had a miscarriage or stillbirth. Having experienced child loss had a marginally significant association with the desire for more children in this sample. Although a study in Brazil showed no association between desire for more children and child loss⁶¹ other studies have found significant associations,^{19,20,165} where some women living with HIV desired more children in order to make up for the loss while others avoid having more children for fear of future loss.¹³ Therefore there may be a number of dynamics at work affecting this association. Surprisingly, variables associated with subjective perceptions of personal health were not significantly related to wanting more children, which has been seen in other studies.¹⁶⁴ This may be due to the fact that this study concentrates on desire and not intent to get pregnant. Desire for more children may focus more on emotional reasons as compared to intent to have children which may put more emphasis on whether women feel physically able to have children. In the bivariate

analysis, participants who were currently on ART were half as likely to want more children and participants who had a detectable viral load were twice as likely to want more children, although the variable lost significance in the final model. This is surprising both because viral load can act as a proxy for clinical health and because those with a detectable viral load may be more likely to be accessing health services and may feel more in control of their health care. In any case, the association is alarming for risk of MTCT. There was a non-significant negative trend seen between knowledge that ART can prevent MTCT and desire for more children in the bivariate an association that has been seen in some studies but not others^{13,165} indicating that knowledge of MTCT was not a key factor associated with wanting more children. Provider characteristics (provider support of women living with HIV and pregnancy as well as the perception of provider scale) did not play a significant role in the association with wanting more children, however it is unclear to what extent women spoke with their providers about pregnancy.

One of the most interesting outcomes was that participants who mentioned wanting more children were significantly more likely to have HIV self-stigma. For every scale unit increase in HIV related self/internalized stigma, there were almost three times the odds of wanting more children. As mentioned, prior research uncovered an interesting dynamic between stigma and pregnancy in women living with HIV. In some contexts women with lower levels of self-stigma were more likely to desire more children but women who had higher levels of disclosure and public stigma were less likely to desire more children.¹³ This study did not investigate public stigma, however the implication that FSWs that have greater negative feelings about themselves related to

their HIV are more likely to want more children warrants greater attention to the role of stigma related to pregnancy desire, even more salient in this particularly vulnerable population. This could be due to the importance of motherhood for a woman including a sense of social acceptance,¹⁹ life aspirations,¹⁸ adherence to social, familial and community norms^{19,132} as seen in prior studies, particularly in the DR, where motherhood has been shown to be a significant part culture and society.^{111,112} Also, having children has been associated with a way to regain a sense of pride, self-worth, support and responsibility among women living with HIV and in marginalized populations.^{13,15,18,53,147} In addition, the sex work related self-stigma scale did not result in a significant association with the desire for more children although the directionality was a slight increase in odds as well. It seems that HIV related self-stigma has a stronger association in this sample than self-stigma related to sex work, which may have to do with the fact that many women are part of sex worker organizations, in which sex work is normalized and where children may be common among FSWs and culturally accepted. However, further research in these areas is warranted.

There are number of study limitations and considerations that should be taken into account. First, this is a cross-sectional study, therefore highlighting associations at one point in time. Selection bias may have occurred. FSWs were recruited at health facilities, sex work organizations and through snowball sampling, therefore FSWs with particular characteristics such as greater exposure to health services or increased empowerment to seek services may be included that are not generalizable to other FSWs, however this would indicate that this population may have better health outcomes as compared to FSWs living with HIV in areas where sex work is criminalized and there is little support.

History and temporality is also a significant limitation. Data was not collected on when or where they had children, therefore it is not clear if or to what extent maternity wards offered prevention of MTCT or what their specific experiences with pregnancy were, particularly with regard to the critiques of the state of public maternity wards. Prior to rollout, and possibly for some time afterwards, information and medical advice about pregnancy and women living with HIV may have not been supportive, dissuading women from having children. This study focuses on desire to have children, not intention to get pregnant. While research has shown that fertility desire is the biggest predictor of intention for the general population,¹⁶⁶ it cannot be assumed in every case. Even if intent is not measured, it is important to understand characteristics related to pregnancy in a population as understudied and at significant risk for a number of health concerns.

Conclusions

This first look at FSWs living with HIV and reproductive health heightens the need for more research on this highly vulnerable population. Almost all of the participants have children and/or have been pregnant and many would like more children in the future. Taking into account occupational risks faced as sex workers, together with the risks and stigma of living with HIV, these women represent a significantly vulnerable population, which heightens the need for non-discriminatory, comprehensive services.^{93,100-102} The most salient factors associated with wanting more children include higher levels of HIV related self-stigma as well as indications through bivariate associations that participants are not currently on ART and have detectable a viral load. This suggests that FSWs living with HIV in this study who want more children are dealing with both psychosocial and clinical health concerns. Further, health providers

should address the role of partners in the desire for more children, as perceptions of partner reaction to pregnancy were significantly related to the desire for children. These issues highlight the importance of the role of health providers in order to discuss pregnancy desires, intentions, address any mental health issues and ensure adherence to ART, particularly with concern to MTCT. At a time when women living with HIV can have a safe and healthy pregnancy, those who desire more children, particularly those at greatest risk, should be given the tailored attention they need for this to occur for both maternal and child health.

References

1. Palella FJ, Jr, Delaney KM, Moorman AC, et al. Declining morbidity and mortality among patients with advanced human immunodeficiency virus infection. HIV outpatient study investigators. *N Engl J Med*. 1998;338(13):853-860.
2. Lima VD, Harrigan R, Bangsberg DR, et al. The combined effect of modern highly active antiretroviral therapy regimens and adherence on mortality over time. *J Acquir Immune Defic Syndr*. 2009;50(5):529-536.
3. Thorne C, Newell ML. Hiv. *Semin Fetal Neonatal Med*. 2007;12(3):174-181.
4. Coutsooudis A, Kwaan L, Thomson M. Prevention of vertical transmission of HIV-1 in resource-limited settings. *Expert Rev Anti Infect Ther*. 2010;8(10):1163-1175.
5. Craft SM, Delaney RO, Bautista DT, Serovich JM. Pregnancy decisions among women with HIV. *AIDS Behav*. 2007;11(6):927-935.
6. Bedimo-Rung AL, Clark AR, Dumestre J, Rice J, Kissinger P. Reproductive decision-making among HIV-infected women. *J Natl Med Assoc*. 2005;97(10):1403-1410.
7. Sowell RL, Murdaugh CL, Addy CL, Moneyham L, Tavokoli A. Factors influencing intent to get pregnant in HIV-infected women living in the southern USA. *AIDS Care*. 2002;14(2):181-191.
8. Nobrega AA, Oliveira FA, Galvao MT, et al. Desire for a child among women living with HIV/AIDS in northeast Brazil. *AIDS Patient Care STDS*. 2007;21(4):261-267.
9. Nebie Y, Meda N, Leroy V, et al. Sexual and reproductive life of women informed of their HIV seropositivity: A prospective cohort study in Burkina Faso. *J Acquir Immune Defic Syndr*. 2001;28(4):367-372.

10. Cooper D, Harries J, Myer L, Orner P, Bracken H, Zweigenthal V. "Life is still going on": Reproductive intentions among HIV-positive women and men in south africa. *Soc Sci Med*. 2007;65(2):274-283.
11. Maier M, Andia I, Emenyonu N, et al. Antiretroviral therapy is associated with increased fertility desire, but not pregnancy or live birth, among HIV+ women in an early HIV treatment program in rural uganda. *AIDS Behav*. 2009;13 Suppl 1:28-37.
12. Sharma A, Feldman JG, Golub ET, et al. Live birth patterns among human immunodeficiency virus-infected women before and after the availability of highly active antiretroviral therapy. *Am J Obstet Gynecol*. 2007;196(6):541.e1-541.e6.
13. Ogilvie GS, Palepu A, Remple VP, et al. Fertility intentions of women of reproductive age living with HIV in british columbia, canada. *AIDS*. 2007;21 Suppl 1:S83-8.
14. Alan Guttmacher Institute. *Hopes and realities; closing the gap between women's aspirations and reproductive experiences*. New York: The Alan Guttmacher Institute; 1995:56.
15. Westreich D, Maskew M, Rubel D, MacDonald P, Jaffray I, Majuba P. Incidence of pregnancy after initiation of antiretroviral therapy in south africa: A retrospective clinical cohort analysis. *Infect Dis Obstet Gynecol*. 2012;2012:917059.
16. Huntington SE, Thorne C, Bansi LK, et al. Predictors of pregnancy and changes in pregnancy incidence among HIV-positive women accessing HIV clinical care. *AIDS*. 2013;27(1):95-103.

17. Loutfy MR, Hart TA, Mohammed SS, et al. Fertility desires and intentions of HIV-positive women of reproductive age in ontario, canada: A cross-sectional study. *PLoS One*. 2009;4(12):e7925.
18. Nattabi B, Li J, Thompson SC, Orach CG, Earnest J. A systematic review of factors influencing fertility desires and intentions among people living with HIV/AIDS: Implications for policy and service delivery. *AIDS Behav*. 2009;13(5):949-968.
19. Loutfy MR, Blitz S, Zhang Y, et al. Self-reported preconception care of HIV-positive women of reproductive potential: A retrospective study. *J Int Assoc Provid AIDS Care*. 2013.
20. Kennedy VL, Serghides L, Raboud JM, et al. The importance of motherhood in HIV-positive women of reproductive age in ontario, canada. *AIDS Care*. 2014;26(6):777-784.
21. Berhan Y, Berhan A. Meta-analyses of fertility desires of people living with HIV. *BMC Public Health*. 2013;13(1):409.
22. Smith DJ, Mbakwem BC. Life projects and therapeutic itineraries: Marriage, fertility, and antiretroviral therapy in nigeria. *AIDS*. 2007;21 Suppl 5:S37-41.
23. Oosterhoff P, Anh NT, Hanh NT, Yen PN, Wright P, Hardon A. Holding the line: Family responses to pregnancy and the desire for a child in the context of HIV in vietnam. *Cult Health Sex*. 2008;10(4):403-416.
24. Yeatman S. HIV infection and fertility preferences in rural malawi. *Stud Fam Plann*. 2009;40(4):261-276.
25. Bankole A, Biddlecom AE, Dzekedzeke K, Akinyemi JO, Awolude O, Adewole IF. Does knowledge about antiretroviral therapy and mother-to-child transmission affect the

- relationships between hiv status and fertility preferences and contraceptive use? new evidence from nigeria and zambia. *J Biosoc Sci.* 2013:1-20.
26. Kirshenbaum SB, Hirky AE, Correale J, et al. "Throwing the dice": Pregnancy decision-making among HIV-positive women in four U.S. cities. *Perspect Sex Reprod Health.* 2004;36(3):106-113.
27. Kanniappan S, Jeyapaul MJ, Kalyanwala S. Desire for motherhood: Exploring HIV-positive women's desires, intentions and decision-making in attaining motherhood. *AIDS Care.* 2008;20(6):625-630.
28. Maccarthy S, Rasanathan JJ, Crawford-Roberts A, Dourado I, Gruskin S. Contemplating abortion: HIV-positive women's decision to terminate pregnancy. *Cult Health Sex.* 2014;16(2):190-201.
29. Wesley Y, Smeltzer SC, Redeker NS, Walker S, Palumbo P, Whipple B. Reproductive decision making in mothers with HIV-1. *Health Care Women Int.* 2000;21(4):291-304.
30. Kearney MH, Murphy S, Rosenbaum M. Mothering on crack cocaine: A grounded theory analysis. *Soc Sci Med.* 1994;38(2):351-361.
31. Barnes DB, Murphy S. Reproductive decisions for women with HIV: Motherhood's role in envisioning a future. *Qual Health Res.* 2009;19(4):481-491.
32. Smee N, Shetty AK, Stranix-Chibanda L, et al. Factors associated with repeat pregnancy among women in an area of high HIV prevalence in zimbabwe. *Womens Health Issues.* 2011;21(3):222-229.

33. MacCarthy S, Rasanathan JJ, Ferguson L, Gruskin S. The pregnancy decisions of HIV-positive women: The state of knowledge and way forward. *Reprod Health Matters*. 2012;20(39 Suppl):119-140.
34. Feldman R, Maposhere C. Safer sex and reproductive choice: Findings from "positive women: Voices and choices" in zimbabwe. *Reprod Health Matters*. 2003;11(22):162-173.
35. Craft SM, Delaney RO, Bautista DT, Serovich JM. Pregnancy decisions among women with HIV. *AIDS Behav*. 2007;11(6):927-935.
36. Nattabi B, Li J, Thompson SC, Orach CG, Earnest J. A systematic review of factors influencing fertility desires and intentions among people living with HIV/AIDS: Implications for policy and service delivery. *AIDS Behav*. 2009;13(5):949-968.
37. Baral S, Beyrer C, Muessig K, et al. Burden of HIV among female sex workers in low-income and middle-income countries: A systematic review and meta-analysis. *Lancet Infect Dis*. 2012;12(7):538-549.
38. Lazarus L, Deering KN, Nabess R, Gibson K, Tyndall MW, Shannon K. Occupational stigma as a primary barrier to health care for street-based sex workers in canada. *Cult Health Sex*. 2012;14(2):139-150.
39. Cohan D, Lutnick A, Davidson P, et al. Sex worker health: San francisco style. *Sex Transm Infect*. 2006;82(5):418-422.
40. Scambler G, Paoli F. Health work, female sex workers and HIV/AIDS: Global and local dimensions of stigma and deviance as barriers to effective interventions. *Soc Sci Med*. 2008;66(8):1848-1862.

41. Kerrigan DL, Wirtz AL, Baral S, Decker MR, Murray L. The global HIV epidemics among sex workers. . 2009.
42. Donastorg Y, Barrington C, Perez M, Kerrigan D. Abriendo puertas: Baseline findings from an integrated intervention to promote prevention, treatment and care among FSW living with HIV in the dominican republic. *PLoS One*. 2014;9(2):e88157.
43. Kerrigan D, Wirtz A, Baral S, et al. *The global HIV epidemics among sex workers*. World Bank Publications; 2012.
44. Elmore-Meegan M, Conroy RM, Agala CB. Sex workers in kenya, numbers of clients and associated risks: An exploratory survey. *Reprod Health Matters*. 2004;12(23):50-57.
45. Wayal S, Cowan F, Warner P, Copas A, Mabey D, Shahmanesh M. Contraceptive practices, sexual and reproductive health needs of HIV-positive and negative female sex workers in goa, india. *Sex Transm Infect*. 2011;87(1):58-64.
46. Kerrigan D, Ellen JM, Moreno L, et al. Environmental-structural factors significantly associated with consistent condom use among female sex workers in the dominican republic. *AIDS*. 2003;17(3):415-423.
47. Murray L&M. *Laughing on the outside, crying on the inside* [rien mis labios llora mi alma]. *Santo Domingo, Dominican Republic: Movimiento de Mujeres Unidas*. 2002.
48. Chege MN, Kabiru EW, Mbithi JN, Bwayo JJ. Childcare practices of commercial sex workers. . *East African Medical Journal*. 2002;79(7):382-389.
49. Decker MR, Yam EA, Wirtz AL, et al. Induced abortion, contraceptive use, and dual protection among female sex workers in moscow, russia. *Int J Gynaecol Obstet*. 2013;120(1):27-31.

50. Reed E, Silverman JG, Stein B, et al. Motherhood and HIV risk among female sex workers in andhra pradesh, india: The need to consider women's life contexts. *AIDS Behav.* 2013;17(2):543-550.
51. Rivers-Moore M. But the kids are okay: Motherhood, consumption and sex work in neo-liberal latin america. *Br J Sociol.* 2010;61(4):716-736.
52. Basu A, Dutta MJ. 'We are mothers first': Localocentric articulation of sex worker identity as a key in HIV/AIDS communication. *Women Health.* 2011;51(2):106-123.
53. Beckman SW. "*Like any other woman*"? pregnancy, motherhood and HIV among sex workers in southern tanzania. *doctoral dissertation.* [PhD]. Baltimore, MD: Johns Hopkins Bloomberg School of Public Health; 2014.
54. Caribbean Epidemiology Centre (CAREC). The caribbean HIVepidemic and the situation in member countries of the caribbean epidemiology centre. . . 2007.
55. International AIDS Society (IAS). The XVII international AIDS conference impact report: From evidence to action. . 2009.
56. UNAIDS. Global report: UNAIDS report on the global AIDS epidemic (2010). . 2010.
57. Vandepitte J, Lyaera R, Dallabetta G, Crabbe F, Alary M, Buve A. Estimates of the number of female sex workers in different regions of the world. *Sex Transm Infect.* 2006;82 Suppl 3:iii18-25.
58. Moreno L, Kerrigan DL.
The evolution of HIV prevention strategies among female sex workers in the dominican republic. . *Research for Sex Work.* ;3:8-10.

59. Sabogal F, Marín G, Otero-Sabogal R, Marín BV, Perez-Stable EJ. Hispanic familism and acculturation: What changes and what doesn't? *Hispanic Journal of Behavioral Sciences*. 1987;9(4):397-412.
60. Santisteban DA, Muir-Malcolm JA, Mitrani VB, Szapocznik J. Integrating the study of ethnic culture and family psychology intervention science. . 2002.
61. Foucault DC, Schneider BH. Parenting values and parenting stress among impoverished village and middle-class small city mothers in the dominican republic. *International Journal of Behavioral Development*. 2009;33(5):440-450.
62. Schumacher G. Culture care meanings, beliefs, and practices in rural dominican republic. *J Transcult Nurs*. 2010;21(2):93-103.
63. Central Intelligence Agency. The world factbook: Dominican republic. <https://www.cia.gov/library/publications/the-world-factbook/geos/dr.html>. Updated March 11, 2014. Accessed March 20, 2014.
64. Casterline JB, Mendoza JA. Unwanted fertility in latin america: Historical trends, recent patterns. . 2008.
65. World Health Organization, UNICEF. Trends in maternal mortality: 1990 to 2013: Estimates by WHO, UNICEF, UNFPA, the world bank and the united nations population division: Executive summary. . 2014.
66. Miller S, Cordero M, Coleman AL, et al. Quality of care in institutionalized deliveries: The paradox of the dominican republic. *Int J Gynaecol Obstet*. 2003;82(1):89-103; discussion 87-8.

67. Ruminjo J, Cordero C, Beattie KJ, Wegner MN. Quality of care in labor and delivery: A paradox in the dominican republic; commentary. *Int J Gynaecol Obstet*. 2003;82(1):115-119.
68. Pérez-Then Eea. Evaluación de la calidad de atención a la embarazada y al niño sano en centros de primer nivel de atención de las regiones de salud III, IV, V y VI de la república dominicana: Resultados de la segunda fase. *Boletín CENISMI*. 2010;20(2).
69. United Nations. Department of Economic and Social Affairs Population Division. World abortion policies 2013. . 2013:May 23, 2014.
70. Proujansky AE. A dominican maternity ward. *Am J Nurs*. 2008;108(12):40-43.
71. Richter ML, Chersich MF, Scorgie F, Luchters S, Temmerman M, Steen R. Sex work and the 2010 FIFA world cup: Time for public health imperatives to prevail. *Global Health*. 2010;6:1-8603-6-1.
72. Allen CF, Edwards M, Williamson LM, et al. Sexually transmitted infection service use and risk factors for HIV infection among female sex workers in georgetown, guyana. *J Acquir Immune Defic Syndr*. 2006;43(1):96-101.
73. Tang J, Nour NM. HIV and pregnancy in resource-poor settings. *Rev Obstet Gynecol*. 2010;3(2):66-71.
74. Samet JH, Pace CA, Cheng DM, et al. Alcohol use and sex risk behaviors among HIV-infected female sex workers (FSWs) and HIV-infected male clients of FSWs in india. *AIDS Behav*. 2010;14 Suppl 1:S74-83.
75. Mtetwa S, Busza J, Chidiya S, Mungofa S, Cowan F. "You are wasting our drugs": Health service barriers to HIV treatment for sex workers in zimbabwe. *BMC Public Health*. 2013;13:698-2458-13-698.

76. King EJ, Maman S, Bowling JM, Moracco KE, Dudina V. The influence of stigma and discrimination on female sex workers' access to HIV services in st. petersburg, russia. *AIDS Behav.* 2013;17(8):2597-2603.
77. Zullinger R. *Experiences of female sex workers along the HIV care continuum in santo domingo, dominican republic.* [PhD]. Baltimore, MD: Johns Hopkins Bloomberg School of Public Health; 2014.
78. Kennedy C, Barrington C, Donastory Y, et al. Exploring the positive health, dignity and prevention needs of female sex workers, men who have sex with men and transgender women in the dominican republic and swaziland. . . 2013.
79. Berger BE, Ferrans CE, Lashley FR. Measuring stigma in people with HIV: Psychometric assessment of the HIV stigma scale. *Res Nurs Health.* 2001;24(6):518-529.
80. Zelaya CE, Sivaram S, Johnson SC, Srikrishnan AK, Solomon S, Celentano DD. HIV/AIDS stigma: Reliability and validity of a new measurement instrument in chennai, india. *AIDS Behav.* 2008;12(5):781-788.
81. Zelaya CE, Sivaram S, Johnson SC, Srikrishnan AK, Suniti S, Celentano DD. Measurement of self, experienced, and perceived HIV/AIDS stigma using parallel scales in chennai, india. *AIDS Care.* 2012;24(7):846-855.
82. Baral S, Adams D, Lebona J, et al. A cross-sectional assessment of population demographics, HIV risks and human rights contexts among men who have sex with men in lesotho. *J Int AIDS Soc.* 2011;14:36-2652-14-36.
83. Earnshaw VA, Smith LR, Chaudoir SR, Amico KR, Copenhaver MM. HIV stigma mechanisms and well-being among PLWH: A test of the HIV stigma framework. *AIDS Behav.* 2013;17(5):1785-1795.

84. Galassi JP, Schanberg R, Ware WB. The patient reactions assessment: A brief measure of the quality of the patient-provider medical relationship. *Psychol Assess.* 1992;4(3):346.
85. Ajzen I. The theory of planned behavior. *Organ Behav Hum Decis Process.* 1991;50(2):179-211.
86. Miller WB. Childbearing motivation and its measurement. *J Biosoc Sci.* 1995;27(04):473-487.
87. Finocchiaro-Kessler S, Dariotis JK, Sweat MD, et al. Do HIV-infected women want to discuss reproductive plans with providers, and are those conversations occurring? *AIDS Patient Care STDS.* 2010;24(5):317-323.
88. da Costa Leite I, Gupta N, do Nascimento Rodrigues R. Female sterilization in latin america: Cross-national perspectives. *J Biosoc Sci.* 2004;36(6):683-698.
89. Loaiza E. Sterilization regret in the dominican republic: Looking for quality-of-care issues. *Stud Fam Plann.* 1995;26(1):39-48.
90. Human Rights Watch (HRW). A test of inequity: Discrimination against women living with HIV in the dominican republic. . *Human Rights Watch.* 2004;16(4(B)):May 10, 2014.
91. Chen JL, Philips KA, Kanouse DE, Collins RL, Miu A. Fertility desires and intentions of HIV-positive men and women. *Fam Plann Perspect.* 2001;33(4):144-52, 165.
92. Nakayiwa S, Abang B, Packel L, et al. Desire for children and pregnancy risk behavior among HIV-infected men and women in uganda. *AIDS Behav.* 2006;10(4 Suppl):S95-104.

93. Kanniappan S, Jeyapaul MJ, Kalyanwala S. Desire for motherhood: Exploring HIV-positive women's desires, intentions and decision-making in attaining motherhood. *AIDS Care*. 2008;20(6):625-630.
94. Miller WB, Rodgers JL, Pasta DJ. Fertility motivations of youth predict later fertility outcomes: A prospective analysis of national longitudinal survey of youth data. *Biodemography and social biology*. 2010;56(1):1-23.
95. Jeal N, Salisbury C. Self-reported experiences of health services among female street-based prostitutes: A cross-sectional survey. *Br J Gen Pract*. 2004;54(504):515-519.
96. Spire B, de Zoysa I, Himmich H. HIV prevention: What have we learned from community experiences in concentrated epidemics? *J Int AIDS Soc*. 2008;11:5-2652-11-5.
97. United Nations. Joint United Nations Programme on HIV (UNAIDS). UNAIDS guidance note on HIV and sex work. . 2009.

Tables

Table 2: Socio-demographic characteristics of FSW living with HIV of reproductive age (n=247).

	N or Mean	% or Range
Age	34.3	(18, 49)
Civil status		
Single/Wid/Div	46	18.62%
Has a partner	201	81.38%
Housing		
Owned or rented house	190	77.92%
Rented room in house or boarding house	20	8.10%
Other	37	14.98%
Education (ever)	243	98.38%
Primary	149	60.32%
Secondary/ tertiary	94	38.06%
Current Residence		
Santo Domingo	192	77.73%
Other area	55	22.27%

Table 3: Behavioral practices and biological characteristics of FSW living with HIV of reproductive age (n=247).

	N or Mean	% or Range
Sex work characteristics		
Age first engaged in sex work	20	(10,46)
Average price per salida (pesos)	889*	(200, 4000)
Number of clients/wk	4	(0,25)
Work Locations		
Establishment based	149	59.65%
Street based	140	55.34%
Other (phone, internet etc.)	79	31.98%
Any conflict with a partner in the last 6 months	89	36.00%
Alcohol use (last 30 days)	Rarely/ never	147
	Sometimes/ often	100
Drug use ever	61	24.70%
Sexual health and HIV care		
Years since HIV diagnosis (n=245)	5.8	(0,18)
Current ART(n=246)	177	71.95%
Viral Load (n=243)	Undetectable (<50 copies/cc)	112
	Detectable	131
Diagnosed with any STI (n=239)	57	23.85%
Anything used for pregnancy prevention (past 6 months)	200	81.30%
Permanent contraception (sterilization/hysterectomy)	121	49.19%
Consistent condom use with all partners	157	64.08%
Stigma scales (range: 1 (lowest stigma) to 4 (highest stigma))		
HIV related self-internalized stigma scale	2.42	0.55 (1, 4)
Sex work related self/ internalized stigma scale	2.38	0.64 (1, 4)
Perception of provider scale	3.23	0.60 (1, 4)
* 889 pesos approximately equals \$20. ** Stigma scales: 1=lowest stigma to 4=highest stigma. Provider scales: 1= least satisfaction to 4=highest satisfaction.		

Table 4: Fertility and childbearing among FSW living with HIV of reproductive age (n=247).

	n (avg)	% or SD (range)
Currently have children	230	93.12%
Number of children (n=230)	2.8	1.36 (1, 8)
Ever lost a child	51	20.65
Have ever been pregnant	236	95.55%
Number of times pregnant (n=236)	4.4	2.24 (1,12)
At least one pregnancy loss*	152	62.95%
Have been pregnant since HIV diagnosis	91	36.84%
Number of times pregnant (n=91)	1.6	0.87 (1, 5)
At least one pregnancy loss since diagnosis (n=90)	32	35.56%
Desire to have more children	70	28.34%
Number of children desired (n=68)	1.6	0.86 (1, 5)
Have had a permanent contraceptive procedure (n=70)	24	34.29%
Currently pregnant (yes or maybe)	8	3.24%
Disagrees that if an HIV positive woman wants to get pregnant it is good to try to get pregnant	136	55.06%
**Feels that partner would be upset if a pregnancy occurred (n=201)	30	14.92%

* Due to any reason, reason not specified. ** Among those who reported having a partner.

Table 5: Bivariate and multiple logistic regression models for desire for more children among FSW living with HIV of reproductive age in the Dominican Republic.

	Odds ratio (n=247)			Adjusted odds ratio (n=239)		
	OR	95% CI	p-val	AOR	95% CI	P-val
Sociodemographics						
Age	0.88	(0.84, 0.92)	<0.0001	0.94	(0.88, 0.99)	0.047
Civil status	1.0	----	----			
	Partner					
	Single/Wid/Div	(0.49, 2.05)	0.01			
Education	1.03	(0.66, 1.59)	0.90	0.96	(0.44, 2.10)	0.93
Number of children	0.50	(0.39, 0.64)	0.003	0.61	(0.44, 0.84)	0.002
HIV behaviors and outcomes						
Years HIV positive	0.89	(0.83, 0.96)	0.002	0.94	(0.85, 1.03)	0.15
Age first engaged in sex work	0.96	(0.93, 1.01)	0.14			
Any abusive conflict from sex partner (last 6 months)	1.61	(0.92, 2.85)	0.096			
Current ARV	0.46	(0.25, 0.82)	0.009			
Viral load (ref= undetectable)	2.16	(1.21, 3.87)	0.003	1.08	(0.79, 4.12)	0.16
Sexual and reproductive health characteristics						
If an HIV positive woman wants to get pregnant it is good to try (ref= disagree)*	6.14	(3.19, 11.79)	<0.0001	6.49	(2.27, 15.39)	<0.0001
Knowledge of mother-to-child transmission	0.68	(0.36, 1.27)	0.23			
Ever lost a pregnancy	0.40	(0.23, 0.71)	0.002	0.37	(0.17, 0.84)	0.017
Ever lost a child	0.67	(0.40, 1.10)	0.116			
Ever spoke to a health provider about HIV in pregnancy	0.65	(0.37, 1.13)	0.13			
Perceived provider support for women who are pregnant and have HIV (ref: little/no support)	1.00	-----	----	1.00	-----	-----
Perceived partners feelings about getting pregnant (ref: supportive)*	1.21	(0.37, 3.91)	0.74	0.86	(0.26, 5.06)	0.86
	Support			1.00	-----	-----
	Upset	(0.02, 0.45)	0.003	0.12	(0.02, 0.66)	0.015
	DK	(0.06, 0.54)	0.002	0.40	(0.16, 0.96)	0.041
Subjective overall health rating (Ref: good health)	1.23	(0.70, 2.16)	0.47			
Stigma and provider scales						
HIV related self-internalized stigma scale	1.60	(1.26, 5.70)	0.06	3.19	(1.5, 6.78)	0.009
Sex work related self/ internalized stigma scale	1.30	(0.84, 2.02)	0.23			
Perception of provider scale	0.83	(0.53, 1.30)	0.45			

* Category of “no partner” is not represented.

Manuscript 2

Factors related to having been pregnant after HIV diagnosis among female sex workers living with HIV in the Dominican Republic

Abstract

Female sex workers (FSWs) living with HIV are a vulnerable population, which until recently, has been largely ignored in public health literature. This study analyzes factors related to pregnancy among 268 FSWs living with HIV in the Dominican Republic. Results indicate that 34% of participants have been pregnant since HIV diagnosis. Multivariate analysis revealed significant associations between pregnancy after HIV diagnosis with ART interruption (AOR: 2.41; 95% CI: 1.19, 4.94), knowledge of mother-to-child transmission (AOR: 2.12; 95% CI: 0.99, 4.55), serostatus disclosure to a sex partner (AOR: 2.46; 95% CI: 1.31, 4.62), age (AOR: 0.91; 95% CI: 0.87, 0.95) and more negative health provider perception (AOR: 0.56; 95% CI: 0.34, 0.93). Results indicate a significant need for further research on FSWs living with HIV to understand pregnancy experiences, particularly related to health care provider communication and ART adherence to ensure maternal child health and prevent future child infections of HIV.

Introduction

The discovery of antiretroviral treatment (ART) changed the face of the HIV epidemic, proving to both extend the length and quality of life for people living with HIV and prevent mother-to-child transmission (MTCT) of HIV during pregnancy and delivery.²⁻⁵ For women of reproductive age living with HIV, ART both allowed for a longer life and the possibility of having a healthy pregnancy, impacting decisions about family planning and increasing the number of women considering having children.^{8,9} Currently, many women globally living with HIV desire to have (more) children¹¹⁻¹⁵ and in some regions, particularly those with strong cultural expectations surrounding the value and importance of childbearing, the desire for more children among women living with HIV is similar to women in the general population.^{13,21-24}

Both individual and social factors have been associated with pregnancy among women living with HIV. On an individual level, pregnancy has been associated with number of current children, length of known HIV-status, subsequent pregnancies and knowledge and use of ART for prevention of MTCT.³⁰ On the social level, pregnancy has been associated with partner and family influence, religiosity^{19,24,29-31} and cultural and traditional factors.^{24,31-33} Additionally, for both individual and social reasons, the desire for motherhood has been found as a strong driver for pregnancy, particularly for marginalized populations where pregnancy is a way to feel valued in society.^{53,147} Motherhood has been seen to play a protective role for many women living with HIV, providing a sense of fulfillment, increased self-esteem and a reason to keep living.^{15,18-20}

Understanding more about pregnancy among women living with HIV is critical, because even on treatment, women living with HIV are more susceptible to a number of

adverse pregnancy outcomes than women who are not HIV-infected including compromised infant health outcomes,^{34,35} poor maternal mental health and sub-optimal adherence to ART.³⁷ Further, pregnant women living with HIV, particularly of lower socioeconomic standing, face challenges to care- reporting discrimination or even refusal of service in maternity wards, health centers and obstetric services in many different settings.^{23,38-42,167} Due increased adverse outcomes and the potential for MTCT, the importance of adherence to ART during pregnancy and consistent and comprehensive care through pregnancy and delivery is crucial for maternal and child health.

Female sex workers and pregnancy

While most of the existing research on pregnancy and childbearing has focused more generally on women living with HIV, there is less information on the reproductive health of FSWs. FSWs are one of the highest risk populations for a number of health and human rights concerns including HIV, STI, violence, and stigma and discrimination.^{76-79,83,95,152} This increased risk for STIs and HIV may also put FSWs at greater risk for unintended pregnancy and complications associated with reproductive health, pregnancy and childbearing.^{89,91} While there is a lack of research on pregnancy experiences of FSWs, high prevalence estimates in different settings indicate many FSWs have been pregnant and have children.⁸¹⁻⁸³ Children and pregnancy have also been seen to play an important role in the lives of FSWs and have been linked to sex work initiation and exit⁸³⁻⁸⁷ as well sexual risk taking during sex work, mainly due to financial pressures of raising children.^{81,88} In addition, along with women living with HIV, FSWs face substantial challenges to care and treatment, including non-judgmental access to health services.^{93,97,98,150}

Pregnancy among FSWs living with HIV

It is estimated that FSWs have 13.5 increased odds contracting HIV compared to the general female population of reproductive age in low and middle-income countries, and have a global HIV prevalence of 11.8%.⁹² Yet there is surprisingly little research focused on FSWs living with HIV. Emerging studies have found FSWs living with HIV have increased health challenges, concerns and face barriers to care, due to their positive serostatus paired with occupational risks.^{83,95,99,102,152,157} FSWs living with HIV have been shown to have an increased likelihood of experiencing discrimination in health care settings, more likely to report feelings of social isolation post-diagnosis and more likely to have been refused medical care or be afraid to go to the doctor than FSWs who did not have HIV⁹⁹ and have also described being humiliated and been demeaned by health workers while seeking health services.¹⁰² Research on pregnancy and maternal health for this population is almost non-existent. This study underscores the importance of increased attention on this understudied population, particularly in regions where fertility and childbearing play a central role in the culture. This study aims to understand factors related to pregnancy after HIV diagnosis among FSWs living with HIV in the Dominican Republic (DR).

Methods

Study setting: The DR has a little over 10 million people, most living in urban areas (69%), although vast discrepancies exist between economic classes.¹⁰⁶ The DR is predominantly (95%) a Roman Catholic country¹⁰⁶ where family and childbearing is a central part of the culture, providing a sense of stability and support, particularly in low-

income populations.¹¹¹⁻¹¹⁴ The study was conducted in Santo Domingo, the capital city with a population of almost 3 million.¹⁰⁶

Study background: This analysis utilizes the baseline survey of a longitudinal intervention research study conducted among FSWs living with HIV in Santo Domingo, named *Abriendo Puertas (Opening Doors)*. The overall study design and methods of this study have been previously describe⁹⁵ The aim of the study was to assess the feasibility and initial effects of a multi-level integrated intervention to promote HIV care, healthy behaviors and foster adherence care for FSWs living with HIV in Santo Domingo, DR over a 10-month period. This study will focus on the baseline characteristics of the population.

Study sample and recruitment: Female sex workers were defined as women who report having exchanged sex for money in the last month. Participants were at least 18 years of age, spoke Spanish, and reported that they were HIV-infected confirmed prior to enrollment by a HIV rapid test. Recruitment occurred in Santo Domingo, through HIV clinics, peer navigators and referral by other study participants. Enrollment occurred from November 2012 to February 2013, resulting in a sample size of 268 participants.

Data collection: This baseline socio-behavioral survey was conducted by trained Dominican field staff in Spanish within private offices of the HIV Vaccine Research Unit (HVRU). Blood samples for HIV viral load were assessed at the Dominican National Reference Laboratory in Santo Domingo using polymerase chain reaction (PCR) testing.

Vaginal swabs for STI testing were obtained by a physician during a clinical exam and processed at a laboratory at Johns Hopkins School of Medicine. AptimaCombo2 assay was used for gonorrhea and Chlamydia and a separate assay was used for trichomoniasis using nucleic acid amplification testing.

Ethics and collaborative partners: This study partnered with a number of organizations in Santo Domingo, Dominican Republic including the HVRU at the Instituto Dermatológico y Cirugía de Piel Dr. Humberto Bogart Díaz and the non-governmental organizations (NGO) Movimiento de Mujeres Unidas (MODEMU) and the Centro de Orientación e Investigación Integral (COIN). Participants provided oral consent that they understood the nature of the study, could discontinue the study at any time and agreed to enroll in the study. Trained interviewers recorded participant consent responses and signed for the participants. Participants were compensated 10 dollars for completion of the survey. The study was approved by the Johns Hopkins Bloomberg School of Public Health as well as the IDCP Institutional Review Board. Participants testing positive for STI received treatment free of charge based on national standards of care.

Measures

Dependent variable: The outcome measure was assessed through the following question: “How many times have you become pregnant since you were diagnosed with HIV?” Survey instructions clarified that the term “pregnant” meant any pregnancy, including a miscarriage or termination of pregnancy, a stillbirth as well as a live birth. Additionally, it was clarified to include those who were currently pregnant (n=3).

Independent variables: Independent variables chosen through existing literature and conceptual relevance. Variables included sociodemographic characteristics (age, civil status, education, number of children), behavioral characteristics (years since diagnosis, alcohol use, ART use, ever an interruption in ART) and sexual and reproductive health characteristics (knowledge of MTCT and serostatus disclosure).

Stigma and provider perception scales

Internalized HIV and sex work stigma scales were measured using adapted measures from those developed by Berger et al.¹³³, Zelaya et al.^{134,135} and Baral et al.¹³⁶ and with guidance from Earnshaw's HIV Stigma Framework¹³⁷. All stigma scales included options of 1 to 4, with a response of 1 being the least amount of stigma and 4 the most stigma. All answers of "don't know" and "refuse to answer" responses were coded as 2.5 in order to keep those participants in the final sample size but neutralize their weight in the scales. Coding was reversed for certain questions to ensure standardization of directionality for all questions. The provider satisfaction scale, adapted from the validated Patients Reactions Assessment scale¹³⁸ differed in that a higher score meant a greater satisfaction with their providers. Data reduction occurred through principal components analysis. Once items were chosen for removal, Cronbach alpha tests were conducted in order to measure internal consistency of the final scale (table 1). When scales were finalized, the items included were averaged across participant to create each final variable.

Table 1: Stigma and provider scale characteristics.

Scale name	Number of final items/ original number of scale items	Cronbach alpha score
HIV related self-internalized stigma scale	7/8	0.8819
Sex work related self/ internalized stigma scale	12/15	0.9089
Provider satisfaction scale	8/10	0.9550

The primary scale used for this paper is the provider satisfaction scale. Table 2 highlights the questions included in the final scale:

Table 2: Perception of provider scale questions.

1	Your doctor is considerate of your needs and concerns.
2	Your doctor takes the time to explain your treatment and follow up slowly and clearly.
3	You feel comfortable asking your doctors questions about your care.
4	You trust your doctors judgments and decisions about your medical care.
5	You feel your doctor does everything they can about your care.
6	Your doctor is well qualified to manage medical problems like yours.
7	You feel respected by your doctor.
8	Your doctor takes the time to ask how you are feeling.

Data analysis: Data was collected by trained interviewers, uploaded into a SQL Server database and converted into Stata version 11 for all analysis. After initial upload, data was examined for outliers, missing information and any discrepancies. Inconsistencies that were identified were checked against original surveys and corrected to ensure integrity of the data. Exploratory data analysis was conducted to understand the nature of the data and categories were created for variables of interest. Descriptive characteristics, including frequencies and percentages were explored for the sample, specifically demographics, biological, clinical, reproductive health and HIV- related variables. T-tests and chi-square tests, as appropriate, were calculated for each association between independent variables and the outcome. Bivariate logistic regression was conducted to determine odds ratios and confidence intervals for each independent variable against the

outcome. The model for multiple logistic regression were built partially in response to outcomes from these crude relationships, those with less than a 0.10 p-value level were included in the model as well as those variables known to be of theoretical importance or have been significant in past research. Models were assessed for multicollinearity and if two variables were correlated and relevant, the variable with the greater conceptual relevance was chosen for the final model. Analysis was conducted through an iterative stepwise procedure using assessments of log-likelihood measures along with the Akaike information criterion (AIC) for each nested model. To determine final goodness-of-fit, a Hosmer-Lemeshow goodness of fit test was conducted on the final model.

Results

Table 3 illustrates the socio-demographic characteristics of the sample population, comprised of 268 FSWs with a median age of 36 years (range: 18 to 61 years). Most of the participants had a partner (80.54%) and owned or rented a house (76.42%). Almost the entire sample had some form of education (97.76%) with a majority having only a primary level (64.55%). A majority of respondents reside in Santo Domingo (78.40%).

Table 4 describes the behavioral practices and biological characteristics of the respondents. There was a broad age range at which they first engaged in sex work (range: 10 to 56) with a median age of 21 years of age. Participants earned an average of 870 Dominican pesos (approximately \$20) per *salida*, or sex work date, seeing an average of 4 clients per week (range: 0 to 25 clients). Most participants worked on the street (55.97%) or at an establishment (56.67%) (club, disco, bar, hotel, colmadon or billiard), many of whom indicated working at numerous locations. About a third of the participants (n=94) responded that they had a conflict with a partner in the past 6 months.

A large number of the participants reported never or rarely using alcohol in the last 30 days (61.57%) and 24.25% of the participants reported having ever used drugs (marijuana, cocaine, crack or heroin). Clinical STI prevalence (chlamydia, gonorrhoea or trichomoniasis) of the sample (n=260) was 23.07%. More than half of the sample reported consistent condom with all sex partners in the last 30 days (63.77%). The average years from HIV diagnosis was 6 years (range: less than a year to 30 years) with 26.49% receiving their first HIV diagnosis during pregnancy. A little over half of respondents (55.22%) reported disclosure of their serostatus to a husband, regular partner, or client. While a majority of the sample (73.66%) were currently on ART, about a half had a detectable viral load (51.89%) and 28.57% have reported that they have ever had a break in their ART.

Stigma and provider scales

Stigma and provider scales are also highlighted in Table 4. For both the HIV related self-internalized scale and the sex work related self-internalized stigma scale (scale is from 1 to 4, 1 being least amount of stigma), participants reported medium to high levels of stigma (2.42 and 2.38 respectively). Lastly, participants seemed to have a relatively good perception of their provider (median score 3.32, with 1 being most negative perception).

Pregnancy and childbearing

Fertility and childbearing characteristics are explored in table 5. Almost all of the participants have been pregnant (95.90%) averaging 4 or 5 lifetime pregnancies (SD 2.2; range 1 to 12). The number of times pregnancy resulted in a live birth averaged 3 (SD 1.6; range 1 to 9). Pregnancy loss was high- 62.41% of the study reported that they had a

pregnancy that did not result in a live birth, which could include stillbirth, termination of pregnancy or miscarriage. Almost all of the participants (93.66%) also currently have children, averaging 3 children (SD 1.4; range 1 to 8). Pregnancy after HIV diagnosis was reported in 34.3% of the population, an average of 1.4 pregnancies (range: 1 to 9; SD: 1.6). A portion of the sample also expressed a desire to have more children (26.12%), with average desire between one and two more children (range 1 to 5; SD: 0.86). Current or possible pregnancies at the time of the study were reported by 2.99%. Of the total number of participants, 57.06% do not agree with the statement, “If an HIV positive woman wants to get pregnant, it is good for her to try to get pregnant.”. For those who disagreed (n=153) about 30% have been pregnant since HIV diagnosis. Lastly, of those who reported having a partner (n=225), almost 62% reported that they feel that their partner would be happy or wouldn’t mind if a pregnancy occurred.

Factors related to having been pregnant since diagnosis

Bivariate logistic regression (table 6) documented significant associations at the $p \leq 0.05$ level between having been pregnant since diagnosis and older age (OR: 0.93; 95% CI: 0.89, 0.96), years living with HIV (OR: 1.07; 95% CI: 1.01, 1.13), age at sex work initiation (OR: 0.96; CI: 0.93, 0.99), ever a breakage in ART (OR: 2.84; 95% CI: 1.57, 5.12), ever been afraid to seek health services due to HIV or sex work (OR: 1.75; 95% CI: 1.05, 2.92), disclosure of serostatus to any sex partner (OR: 2.33; 95% CI: 1.37, 3.95) and lower satisfaction with their health provider (OR: 0.57; 95% CI: 0.37, 0.87).

Marginally significant associations at the $p \leq 0.1$ level with having been pregnant after diagnosis included being single/widowed/divorced as compared to having a partner (married or regular partner) (OR: 0.48; 95% CI: 0.22, 1.03), agreeing that if an HIV-

infected woman wants to get pregnant it is good to try (OR: 1.57; 95% CI: 0.92, 2.67) and knowledge that ART reduced MTCT (OR: 1.83; 95% CI: 0.97, 3.44).

Multivariate logistic regression results (table 7) at the $p \leq 0.05$ level, adjusting for education and civil status revealed that age (AOR: 0.91; 95% CI: 0.87, 0.95), years since HIV diagnosis (AOR: 1.13; 95% CI: 1.05, 1.20), ever having a break in their ART (AOR: 2.31; 95% CI: 1.15, 4.98), correct knowledge that ART reduced MTCT (AOR: 2.19; 95% CI: 1.02, 4.98), serostatus disclosure to any sexual partner (AOR: 2.38; 95% CI: 1.20, 4.73) and a lower perception of their health provider (AOR: 0.56; 95% CI: 0.33, 0.91) had significant associations with having been pregnant since HIV diagnosis.

Discussion

The results from this study on a highly vulnerable and under-researched population, solidifies the need for more research on pregnancy and reproductive health of FSWs living with HIV. Pregnancy and childbearing are a prevalent part of the FSWs living with HIV in this study. The significant health risks and barriers to care that this population faces^{83,95,99,152} substantiates the need for further research on this population, particularly concerning pregnancy reproductive health.

Many participants in this study are still in their reproductive years, over a quarter of participants would like more children and many have been pregnant since HIV diagnosis. Since the women in the DR generally have children at a young mean age (20 years)¹⁰⁶, typically have large families, and place cultural importance on family^{111,112} the high percentage of women who have been pregnant is not surprising. However living with HIV and actively selling sex may place these women at high risk for pregnancy related health concerns as has been seen with both FSWs and women living with HIV

independently^{34,35,37,89,91}. While this study did not aim to investigate the role that children and pregnancy play in the lives of these women, it does highlight the need for more research to understand influences on maternal, child and family health. In addition to the high number of pregnancies, the high number of pregnancy loss- reported by over half the participants in the sample is of concern. While this study did not specify the reasons for pregnancy loss, due to the strict abortion laws and religious context, this deserves further attention.

The focus of this study is to understand characteristics of FSWs who have become pregnant after their HIV diagnosis. At a time when pregnancy can be safe and healthy for women living with HIV, the fact that a majority of these women (many who have been pregnant after HIV diagnosis) do not feel that it is good to try to get pregnant if you are living with HIV suggests that women may have had negative experiences with pregnancy and delivery and/or this could indicate non-supportive cultural or social norms or provider opinions surrounding pregnancy among women living with HIV. Salient results from the bivariate and multivariate analyses indicate that those who have reported a pregnancy since HIV diagnosis were more likely to be younger, even with the inclusion of years since HIV diagnosis in the multivariate model. This may reflect more recent advancements in knowledge and access to prevention of MTCT in the DR- older women may have been more cautious about pregnancy after diagnosis if prevention of MTCT was not available. The DR also has a history of sterilization after HIV diagnosis, sometimes conducted without proper understanding or consent of the patient¹⁶³ - an occurrence that has been found in other settings as well.²³ With the permanent

contraceptive prevalence so high in this population, this may have been the case for older women.

Contradictory to prior studies,¹³⁰ number of current children was not significantly linked to having been pregnant since HIV diagnosis, however this study does not ask the number of children at the time of pregnancy, which may influence the association. Associations between disclosure to a partner and having been pregnant after HIV diagnosis were significant in both bivariate and multivariate models, which may be due to pregnancy related disclosure or diagnosis occurring with a regular partner. Those who knew that treatment could prevent MTCT were more likely to have been pregnant since HIV diagnosis, though the associations were marginally significant for the bivariate and multivariate associations. This is consistent with prior research on women living with HIV, though it is unclear whether this information stems from health providers or other organizations that aim to educate FSWs about HIV.

Most participants felt a great amount of self-internalized stigma related to HIV and to being a sex worker. However, none of the stigma scales proved to be significant. While stigma has been shown to play a large role among women living with HIV who desire pregnancy and become pregnant in prior studies^{38-42,130,167} this lack of association could be due to temporality. Pregnancies in this population occurred at some time prior to the study, therefore stigma associated with being pregnant might have shifted, particularly if pregnancies occurred long before the study. Prior research has also showed that having children can foster feelings of self-esteem and confidence in some women living with HIV¹⁵, therefore participants may have gained a sense of pride or a sense of normality after the children were born. This effect may be even more salient in a

culture that places high importance on fertility and childbearing^{21-23,130}. Lastly, with the high numbers of children and pregnancies in the cohort and organization supporting sex workers in the DR, having children may be more normalized among this population of FSWs.

Associations between having been pregnant after HIV diagnosis and health service related outcomes are of particular interest and importance in this study. In the bivariate analysis, those who reported being afraid to seek health services were almost 2 times more likely to have been pregnant since diagnosis compared to those who are not, suggesting the possibility of negative experiences with pregnancy as a woman living with HIV. Prior studies have found that many FSWs do not disclose their work to their providers due to fear of stigma and judgment^{97,98,150} which may explain that most participants indicated fear due to HIV and less so, sex work. This is a concern because FSWs may not receive the tailored services related to occupational health risks if they do not disclose their sex work- however they risk being stigmatized by providers or health personnel if they do. This may add to the barriers to service that as a FSW and a woman living with HIV already face. As previously mentioned, both FSWs and women living with HIV experience a high degree of stigma and discrimination, which may be compounded for FSWs living with HIV. A recent study of FSWs living with HIV in Russia found increased stigma and barriers to care among FSWs living with HIV as compared to women living with HIV not involved with sex work.⁹⁹

Significant associations indicate that FSWs who reported an interruption in ART had higher odds of having been pregnant after diagnosis compared to those who did not. It is not known whether women stopped ART during pregnancy or whether women

stopped treatment after birth or pregnancy loss, however similar associations have been found in women living with HIV.³⁷ A systematic review and meta-analysis found that women living with HIV had sub-optimal adherence to treatment, particularly postpartum due to physical, economic and emotional stress, alcohol or drug use and depression.³⁷ It was not clear in the current study whether women were postpartum, and with only 5 participants currently pregnant or possibly pregnant, specific associations could not be made, but the association warrants further insight with both adherence and MTCT as concerns.

A key association from this study is that participants who reported a more negative perception of their health provider were more likely to have been pregnant since HIV diagnosis, an association that maintained significance in the final model. Descriptive ratings of the perception of their health provider were on the higher end (about 3.32/4.00), indicating that in general participants are pretty satisfied with their health providers. When looking at both the bivariate and multivariate associations, participants who reported a more positive perception of their health provider (one unit increase in the scale) were almost half as likely to have been pregnant while living with HIV. This suggests that in this cohort, being pregnant and having HIV as a FSW might negatively affect perceptions of health providers. Reports of public maternity wards in the DR uncovered significant issues in care and treatment of pregnant women in the general population,^{115,119} which may be augmented for pregnant women living with HIV and/or FSWs. However, it is unclear what experiences are for women who are living with HIV in the DR with regard to pregnancy, labor and delivery- particularly those who are further marginalized, such as FSWs. The association between negative perceptions of health

providers and having been pregnant since diagnosis together with the large number of participants who felt that it was not good for women living with HIV to get pregnant if they want to and had been pregnant since diagnosis, suggests negative experiences with health providers during pregnancy, labor or delivery. What is clear is that more research is needed into the health care and experiences of FSWs living with HIV and pregnancy, with particular focus to seeking care and stigma.

The cultural and social context of the DR should also be taken into account. Family and childbearing is an important part of the culture and the average number of children in the general population is similar to the average number of children in this sample, at almost 3 children.¹⁰⁶ FSWs living with HIV in this study have a similar average number of children, although they are at high risk for a number of health concerns. The high amount of pregnancy loss may indicate that women chose to terminate pregnancies. Since the reasons for pregnancy loss are not specified, this cannot be verified, however even a high rate of miscarriage or stillborn is of concern. In a Catholic country with strict abortion laws, high maternal and infant mortality rates, it would be important to ensure that women are safe and healthy when making reproductive health decisions.

Limitations

There are a number of limitations to this study that should be considered. First, the study is a cross sectional design, therefore can only highlight participant experiences at one point in time. Except for the clinical tests and perceptions, most of the interviews relied on recall and due to the sensitive nature of the questions, self-report bias may have occurred. Temporality may play a role in associations, as there was a broad range of

years that FSWs have been diagnosed with HIV and no indication when/where pregnancies occurred, so services to prevention of MTCT and access may have differed. Further, it is not clear whether pregnancies in this population were intended or unintended, therefore results from this study can only be viewed more broadly in relation to experiences with pregnancy. Generalizability may be limited since sex worker rights organizations- aimed to empower and educate FSWs- have existed in Santo Domingo for a number of years. FSWs may be part of these organizations and while this is not a limitation, these women are most likely more empowered and more engaged in care than other FSWs living with HIV, driving the need for more research, particularly on populations where sex work is criminalized or services are not available. Therefore, greater attention and tailored services is needed for this population, particularly surrounding reproductive health.

Conclusions

It is clear that much more research is necessary on the reproductive health of FSWs living with HIV, especially in countries where family and having children is a central part of the culture. Children and pregnancy clearly play a large role in the lives of these women and in order to increase maternal and child health in the DR and prevent new infections in children it is essential to better understand reproductive health in this population. The increasing amount of evidence from studies focusing on FSWs living with HIV has uncovered multi-level challenges to their health and well-being, as well as their children and families, particularly seeking health services. Future studies on pregnancy in this population should focus on health services, particularly experiences seeking care during pregnancy- including provider and clinic experiences and ART

adherence during and after pregnancy. In the DR, sex work is not criminalized and there are sex work organizations providing support and empowerment, yet evidence suggests they are still dealing with increased health concerns, discrimination, stigma and as these results show, are more likely to have had a break in ART and have a negative perception of their health provider if they have been pregnant since diagnosis. Increased attention to FSWs living with HIV and reproductive health is needed, in general and in contexts where sex work is explicitly criminalized or where there are even greater barriers to care and support. Qualitative studies paired with more specifically tailored quantitative studies- particularly focused on the experiences of FSWs living with HIV through pregnancy, labor, delivery and post-partum would be helpful in learning more about this population and increasing individual, child and family health and care and reducing childhood HIV infections. Lastly, there is a need for tailored care for FSWs living with HIV- a population that faces unique challenges to health and care. Sensitizing health providers to the needs of this population in the form of education and non-judgmental, tailored communication and care is essential for maternal and child health in a highly vulnerable population.

References:

- (1) Connor EM, Sperling RS, Gelber R, Kiselev P, Scott G, O'Sullivan MJ, et al. Reduction of maternal-infant transmission of human immunodeficiency virus type 1 with zidovudine treatment. Pediatric AIDS Clinical Trials Group Protocol 076 Study Group. *N Engl J Med* 1994 Nov 3;331(18):1173-1180.
- (2) Sperling RS, Shapiro DE, Coombs RW, Todd JA, Herman SA, McSherry GD, et al. Maternal viral load, zidovudine treatment, and the risk of transmission of human immunodeficiency virus type 1 from mother to infant. Pediatric AIDS Clinical Trials Group Protocol 076 Study Group. *N Engl J Med* 1996 Nov 28;335(22):1621-1629.
- (3) Thorne C, Newell ML. *Hiv. Semin Fetal Neonatal Med* 2007 Jun;12(3):174-181.
- (4) Coutsoydis A, Kwaan L, Thomson M. Prevention of vertical transmission of HIV-1 in resource-limited settings. *Expert Rev Anti Infect Ther* 2010 Oct;8(10):1163-1175.
- (5) Boonstra H. Meeting the sexual and reproductive health needs of people living with HIV. *Issues Brief (Alan Guttmacher Inst)* 2006 Oct;(6)(6):1-4.
- (6) MacCarthy S, Rasanathan JJ, Ferguson L, Gruskin S. The pregnancy decisions of HIV-positive women: the state of knowledge and way forward. *Reprod Health Matters* 2012 Dec;20(39 Suppl):119-140.
- (7) Loutfy MR, Hart TA, Mohammed SS, Su D, Ralph ED, Walmsley SL, et al. Fertility desires and intentions of HIV-positive women of reproductive age in Ontario, Canada: a cross-sectional study. *PLoS One* 2009 Dec 7;4(12):e7925.
- (8) Ogilvie GS, Palepu A, Remple VP, Maan E, Heath K, MacDonald G, et al. Fertility intentions of women of reproductive age living with HIV in British Columbia, Canada. *AIDS* 2007 Jan;21 Suppl 1:S83-8.
- (9) Nattabi B, Li J, Thompson SC, Orach CG, Earnest J. A systematic review of factors influencing fertility desires and intentions among people living with HIV/AIDS: implications for policy and service delivery. *AIDS Behav* 2009 Oct;13(5):949-968.
- (10) Loutfy MR, Blitz S, Zhang Y, Hart TA, Walmsley SL, Smail FM, et al. Self-Reported Preconception Care of HIV-Positive Women of Reproductive Potential: A Retrospective Study. *J Int Assoc Provid AIDS Care* 2013 Aug 5.
- (11) Kennedy VL, Serghides L, Raboud JM, Su D, Blitz S, Hart TA, et al. The importance of motherhood in HIV-positive women of reproductive age in Ontario, Canada. *AIDS Care* 2014;26(6):777-784.
- (12) Yeatman S. HIV infection and fertility preferences in rural Malawi. *Stud Fam Plann* 2009 Dec;40(4):261-276.
- (13) Bankole A, Biddlecom AE, Dzekedzeke K, Akinyemi JO, Awolude O, Adewole IF. Does Knowledge about Antiretroviral Therapy and Mother-To-Child Transmission Affect the Relationships between Hiv Status and Fertility Preferences and Contraceptive Use? New Evidence from Nigeria and Zambia. *J Biosoc Sci* 2013 Dec 16:1-20.
- (14) Maccarthy S, Rasanathan JJ, Crawford-Roberts A, Dourado I, Gruskin S. Contemplating abortion: HIV-positive women's decision to terminate pregnancy. *Cult Health Sex* 2014;16(2):190-201.
- (15) Kirshenbaum SB, Hirky AE, Correale J, Goldstein RB, Johnson MO, Rotheram-Borus MJ, et al. "Throwing the dice": pregnancy decision-making among HIV-positive women in four U.S. cities. *Perspect Sex Reprod Health* 2004 May-Jun;36(3):106-113.

- (16) Bah'him YM, Oguntibeju OO, Lewis HA, Mokoena K. Factors associated with pregnancies among HIV-positive women in a prevention of mother-to-child transmission programme. *West Indian Med J* 2010 Jul;59(4):362-368.
- (17) da Silveira Rossi A, Fonsechi-Carvasan GA, Makuch MY, Amaral E, Bahamondes L. Factors associated with reproductive options in HIV-infected women. *Contraception* 2005 Jan;71(1):45-50.
- (18) Cooper D, Harries J, Myer L, Orner P, Bracken H, Zweigenthal V. "Life is still going on": reproductive intentions among HIV-positive women and men in South Africa. *Soc Sci Med* 2007 Jul;65(2):274-283.
- (19) Kumar A, Bent V. Characteristics of HIV-infected childbearing women in Barbados. *Rev Panam Salud Publica* 2003 Jan;13(1):1-9.
- (20) Temmerman M, Moses S, Kiragu D, Fusallah S, Wamola IA, Piot P. Impact of single session post-partum counselling of HIV infected women on their subsequent reproductive behaviour. *AIDS Care* 1990;2(3):247-252.
- (21) Blair JM, Hanson DL, Jones JL, Dworkin MS. Trends in pregnancy rates among women with human immunodeficiency virus. *Obstet Gynecol* 2004 Apr;103(4):663-668.
- (22) Kearney MH, Murphy S, Rosenbaum M. Mothering on crack cocaine: a grounded theory analysis. *Soc Sci Med* 1994 Jan;38(2):351-361.
- (23) Barnes DB, Murphy S. Reproductive decisions for women with HIV: motherhood's role in envisioning a future. *Qual Health Res* 2009 Apr;19(4):481-491.
- (24) Smith DJ, Mbakwem BC. Life projects and therapeutic itineraries: marriage, fertility, and antiretroviral therapy in Nigeria. *AIDS* 2007 Oct;21 Suppl 5:S37-41.
- (25) Kanniappan S, Jeyapaul MJ, Kalyanwala S. Desire for motherhood: exploring HIV-positive women's desires, intentions and decision-making in attaining motherhood. *AIDS Care* 2008 Jul;20(6):625-630.
- (26) Brocklehurst P, French R. The association between maternal HIV infection and perinatal outcome: a systematic review of the literature and meta-analysis. *Br J Obstet Gynaecol* 1998 Aug;105(8):836-848.
- (27) Kreitchmann R, Harris DR, Kakehasi F, Haberer JE, Cahn P, Losso M, et al. Antiretroviral adherence during pregnancy and postpartum in Latin America. *AIDS Patient Care STDS* 2012 Aug;26(8):486-495.
- (28) Nachega JB, Uthman OA, Anderson J, Peltzer K, Wampold S, Cotton MF, et al. Adherence to antiretroviral therapy during and after pregnancy in low-income, middle-income, and high-income countries: a systematic review and meta-analysis. *AIDS* 2012 Oct 23;26(16):2039-2052.
- (29) Qualitative study of the challenges to seeking health care among HIV-positive pregnant women in Ho Chi Minh City. XVI International AIDS Conference, Toronto, Canada. Retrieved from <http://www.aegis.com/conferences/iac/2006/MoAx0303.html>; 2006.
- (30) Bond V, Chase E and Aggleton P. Stigma, HIV/AIDS and prevention of mother-to-child transmission in Zambia. *Evaluation and Program Planning*. 2002;25(4):347-356.
- (31) Misiri HE, Tadesse E, Muula AS. Are public antenatal clinics in Blantyre, Malawi, ready to offer services for the prevention of vertical transmission of HIV? *Afr J Reprod Health* 2004 Aug;8(2):64-70.

- (32) Jean-Baptiste R. Operations Research Results. HIV/AIDS Related Stigma, Fear and Discriminatory Practices among Health Care Providers in Rwanda. 2008;2014(March 15).
- (33) Reis C, Heisler M, Amowitz LL, Moreland RS, Mafeni JO, Anyamele C, et al. Discriminatory attitudes and practices by health workers toward patients with HIV/AIDS in Nigeria. *PLoS Med* 2005 Aug;2(8):e246.
- (34) Subramaniyan A, Sarkar S, Roy G, Lakshminarayanan S. Experiences of HIV Positive Mothers From Rural South India during Intra-Natal Period. *J Clin Diagn Res* 2013 Oct;7(10):2203-2206.
- (35) Kerrigan D, Wirtz A, Baral S, Stanciole A, Butler J, Oelrichs R, et al. The global HIV epidemics among sex workers. : World Bank Publications; 2012.
- (36) Wayal S, Cowan F, Warner P, Copas A, Mabey D, Shahmanesh M. Contraceptive practices, sexual and reproductive health needs of HIV-positive and negative female sex workers in Goa, India. *Sex Transm Infect* 2011 Feb;87(1):58-64.
- (37) Richter ML, Chersich MF, Scorgie F, Luchters S, Temmerman M, Steen R. Sex work and the 2010 FIFA World Cup: time for public health imperatives to prevail. *Global Health* 2010 Feb 11;6:1-8603-6-1.
- (38) Allen CF, Edwards M, Williamson LM, Kitson-Piggott W, Wagner HU, Camara B, et al. Sexually transmitted infection service use and risk factors for HIV infection among female sex workers in Georgetown, Guyana. *J Acquir Immune Defic Syndr* 2006 Sep;43(1):96-101.
- (39) Tang J, Nour NM. HIV and Pregnancy in Resource-Poor Settings. *Rev Obstet Gynecol* 2010 Spring;3(2):66-71.
- (40) Samet JH, Pace CA, Cheng DM, Coleman S, Bridden C, Pardesi M, et al. Alcohol use and sex risk behaviors among HIV-infected female sex workers (FSWs) and HIV-infected male clients of FSWs in India. *AIDS Behav* 2010 Aug;14 Suppl 1:S74-83.
- (41) Donastorg Y, Barrington C, Perez M, Kerrigan D. Abriendo Puertas: baseline findings from an integrated intervention to promote prevention, treatment and care among FSW living with HIV in the Dominican Republic. *PLoS One* 2014 Feb 14;9(2):e88157.
- (42) Chacham AS, Diniz SG, Maia MB, Galati AF, Mirim LA. Sexual and reproductive health needs of sex workers: two feminist projects in Brazil. *Reprod Health Matters* 2007 May;15(29):108-118.
- (43) Decker MR, McCauley HL, Phuengsamran D, Janyam S, Silverman JG. Sex trafficking, sexual risk, sexually transmitted infection and reproductive health among female sex workers in Thailand. *J Epidemiol Community Health* 2011 Apr;65(4):334-339.
- (44) Elmore-Meegan M, Conroy RM, Agala CB. Sex workers in Kenya, numbers of clients and associated risks: an exploratory survey. *Reprod Health Matters* 2004 May;12(23):50-57.
- (45) Reed E, Silverman JG, Stein B, Erausquin JT, Biradavolu M, Rosenberg A, et al. Motherhood and HIV risk among female sex workers in Andhra Pradesh, India: the need to consider women's life contexts. *AIDS Behav* 2013 Feb;17(2):543-550.
- (46) Kerrigan D, Ellen JM, Moreno L, Rosario S, Katz J, Celentano DD, et al. Environmental-structural factors significantly associated with consistent condom use among female sex workers in the Dominican Republic. *AIDS* 2003 Feb 14;17(3):415-423.

- (47) Murray L&M. *Laughing on the outside, crying on the inside* [Rien Mis Labios Lloro Mi Alma]. Santo Domingo, Dominican Republic: Movimiento de Mujeres Unidas. 2002.
- (48) Rivers-Moore M. But the kids are okay: motherhood, consumption and sex work in neo-liberal Latin America. *Br J Sociol* 2010 Dec;61(4):716-736.
- (49) Basu A, Dutta MJ. 'We are mothers first': localocentric articulation of sex worker identity as a key in HIV/AIDS communication. *Women Health* 2011 Mar;51(2):106-123.
- (50) Beckman SW. "Like Any Other Woman"? Pregnancy, Motherhood and HIV Among Sex Workers in Southern Tanzania. Doctoral dissertation. Johns Hopkins Bloomberg School of Public Health 2014.
- (51) Lazarus L, Deering KN, Nabess R, Gibson K, Tyndall MW, Shannon K. Occupational stigma as a primary barrier to health care for street-based sex workers in Canada. *Cult Health Sex* 2012;14(2):139-150.
- (52) Cohan D, Lutnick A, Davidson P, Cloniger C, Herlyn A, Breyer J, et al. Sex worker health: San Francisco style. *Sex Transm Infect* 2006 Oct;82(5):418-422.
- (53) Scambler G, Paoli F. Health work, female sex workers and HIV/AIDS: global and local dimensions of stigma and deviance as barriers to effective interventions. *Soc Sci Med* 2008 Apr;66(8):1848-1862.
- (54) United Nations. Joint United Nations Programme on HIV (UNAIDS). UNAIDS Guidance Note on HIV and Sex Work. 2009.
- (55) Baral S, Beyrer C, Muessig K, Poteat T, Wirtz AL, Decker MR, et al. Burden of HIV among female sex workers in low-income and middle-income countries: a systematic review and meta-analysis. *Lancet Infect Dis* 2012 Jul;12(7):538-549.
- (56) Mtetwa S, Busza J, Chidiya S, Mungofa S, Cowan F. "You are wasting our drugs": health service barriers to HIV treatment for sex workers in Zimbabwe. *BMC Public Health* 2013 Jul 31;13:698-2458-13-698.
- (57) King EJ, Maman S, Bowling JM, Moracco KE, Dudina V. The influence of stigma and discrimination on female sex workers' access to HIV services in St. Petersburg, Russia. *AIDS Behav* 2013 Oct;17(8):2597-2603.
- (58) Zullinger R. Experiences of Female Sex Workers along the HIV Care Continuum in Santo Domingo, Dominican Republic. 2014.
- (59) Central Intelligence Agency. The World Factbook: Dominican Republic. March 11, 2014; Available at: <https://www.cia.gov/library/publications/the-world-factbook/geos/dr.html>. Accessed March 20, 2014.
- (60) Sabogal F, Marín G, Otero-Sabogal R, Marín BV, Perez-Stable EJ. Hispanic Familism and Acculturation: What Changes and What Doesn't? *Hispanic Journal of Behavioral Sciences* 1987 December 01;9(4):397-412.
- (61) Santisteban DA, Muir-Malcolm JA, Mitrani VB, Szapocznik J. Integrating the study of ethnic culture and family psychology intervention science. 2002.
- (62) Foucault DC, Schneider BH. Parenting values and parenting stress among impoverished village and middle-class small city mothers in the Dominican Republic. *International Journal of Behavioral Development* 2009;33(5):440-450.
- (63) Schumacher G. Culture care meanings, beliefs, and practices in Rural Dominican Republic. *J Transcult Nurs* 2010 Apr;21(2):93-103.
- (64) Berger BE, Ferrans CE, Lashley FR. Measuring stigma in people with HIV: psychometric assessment of the HIV stigma scale. *Res Nurs Health* 2001 Dec;24(6):518-529.

- (65) Zelaya CE, Sivaram S, Johnson SC, Srikrishnan AK, Solomon S, Celentano DD. HIV/AIDS stigma: reliability and validity of a new measurement instrument in Chennai, India. *AIDS Behav* 2008 Sep;12(5):781-788.
- (66) Zelaya CE, Sivaram S, Johnson SC, Srikrishnan AK, Suniti S, Celentano DD. Measurement of self, experienced, and perceived HIV/AIDS stigma using parallel scales in Chennai, India. *AIDS Care* 2012;24(7):846-855.
- (67) Baral S, Adams D, Lebona J, Kaibe B, Letsie P, Tshehlo R, et al. A cross-sectional assessment of population demographics, HIV risks and human rights contexts among men who have sex with men in Lesotho. *J Int AIDS Soc* 2011 Jul 4;14:36-2652-14-36.
- (68) Earnshaw VA, Smith LR, Chaudoir SR, Amico KR, Copenhaver MM. HIV stigma mechanisms and well-being among PLWH: a test of the HIV stigma framework. *AIDS Behav* 2013 Jun;17(5):1785-1795.
- (69) Galassi JP, Schanberg R, Ware WB. The Patient Reactions Assessment: A brief measure of the quality of the patient-provider medical relationship. *Psychol Assess* 1992;4(3):346.
- (70) Human Rights Watch (HRW). A Test of Inequity: Discrimination against Women Living with HIV in the Dominican Republic. . *Human Rights Watch* 2004;16(4(B)):May 10, 2014.
- (71) Nattabi B, Li J, Thompson SC, Orach CG, Earnest J. A systematic review of factors influencing fertility desires and intentions among people living with HIV/AIDS: implications for policy and service delivery. *AIDS Behav* 2009 Oct;13(5):949-968.
- (72) Miller S, Cordero M, Coleman AL, Figueroa J, Brito-Anderson S, Dabagh R, et al. Quality of care in institutionalized deliveries: the paradox of the Dominican Republic. *Int J Gynaecol Obstet* 2003 Jul;82(1):89-103; discussion 87-8.
- (73) Proujansky AE. A Dominican maternity ward. *Am J Nurs* 2008 Dec;108(12):40-43.

Tables

Table 3: Socio-demographic characteristics of female sex workers living with HIV in the Dominican Republic (n=268).

	N or Mean (SD)	% or Range
Age	35.9 (9.11)	(18, 61)
Civil status		
Single/Wid/Div	51	(19.00%)
Married/ Living with partner	103	(38.00%)
Partner, not living with	114	(42.54%)
Housing		
Own house	94	(35.00%)
Rented house	111	(41.42%)
Rented room in house or boarding house	21	(7.84%)
Other	42	(15.67%)
Education (ever)	262	(97.76%)
Primary	167	(64.55%)
Secondary	81	(30.00%)
Tertiary	14	(5.2%)
Current Residence		
Santo Domingo	210	(78.40%)
Other area	58	(21.60%)

Table 4: Behavioral practices and biological characteristics of female sex workers living with HIV in the Dominican Republic (n=268).

	N or Mean (SD)	% or Range
Sex work characteristics		
Age first engaged in sex work	21	(10, 56)
Avg price per salida (pesos)	870*	(200, 4000)
Number of clients/wk	4.1	(0, 25)
Work Locations	Establishment	152
	The street	150
	Other	84
Any conflict with a partner in the last 6 months	94	35.07%
Alcohol use (last 30 days)	Never/Rarely	165
	Sometimes/Often	103
Drug use ever	65	24.25%
Sexual health and HIV characteristics		
Diagnosed with any STI (n=260)	60	23.07%
Consistent condom use with all partners (last 30 days)	169	63.77%
No contraception in the past 6 months (n=267)	50	18.73%
Permanent contraceptive procedure	134	50.19%
Years since HIV diagnosis (n=266)	5.9 (4.6)	(0,30)
Initial HIV diagnosis during pregnancy	71	26.49%
Know that ART can prevent MTCT	203	75.75%
Ever been afraid to seek health services due to HIV or SW	115	43.07%
Due to HIV	114	42.70%
Due to SW	54	20.15%
Disclosed to any sex partner	148	55.22%
Viral Load (n=264)	Undetectable (<50 copies/cc)	127
	Detectable	137
Current ARV use (n=267)	194	72.66%
Ever a break in ARV treatment	76	28.57%
Stigma and provider scales		
HIV related self-internalized stigma scale	2.42	(1, 4)
Sex work related self-internalized stigma scale	2.38	(1, 4)
Perception of provider scale	3.32	(1, 4)

* 870 pesos approximately equal \$20

Table 5: Fertility and childbearing characteristics of female sex workers living with HIV in the Dominican Republic (n=268).

	n or mean	% or SD (range)
Currently have children	251	93.66%
Average number of children (n=251)	3	1.4 (1, 8)
Have ever been pregnant	257	95.8%
Number of times pregnant (n=257)	4.6	2.2 (1,12)
Number of times pregnancy resulted in a live birth (n=255)	3.2	1.6 (1, 9)
At least one pregnancy loss*	166	62%
Have been pregnant since HIV diagnosis	92	34.3%
Number of times pregnant (n=92)	1.6	0.87 (1, 5)
Percentage of pregnancies resulting in live birth (n=92)	76	80.85%
Desire to have more children	70	26.12%
Number of children desired (n=68)	1.6	0.86(1, 5)
Currently pregnant or might be pregnant	8	2.99%
Do not agree that if an HIV positive woman wants to get pregnant it is good to try to get pregnant	153	57.09%
And have been pregnant since HIV diagnosis (n=153)	47	30.72%

* Due to any reason, reason not specified.

Table 6: Bivariate analysis for female sex workers living with HIV in the Dominican Republic who have been pregnant during diagnosis (n=268).

Participant characteristics	Odds Ratio	95% Confidence Interval	p-value
Age	0.93	0.89, 0.96	<0.0001
Civil status			
Married/ living with partner (ref)	1.00	----	----
Partner	0.85	0.49, 1.48	0.57
Single/Wid/Div	0.48	0.22, 1.03	0.06
Education	1.07	0.72, 1.60	0.73
Number of children	1.02	0.87, 1.20	0.77
Behaviors			
Number of clients per month	0.98	0.95, 1.01	0.23
Years since HIV diagnosis (n=266)	1.07	1.01, 1.13	0.02
Age first engaged in sex work	0.96	0.93, 0.99	0.05
Alcohol use (ref= rarely or never use)	1.00	----	----
Often/occasionally	1.58	0.95, 2.65	0.08
Drug use ever	1.51	0.85, 2.68	0.16
Ever ART	1.45	0.25, 0.76	0.25
Ever a break in ART (ref= no break in ART)*	2.84	1.57, 5.12	0.001
Viral load (n=264) (ref= undetectable)	1.42	0.85, 2.37	0.17
Sexual and reproductive health characteristics			
Agree if an HIV positive woman wants to get pregnant it is a good idea to try (ref= disagree)**	1.00	----	----
Agree	1.57	0.92, 2.67	0.01
Knowledge of mother-to-child transmission	1.83	0.97, 3.44	0.06
Ever lost a pregnancy	1.17	0.69, 1.98	0.55
Ever been afraid to seek health services due to HIV or SW	1.75	1.05, 2.92	0.03
Disclosed HIV status to any sexual partner	2.33	1.37, 3.95	0.002
Subjective overall health rating (ref: good health)	1.35	0.81, 2.25	0.26
Stigma and provider scales			
HIV related self-internalized stigma scale	0.79	0.49, 1.27	0.34
Sex work related self/ internalized stigma scale	0.98	0.66, 1.46	0.93
Perception of provider scale	0.57	0.37, 0.87	0.009

*Category of those “never been on ART is not shown. ** Category of “neither agree or disagree” and “Don’t know” is not shown.

Table 7: Multivariate logistic regression model measuring characteristics of female sex workers living with HIV that have been pregnant since diagnosis (n=264)*.

	Adjusted Odds Ratio	95% Confidence Interval	P-value
Age	0.91	0.87, 0.95	<0.0001
Years since HIV diagnosis	1.13	1.05, 1.20	0.001
Alcohol use (last 30 days)	1.44	0.78, 2.65	0.239
Ever a break in ART**	2.31	1.15, 4.67	0.019
Knowledge of mother-to-child transmission	2.19	1.02, 4.98	0.043
Disclosed HIV status to any sexual partner	2.38	1.20, 4.73	0.013
Perception of provider scale	0.56	0.33, 0.91	0.021

* Adjusted for civil status and education ** Compared to no break in ART, category of never on ART not shown.

Manuscript 3

Understanding factors related to patient-provider communication about pregnancy and HIV among female sex workers living with HIV in Santo Domingo, Dominican Republic

Abstract

Background: Health providers can play an important role in communication about pregnancy, particularly for women at increased risk for pregnancy complications.

Aim: This study explores factors related to patient-provider communication about pregnancy among 253 female sex workers living with HIV and of reproductive age in Santo Domingo, Dominican Republic.

Design: A cross-sectional study design was employed using structured survey methods with participants. Data were analyzed utilizing bivariate and multivariate logistic regression.

Results: Almost all women had been pregnant (95.65%) at least once (average: 4 to 5 times), many had been pregnant after being diagnosed with HIV (36%) and reported wanting more children (28%). Over half of the population (58%) reported ever spoken to a health provider about pregnancy and women living with HIV. Multivariate logistic regression found significant associations between having spoken to a health provider about HIV in pregnancy and a more positive perception of their health provider (AOR: 1.97; 95% CI: 1.01, 2.48) and years since HIV diagnosis (AOR: 1.07; 95% CI: 1.00, 1.13). Negative associations were seen with history of drug use (AOR: 0.38; 95% CI: 0.20, 0.90) and current alcohol use (AOR: 0.52; 95% CI: 0.30, 0.92).

Conclusions: This paper examines missed opportunities and gaps in patient-provider communication about pregnancy for a highly vulnerable population. Findings highlight the crucial importance for non-judgmental and tailored provider-initiated conversations surrounding pregnancy for female sex workers living with HIV.

Key message points

- Pregnancies and children are prevalent in the lives of female sex workers (FSWs) living with HIV, yet little is known about this population.
- Many FSWs living with HIV have not discussed pregnancy with their providers although they are at high risk for pregnancy complications and concerns.
- Substance use and health provider perceptions are influential in determining whether FSWs living with HIV discuss pregnancy with their health providers.

Introduction

Patient-provider communication surrounding pregnancy for women living with HIV of reproductive age is extremely important for both maternal and infant health.⁴⁸ Pregnancy rates among women living with HIV have increased over the last 10 years in different settings globally, giving increased salience to preconception conversations surrounding pregnancy.^{51,52} For women living with HIV who desire more children, preconception care and counseling by a health provider provides an opportunity to promote planned pregnancies, educate women on prevention of mother to child transmission of HIV (MTCT), support safe conception and delivery practices, and to ensure safe outcomes both mother and child.⁴⁸ For women who do not want (more) children, discussing pregnancy and family planning can prevent unwanted pregnancies and potential associated negative health outcomes. For women living with HIV of reproductive age who are pregnant or would like to become pregnant, it is imperative that their health provider provide information, support without judgment, ensure retention in care and monitor health progress,⁴⁴⁻⁴⁹ particularly because women living with HIV and their infants, even on treatment, are at risk for a number of complications.^{34,35} In many settings, however, a majority of HIV-infected women of reproductive age have never discussed pregnancy and childbearing with their health providers, highlighting a clear gap in service provision.⁴⁴⁻⁴⁷

When conversations surrounding pregnancy do occur, even among planned pregnancies, evidence suggests that many times these conversations are mostly patient-initiated and occur after pregnancy.^{44,46,168} Further, health workers attitudes and communication cues have been seen to influence proactive communication and personal

decisions with providers surrounding pregnancy and fertility among women living with HIV.^{13,54,55,64,131} Women who perceive or experience negative attitudes, stigma or discrimination from providers surrounding childbearing, are more likely to have negative attitudes themselves⁶⁵ and during routine visits some women avoid the topic of fertility due to perceived judgment by the provider.^{54,65,69} A conversation with a health provider has the potential to dispel fears about pregnancy and HIV, it can provide information on the importance of ART adherence, provide an understanding of tailored health risks, educate the patient on related risk behaviors and can refer women to proper resources.

Potential barriers to preconception communication with health providers for women living with HIV include a myriad of influences. From a patient perspective, women may be more concerned with competing priorities and more immediate concerns, feel stigmatized or judged due to their HIV infection, or lack a sense of empowerment to discuss sexual health.⁶⁵ Even if women living with HIV feel that they can conceive with appropriate care, they may still feel societal stigma at having children.⁴⁶ From a provider perspective, providers may be reluctant to discuss reproduction and fertility with patients or may assume that women living with HIV do not want to become pregnant.⁶⁵ From a dual perspective, there may be lack of knowledge about pregnancy in HIV by either patient or provider, or there may be a lack of defined provider roles if the patient is seeing multiple providers for care.⁶⁵

In addition to preconception communication surrounding pregnancy desire and intentions among women living with HIV, patient-provider challenges in communication have been seen to continue through care and treatment after pregnancy.⁴⁹ Some of the most salient influences seen in the patient-provider interaction during pregnancy and

ART initiation and adherence have been shown to include negative interactions between patient and provider including stigma,^{54,67} a biomedical focus of clinical care interactions without addressing social factors⁶⁸ and power dynamics in clinic that affect a woman's ability to ask questions.¹⁷

Within the body of research focused on patient-provider communication for women living with HIV there has been limited attention on marginalized populations, such as female sex workers (FSWs) even with the knowledge that globally, many, if not most FSWs have children and have been pregnant.^{67,80,82,83} Similar women living with HIV, FSWs face severe discrimination from health care workers and other barriers to care in different settings globally^{93,97-99,150} but are at greater risk for a number of health concerns including HIV, other STIs, violence^{9,76-79,83,169} and complications associated with reproductive health, pregnancy and childbearing.^{89,91}

At approximately 13.5 times the risk for HIV than women in the general population in lower and middle income countries,¹⁴⁹ the global burden HIV for FSWs is significant enough to warrant attention for this population at heightened risk. FSWs living with HIV are faced with multiple stigmatized identities and emerging evidence suggests that they are more likely to experience discrimination in health care settings, report feelings of social isolation once they learned their serostatus and to have been refused medical care or be afraid to go to the doctor than FSWs not living with HIV.⁹⁹ Further, a qualitative study of FSWs living with HIV in Zimbabwe uncovered experiences of humiliation and feeling demeaned by health care workers while seeking clinical services.¹⁰² The lack of information about FSWs living with HIV is concerning, particularly with the acknowledgement of the need for comprehensive and tailored

prevention, care and treatment for this population.^{93,100,101} This paper aims to understand factors related to having spoken to a health provider about pregnancy among FSWs living with HIV in Santo Domingo, Dominican Republic (DR).

Methods

Study background: The current analysis is situated within a longitudinal intervention research study named *Abriendo Puertas* (Opening Doors) conducted among FSWs living with HIV in Santo Domingo, DR- the details of which have been previously described.⁹⁵ The study aim was to assess the feasibility and initial effects of a multi-level intervention to promote engagement in and adherence to HIV care and foster preventive sexual health behaviors.

Study setting: The DR is a Caribbean country located next to Haiti on the island of Hispaniola with a population of about 10 million with the capital city of Santo Domingo. The DR is a predominately Catholic country (95%) with vast economic disparities seen between economic classes.¹⁰⁶ Sex work is not illegal and there are organizations whose aim is to educate and empower FSWs. The HIV prevalence in the country is about 0.7%¹²⁵ and is estimated among sex workers at a much higher prevalence of 4.8%.¹⁶⁹

Study sample and recruitment: FSWs were defined as women who report having exchanged sex for money in the last month. Participants were at least 18 years of age, spoke Spanish, and reported that they were HIV-infected confirmed prior to enrollment by a HIV rapid test. Recruitment occurred in Santo Domingo, through HIV clinics, peer navigators and referral by other study participants. Enrollment occurred from November

2012 to February 2013, resulting in a sample size of 268 participants. This analysis includes the subset of this sample FSWs who were of reproductive age while living with HIV- a total of 253 participants.

Data collection: This baseline socio-behavioral survey was conducted by trained Dominican field staff in Spanish within private offices of the HIV Vaccine Research Unit (HVRU). Blood samples for HIV viral load were assessed at the Dominican National Reference Laboratory in Santo Domingo using polymerase chain reaction (PCR) testing.

Ethics and collaborative partners: This study partnered with a number of organizations in Santo Domingo, Dominican Republic including the HVRU at the Instituto Dermatológico y Cirugía de Piel Dr. Humberto Bogart Díaz and the non-governmental organizations, MODEMU and COIN. Participants provided oral consent that they understood the nature of the study, could discontinue the study at any time and agreed to enroll in the study. Trained interviewers recorded participant consent responses and signed for the participants. Participants were compensated 400 Dominican pesos (about \$10) for survey completion. Approval was granted by the Johns Hopkins Bloomberg School of Public Health as well as the IDCP Institutional Review Board.

Measures

Dependent variable: The main outcome was assessed through the following question, “Have you and a health care provider ever talked about pregnancy in women living with

HIV?” Response options were “yes” “no” “don’t know” and “refuse to answer”. All respondents answered either yes or no and therefore treated as a dichotomous variable.

Key independent variables: Selection of independent variables was guided through background literature and conceptual relevance. The main independent variable was health provider perception while other variables of interest included sociodemographic characteristics, risk behaviors, HIV characteristics, stigma scales and sexual and reproductive health characteristics. The final model controlled for age, civil status, education level, number of times pregnant and years living with HIV.

Aggregate measures: Consistent condom use was an aggregate of three separate questions asking the participants 1) if they have ever had sex without a condom 2) if they have had sex without a condom in the last 30 days and 3) if they had sex without a condom the last time they had sex. These questions were asked for 3 types of partners (regular partner, casual partner, client). If each question answered consistently that condoms were used for each partner this was categorized as consistent condom use. Stigma scales included sex work and HIV internalized stigma. Scales were measured using adapted measures from those developed by Berger et al.,¹³³ Zelaya et al.,^{134,135} and Baral et al.,¹³⁶ and with guidance from Earnshaw’s HIV Stigma Framework.¹³⁷ All stigma scales included options of 1 to 4, with a response of 1 being the least amount of stigma and 4 the most stigma. All answers of “don’t know” and “refuse to answer” responses were coded as 2.5 in order to maintain sample size but neutralize their weight in the scales. Standardization of directionality was ensured for all questions. The provider

satisfaction scale, the primary independent variable, was adapted from the validated Patients Reactions Assessment scale¹³⁸ differed in that a higher score meant a greater satisfaction with their providers. Data reduction occurred through principal components analysis. Once items were chosen for removal, Cronbach alpha tests were conducted (see table1) in order to measure internal consistency of the final scale. When scales were finalized, the items included were averaged across participant to create each final variable.

Table 1: Stigma and provider scale characteristics.

Scale name	Number of final items	Cronbach alpha score
HIV related self-internalized stigma scale	7	0.8819
Sex work related self/ internalized stigma scale	12	0.9089
Provider satisfaction scale	8	0.9550

Data analysis: Data was collected and uploaded into a secure SQL server database and converted to Stata version 11 for analysis. Exploratory analysis was conducted to explore the nature of the data and examine any outliers or inconsistencies, which were subsequently checked against original data. Descriptive analysis was conducted and t-tests or chi-square analysis, as appropriate, were used to explore associations between independent variables and the outcome. Bivariate logistic regression was conducted to determine odds ratios and confidence intervals for associations. Associations that were determined at a 0.10 p-value level or less were included in the model, guided also by conceptual relevance. The final model was built using multiple iterations through a traditional stepwise fashion. After the addition of each variable the Akiake information criterion (AIC) was calculated for each nested model and log likelihood tests were assessed. The model with the lowest AIC value, together with low log likelihood values

aided in the determination of most parsimonious model fit. Finally a Hosmer-Lemeshow goodness of fit test was conducted on the final model to determine the final model fit.

Results

Socio-demographic, behavioral and stigma characteristics

The final sample size for this analysis was 253 participants with a broad average age range. Table 2 illustrates the socio-demographic, behavioral, sexual health, HIV and stigma characteristics. Most participants had some sort of education but most only at the primary level (61.26%). Most participants had a regular partner (81.82%) and had housing that they owned or rented. There was a wide age range in which participants reported first engaging in sex work with a median age of about 20 years (range: 10, 46) however most participants were engaged in sex work for the first time under 20 years of age. Predominant sex work locations included within an establishment (e.g. disco, bar, hotel, billiard) or the street, however many indicated more than one location. About 37.94% of participants mentioned they never drank alcohol. More than half reported consistent condom use with all sexual partners (63.60%). Permanent contraceptive procedures included hysterectomy (3.75%) and sterilization (tubal ligation) at 47.39%, together making up almost half of the participants. There was a broad range of years since HIV diagnosis however 63.24% were diagnosed in the last 6 years.

Reproductive health and pregnancy

Reproductive health and service characteristics are illustrated in table 3. Pregnancies and children were prevalent in this population, with many reporting more than one pregnancy since diagnosis and wanting (more) children. A high number of

FSWs reported a pregnancy that did not result in a live birth. Over half of the sample did not feel that it is good to get pregnant if you are living with HIV and desire more children. With regard to services and care, barriers to care included feelings that lack of access to treatment and HIV care was a serious problem for FSWs and fear of seeking services, confusion with provider communication about treatment and fear of a breach of confidentiality. While communication with a health provider occurred for more than half of the population, clear gaps exist for women in most need of this discussion, including women who have been pregnant since HIV diagnosis, want more children and negative perceptions of HIV among women who are living with HIV

Regression analyses

Bivariate and multivariate regression analysis results are highlighted in table 4. Bivariate regression analysis revealed associations at the 0.05 level of significance or lower between both participants reporting substance use (ever having used drugs or current often/occasional alcohol use), as well as participants with a higher perception of their health provider and those who have spoken to a health provider about pregnancy among women living with HIV. The stigma scales had non-significant negative trends with the outcome suggesting a similar, yet non-significant association between stigma and communication about pregnancy with HIV-related stigma only marginally non-significant. Controlling for age, civil status and education, years living with HIV and number of times pregnant, the multivariate analysis uncovered a number of associations at the 0.05 level of significance including a more positive perception of their health providers, history of drug use, and current alcohol use.

Discussion

Patient-provider communication regarding reproductive health and pregnancy is essential on multiple levels- to reduce stigma, to tailor care and to provide appropriate support for women living with HIV. Proper preconception conversations with providers can dispel anxiety, encourage adherence and ultimately improve maternal and child health as well as help avoid unwanted pregnancies and prevent unsafe abortion.⁴⁸ Results from this paper highlight the fact that pregnancy and childbearing is a substantial part of the lives of female sex workers living with HIV. However, there are clear barriers to provider communication about pregnancy as seen in other studies of women living with HIV.^{19,44,46} In a country that where there are legal barriers to safe abortion,¹²⁰ a history of high maternal and infant mortality rates⁵⁰ and a history of questionable maternity wards practices,^{104,115} understanding barriers to patient-provider communication is even more salient for a population that faces multiple stigmatized identities.

The lack of patient-provider communication surrounding pregnancy is concerning, particularly because of the high number of lifetime pregnancies, number of children and pregnancy losses in the study sample. These women all were of reproductive age when diagnosed with HIV and have seen a health provider at least once, highlighting missed opportunities for education and tailored care. Lack of patient-provider communication about pregnancy has been seen among women living with HIV in other settings,⁴⁴⁻⁴⁷ however FSWs may be at greater risk pregnancy related complications.^{89,91} Many FSWs who have been pregnant since diagnosis and who want more children have never spoken to a provider about pregnancy. Of those who have spoken to a provider, more than half do not feel a women living with HIV should get pregnant if desired. This

suggests that there may be some aspects of the conversation that may dissuade women from feeling that it is safe to have children when infected with HIV. For any conversation that may have included family planning, among those who used nothing to prevent pregnancy in the last 6 months, more than half do not want more children, highlighting an unmet need for conversations surrounding family planning as well.

Risk behaviors also seem to be associated with provider communication about pregnancy. Consistent with other studies related to this study population of FSWs living with HIV, substance use has been seen to play a role in ART continuity of care, STI diagnosis and having detectable viral load^{95,157} and in this study, with having had a conversation about pregnancy with a health provider, controlling for key factors. FSWs with a history of drug use or who drink alcohol often or occasionally were less likely to have discussed pregnancy with a provider. This may be explained through avoidance of seeking care for fear of judgment for a population already dealing with stigma, particularly if that want children or become pregnant. This may also concern competing priorities- those with a greater amount of risk behaviors who are seeking services may be discussing substance use or other issues verses having a conversation about pregnancy.

Provider-initiated conversation can dispel fears surrounding fear of judgment and provide support for women who are concerned about pregnancy. Provider verbal and non-verbal attitudes have been seen to be influential on the desire to discuss pregnancy and personal decision-making surrounding pregnancy.^{54,55,64,130,131} Multivariate regression results suggest that FSWs who had a more positive perception of their providers were significantly more likely to have spoken to a health provider about pregnancy. Interestingly, FSWs living with HIV had a significantly lower perception of their health

provider if they had been pregnant after HIV diagnosis (manuscript 2). This may suggest that those who are more comfortable with their providers are discussing pregnancy, therefore have a better perception. It may also suggest that while conversations with a health provider about pregnancy may be a good experience, actual experiences interacting with providers while pregnant or post-pregnancy may be negative. Given the history of negative conditions of public maternity wards found in the DR^{115,119} and the potentially added stigma and discrimination that women living with HIV as well as FSWs face, these findings might reflect these broader issues with maternity care in the DR.

Stigma has seen to play a role in a number of different settings with providers, this study showed that none of the scales were significantly associated with speaking to a provider about pregnancy. Many FSWs may not disclose their sex work to providers for fear of stigma or judgment,^{93,97-99,150} explaining the lack of association of the FSW scale. Bivariate analysis showed a marginally non-significant association with HIV related self-stigma suggesting that a conversation with a provider may be associated with lower HIV related self-stigma related to HIV.

There are several limitations that should be discussed with regard to this study. First this study is cross-sectional in nature and therefore only captures participant information at one point in time. There may be issues with self-report or recall bias for many questions and a level of social desirability bias for issues surrounding health care or behavior. Future studies should focus on nuances of this conversation- whether they are patient or provider initiated, important for understanding dynamics of conversations surrounding pregnancy or if these conversations preceded experiences with pregnancy.

Further, the nature of these conversations should be explored in future studies to understand whether preconception or family planning counseling was occurring, or whether conversations were with patients already pregnant. Qualitative studies would also be helpful- both with patients and health providers to further understand details of this important conversation. With these limitations and gaps in mind, this study did highlight clear factors related to patient-provider communication about pregnancy for a highly vulnerable population that is at high risk for unintended pregnancy, MTCT and health complications during pregnancy. With FSWs of reproductive age at significantly higher risk for HIV infection than the general population¹⁴⁹ and the incidence of HIV in this population paired with the high number of FSWs who become pregnant and/or have children it is concerning that there is very limited information in the literature about experiences of FSWs living with HIV and pregnancy.

Conclusions

Tailored services for FSWs and FSWs living with HIV are crucial, as these populations face unique health concerns and barriers to care. Non-judgmental provider-initiated conversations surrounding pregnancy and family planning are essential for a safe pregnancy and have the potential to influence other behaviors as well. This is more salient by the fact that women with a history of or current substance use who may be less likely to have these conversations, but are at greater risk for pregnancy complications. Health providers sensitized to these concerns can play a critical role in promoting the health and well being of FSWs living with HIV and their families.

References

1. Steiner RJ, Finocchiaro-Kessler S, Dariotis JK. Engaging HIV care providers in conversations with their reproductive-age patients about fertility desires and intentions: A historical review of the HIV epidemic in the united states. *Am J Public Health*. 2013;103(8):1357-1366.
2. Westreich D, Maskew M, Rubel D, MacDonald P, Jaffray I, Majuba P. Incidence of pregnancy after initiation of antiretroviral therapy in south africa: A retrospective clinical cohort analysis. *Infect Dis Obstet Gynecol*. 2012;2012:917059.
3. Huntington SE, Thorne C, Bansi LK, et al. Predictors of pregnancy and changes in pregnancy incidence among HIV-positive women accessing HIV clinical care. *AIDS*. 2013;27(1):95-103.
4. Finocchiaro-Kessler S, Dariotis JK, Sweat MD, et al. Do HIV-infected women want to discuss reproductive plans with providers, and are those conversations occurring? *AIDS Patient Care STDS*. 2010;24(5):317-323.
5. Mindry D, Wagner G, Lake J, et al. Fertility desires among HIV-infected men and women in los angeles county: Client needs and provider perspectives. *Matern Child Health J*. 2013;17(4):593-600.
6. Squires KE, Hodder SL, Feinberg J, et al. Health needs of HIV-infected women in the united states: Insights from the women living positive survey. *AIDS Patient Care STDS*. 2011;25(5):279-285.
7. Schwartz SR, Mehta SH, Taha TE, Rees HV, Venter F, Black V. High pregnancy intentions and missed opportunities for patient–provider communication about fertility in

a south african cohort of HIV-positive women on antiretroviral therapy. *AIDS and Behavior*. 2012;16(1):69-78.

8. Ferguson L, Grant AD, Watson-Jones D, Kahawita T, Ong'ech JO, Ross DA. Linking women who test HIV-positive in pregnancy-related services to long-term HIV care and treatment services: A systematic review. *Tropical Medicine & International Health*. 2012;17(5):564-580.

9. Brocklehurst P, French R. The association between maternal HIV infection and perinatal outcome: A systematic review of the literature and meta-analysis. *Br J Obstet Gynaecol*. 1998;105(8):836-848.

10. Kreitchmann R, Harris DR, Kakehasi F, et al. Antiretroviral adherence during pregnancy and postpartum in latin america. *AIDS Patient Care STDS*. 2012;26(8):486-495.

11. Finocchiaro-Kessler S, Mabachi N, Dariotis JK, Anderson J, Goggin K, Sweat M. "We weren't using condoms because we were trying to conceive": The need for reproductive counseling for HIV-positive women in clinical care. *AIDS Patient Care STDS*. 2012;26(11):700-707.

12. Harries J, Cooper D, Myer L, Bracken H, Zweigenthal V, Orner P. Policy maker and health care provider perspectives on reproductive decision-making amongst HIV-infected individuals in south africa. *BMC Public Health*. 2007;7:282.

13. Nduna M, Farlane L. Women living with HIV in south africa and their concerns about fertility. *AIDS and Behavior*. 2009;13(1):62-65.

14. Nattabi B, Li J, Thompson SC, Orach CG, Earnest J. A systematic review of factors influencing fertility desires and intentions among people living with HIV/AIDS: Implications for policy and service delivery. *AIDS Behav.* 2009;13(5):949-968.
15. Jones D, Chakhtoura N, Cook R. Reproductive and maternal healthcare needs of HIV infected women. *Curr HIV/AIDS Rep.* 2013;10(4):333-341.
16. Sofolahan YA, Airhihenbuwa CO. Cultural expectations and reproductive desires: Experiences of south african women living with HIV/AIDS (WLHA). *Health Care Women Int.* 2013;34(3-4):263-280.
17. Hoyt MJ, Storm DS, Aaron E, Anderson J. Preconception and contraceptive care for women living with HIV. *Infect Dis Obstet Gynecol.* 2012;2012:604183.
18. Sofolahan Y, Airhihenbuwa C. Childbearing decision making: A qualitative study of women living with HIV/AIDS in southwest nigeria. *AIDS research and treatment.* 2012;2012.
19. Finocchiaro-Kessler S, Bastos F, Malta M, et al. Discussing childbearing with HIV-infected women of reproductive age in clinical care: A comparison of brazil and the US. *AIDS and Behavior.* 2012;16(1):99-107.
20. World Health Organization, UNICEF. Trends in maternal mortality: 1990 to 2013: Estimates by WHO, UNICEF, UNFPA, the world bank and the united nations population division: Executive summary. . 2014.
21. Duff P, Shoveller J, Zhang R, Alexson D, Montaner JS, Shannon K. High lifetime pregnancy and low contraceptive usage among sex workers who use drugs- an unmet reproductive health need. *BMC Pregnancy Childbirth.* 2011;11:61-2393-11-61.

22. Levy JM. Women's expectations of treatment and care after an antenatal HIV diagnosis in Lilongwe, Malawi. *Reprod Health Matters*. 2009;17(33):152-161.
23. Gruskin S, Firestone R, Maccarthy S, Ferguson L. HIV and pregnancy intentions: Do services adequately respond to women's needs? *Am J Public Health*. 2008;98(10):1746-1750.
24. Elmore-Meegan M, Conroy RM, Agala CB. Sex workers in Kenya, numbers of clients and associated risks: An exploratory survey. *Reprod Health Matters*. 2004;12(23):50-57.
25. Decker MR, Yam EA, Wirtz AL, et al. Induced abortion, contraceptive use, and dual protection among female sex workers in Moscow, Russia. *Int J Gynaecol Obstet*. 2013;120(1):27-31.
26. Wayal S, Cowan F, Warner P, Copas A, Mabey D, Shahmanesh M. Contraceptive practices, sexual and reproductive health needs of HIV-positive and negative female sex workers in Goa, India. *Sex Transm Infect*. 2011;87(1):58-64.
27. Lazarus L, Deering KN, Nabess R, Gibson K, Tyndall MW, Shannon K. Occupational stigma as a primary barrier to health care for street-based sex workers in Canada. *Cult Health Sex*. 2012;14(2):139-150.
28. Cohan D, Lutnick A, Davidson P, et al. Sex worker health: San Francisco style. *Sex Transm Infect*. 2006;82(5):418-422.
29. Scambler G, Paoli F. Health work, female sex workers and HIV/AIDS: Global and local dimensions of stigma and deviance as barriers to effective interventions. *Soc Sci Med*. 2008;66(8):1848-1862.

30. King EJ, Maman S, Bowling JM, Moracco KE, Dudina V. The influence of stigma and discrimination on female sex workers' access to HIV services in st. petersburg, russia. *AIDS Behav.* 2013;17(8):2597-2603.
31. United Nations. Joint United Nations Programme on HIV (UNAIDS). UNAIDS guidance note on HIV and sex work. . 2009.
32. Kerrigan D, Wirtz A, Baral S, et al. *The global HIV epidemics among sex workers.* World Bank Publications; 2012.
33. Richter ML, Chersich MF, Scorgie F, Luchters S, Temmerman M, Steen R. Sex work and the 2010 FIFA world cup: Time for public health imperatives to prevail. *Global Health.* 2010;6:1-8603-6-1.
34. Allen CF, Edwards M, Williamson LM, et al. Sexually transmitted infection service use and risk factors for HIV infection among female sex workers in georgetown, guyana. *J Acquir Immune Defic Syndr.* 2006;43(1):96-101.
35. Tang J, Nour NM. HIV and pregnancy in resource-poor settings. *Rev Obstet Gynecol.* 2010;3(2):66-71.
36. Samet JH, Pace CA, Cheng DM, et al. Alcohol use and sex risk behaviors among HIV-infected female sex workers (FSWs) and HIV-infected male clients of FSWs in india. *AIDS Behav.* 2010;14 Suppl 1:S74-83.
37. MacCarthy S, Rasanathan JJ, Ferguson L, Gruskin S. The pregnancy decisions of HIV-positive women: The state of knowledge and way forward. *Reprod Health Matters.* 2012;20(39 Suppl):119-140.

38. Chacham AS, Diniz SG, Maia MB, Galati AF, Mirim LA. Sexual and reproductive health needs of sex workers: Two feminist projects in brazil. *Reprod Health Matters*. 2007;15(29):108-118.
39. Decker MR, McCauley HL, Phuengsamran D, Janyam S, Silverman JG. Sex trafficking, sexual risk, sexually transmitted infection and reproductive health among female sex workers in thailand. *J Epidemiol Community Health*. 2011;65(4):334-339.
40. Baral S, Beyrer C, Muessig K, et al. Burden of HIV among female sex workers in low-income and middle-income countries: A systematic review and meta-analysis. *Lancet Infect Dis*. 2012;12(7):538-549.
41. Mtetwa S, Busza J, Chidiya S, Mungofa S, Cowan F. "You are wasting our drugs": Health service barriers to HIV treatment for sex workers in zimbabwe. *BMC Public Health*. 2013;13:698-2458-13-698.
42. Jeal N, Salisbury C. Self-reported experiences of health services among female street-based prostitutes: A cross-sectional survey. *Br J Gen Pract*. 2004;54(504):515-519.
43. Spire B, de Zoysa I, Himmich H. HIV prevention: What have we learned from community experiences in concentrated epidemics? *J Int AIDS Soc*. 2008;11:5-2652-11-5.
44. Donastorg Y, Barrington C, Perez M, Kerrigan D. Abriendo puertas: Baseline findings from an integrated intervention to promote prevention, treatment and care among FSW living with HIV in the dominican republic. *PLoS One*. 2014;9(2):e88157.
45. Central Intelligence Agency. The world factbook: Dominican republic. <https://www.cia.gov/library/publications/the-world-factbook/geos/dr.html>. Updated March 11, 2014. Accessed March 20, 2014.

46. UNAIDS. Global report: UNAIDS report on the global AIDS epidemic (2010). . 2010.
47. Berger BE, Ferrans CE, Lashley FR. Measuring stigma in people with HIV: Psychometric assessment of the HIV stigma scale. *Res Nurs Health*. 2001;24(6):518-529.
48. Zelaya CE, Sivaram S, Johnson SC, Srikrishnan AK, Solomon S, Celentano DD. HIV/AIDS stigma: Reliability and validity of a new measurement instrument in chennai, india. *AIDS Behav*. 2008;12(5):781-788.
49. Zelaya CE, Sivaram S, Johnson SC, Srikrishnan AK, Suniti S, Celentano DD. Measurement of self, experienced, and perceived HIV/AIDS stigma using parallel scales in chennai, india. *AIDS Care*. 2012;24(7):846-855.
50. Baral S, Adams D, Lebona J, et al. A cross-sectional assessment of population demographics, HIV risks and human rights contexts among men who have sex with men in lesotho. *J Int AIDS Soc*. 2011;14:36-2652-14-36.
51. Earnshaw VA, Smith LR, Chaudoir SR, Amico KR, Copenhaver MM. HIV stigma mechanisms and well-being among PLWH: A test of the HIV stigma framework. *AIDS Behav*. 2013;17(5):1785-1795.
52. Galassi JP, Schanberg R, Ware WB. The patient reactions assessment: A brief measure of the quality of the patient-provider medical relationship. *Psychol Assess*. 1992;4(3):346.
53. Cooper D, Harries J, Myer L, Orner P, Bracken H, Zweigenthal V. "Life is still going on": Reproductive intentions among HIV-positive women and men in south africa. *Soc Sci Med*. 2007;65(2):274-283.

54. United Nations. Department of Economic and Social Affairs Population Division. World abortion policies 2013. . 2013:May 23, 2014.
55. Miller S, Cordero M, Coleman AL, et al. Quality of care in institutionalized deliveries: The paradox of the dominican republic. *Int J Gynaecol Obstet.* 2003;82(1):89-103; discussion 87-8.
56. Caribbean Epidemiology Centre (CAREC).
The caribbean HIV epidemic and the situation in member countries of the caribbean epidemiology centre. . . 2007.
57. Zullinger R. *Experiences of female sex workers along the HIV care continuum in santo domingo, dominican republic.* [PhD]. Baltimore, MD: Johns Hopkins Bloomberg School of Public Health; 2014.
58. Nattabi B, Li J, Thompson SC, Orach CG, Earnest J. A systematic review of factors influencing fertility desires and intentions among people living with HIV/AIDS: Implications for policy and service delivery. *AIDS Behav.* 2009;13(5):949-968.
59. Proujansky AE. A dominican maternity ward. *Am J Nurs.* 2008;108(12):40-43.

Tables

Table 2: Socio-demographic and health characteristics of FSWs living with HIV in the Dominican Republic (n=253).

Socio-demographic characteristics	N or Mean	% or (SD) Range
Age	34.8	8.0 (18, 53)
Civil status		
Single/widowed or divorced	46	(18.18%)
Married or have a partner	207	(81.82%)
Housing		
Own house	90	(35.57%)
Rented house, apt or room	124	(49.02%)
Other	39	(15.42%)
Education (any)	249	(98.42%)
None or primary	159	(62.85%)
Secondary or tertiary	94	(32.15%)
Current Residence		
Santo Domingo	196	(77.47%)
Other area	57	(22.53%)
Sex work and risk behavior characteristics	N or Mean	% or Range
Age first engaged in sex work	20.3	(10,46)
Average price per salida (pesos)	886*	(200, 4000)
Number of clients/wk	3.68	(0,8)
Work Locations		
Establishment	155	59.65%
The street	140	55.34%
Other (predominantly by calling)	80	31.62%
Any conflict with a sex partner in the last 6 months	92	36.36%
Alcohol use		
Sometimes/often	102	40.32%
Rarely/never	151	59.68%
Drug use (ever)	62	24.51%
Sexual health and HIV care		
Consistent condom use with all partners (n=250)	159	63.6%
Permanent contraceptive procedure	125	49.60%
Viral Load (n=249)		
Undetectable (<50 copies/cc)	119	47.79%
Detectable	130	52.21%
Current ARV use (n=252)	182	72.22%
Years since HIV diagnosis	5.97	4.7 (0,30)
Stigma and provider scales (n=253) **	Mean	Range
HIV related self-internalized stigma scale	2.42	(1, 4.00)
Sex work related self-internalized stigma scale	2.38	(1, 4.00)
Perception of provider scale	3.23	(1, 4.00)
* 870 pesos approximately equal \$20 **All scales were average ratings from 1 to 4. For the stigma scales, 1 is the lowest amount of stigma and 4 the highest. For the provider scale, a higher scale indicates better perception of provider.		

Table 3: Reproductive health and health service characteristics for FSWs living with HIV in the Dominican Republic (n=253).

Reproductive health and health service characteristics	n	% or SD (range)
Currently have children	236	93.28%
Number of children (n=236)	2.8	1.37 (1, 8)
Have ever been pregnant in lifetime	242	95.65%
Number of times pregnant (n=242)	4.5	2.26 (1,12)
At least one pregnancy loss (n=241)	158	65.56%
Have been pregnant since HIV diagnosis	91	35.97%
Number of times pregnant (n=91)	1.6	0.88 (1, 5)
At least one pregnancy loss since diagnosis (n=91)	33	27.67%
Desire to have more children (yes or maybe)	70	28.34%
Number of children desired (n=68)	1.6	0.87 (1, 5)
Currently/possibly pregnant	8	3.17%
Do not feel that if an HIV positive woman wants to get pregnant she should	142	56.13%
Knows that ARTs can reduce the risk of MTCT	192	75.89%
Feels health providers are supportive of pregnancy in women who are living with HIV	191	75.49%
Services and health care	N	Percent
Feel that a lack of access to treatment and HIV care is a serious problem for SW	185	75.20%
Have ever been afraid to seek health services due to HIV or sex work	112	44.44%
Worry that people will find out my HIV status if I attend the health clinic (n=252)	81	32.14%
When your doctor gives information about your treatment you come away feeling confused	73	31.88%
Feels that health providers might not keep information private	75	27.99%
Reproductive health access to care and services	N	Percent
Have ever spoken to a healthcare provider about pregnancy in HIV positive women (n=252)	146	57.94%
And have been pregnant since HIV diagnosis (n=146)	56	38.62%
And would like/might like another child (n=146)	36	24.66%
And who disagree that it is good to get pregnant if you are HIV+ (n=145)	83	56.35%
Have been pregnant since diagnosis without discussing pregnancy (91-56=35; 35/91= 38.46%)	35	38.36%
Would like (more) children and have not discussed pregnancy (70-36 = 34; 34/70= 48.57%)	34	48.57%
Did not use any method to prevent pregnancy in the last 6M (n=252)	45	17.86%
And do not want more children	27	60.00%

Table 4: Bivariate and multivariate logistic regression analysis for having spoken to a health provider about pregnancy among FSWs living with HIV in the DR who were of reproductive age during diagnosis (n=252).

Sociodemographics	OR	95% CI	AOR	95% CI
Age	1.0	0.97, 1.03	0.98	0.94, 1.01
Civil status (ref: has partner)	0.68	0.35, 1.33	0.85	0.41, 1.74
Education (ref: secondary/tertiary education)	1.59	0.94, 2.68	1.26	0.70, 2.27
Risk behaviors and HIV characteristics				
Alcohol use (last 30 days)	0.47**	0.28, 0.79	0.52*	0.30, 0.92
Drug use ever	0.30***	0.17, 0.55	0.38*	0.20, 0.75
Years since HIV diagnosis	1.07*	1.00, 1.13	1.07*	1.00, 1.13
Viral load (n=248)	0.61	0.37, 1.01		
Sexual and reproductive health characteristics	OR	CI		
Number of times pregnant	0.89	0.79, 1.01	0.92	0.80, 1.06
No contraception in the last 6 months	0.78	0.41, 1.47		
Have been pregnant since HIV diagnosis	1.26	0.75, 2.13		
If an woman with HIV wants to get pregnant she should try	0.87	0.51, 1.47		
Knows that ART during pregnancy can prevent MTCT	1.12	0.62, 2.01		
Desire more children	0.69	0.39, 1.21		
Stigma and support				
Perception of provider scale	1.97**	1.29, 3.02	1.58*	1.01, 2.48
HIV related self-internalized stigma scale	0.68	0.43, 1.07		
Sex work related self/ internalized stigma scale	0.94	0.64, 1.39		

* $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$

General discussion

The overall aim of this dissertation was to explore factors related to pregnancy and care among FSWs living with HIV in the Dominican Republic. Dealing with multiple levels of discrimination, this population is hard to reach, however is most at risk for a number of health concerns.^{1,2,3} Each manuscript in this dissertation highlighted particular associations of interest, but as discussed, should be viewed relative to influences on multiple levels as illustrated in the conceptual model (figure 1).

Manuscript one highlighted the importance of stigma in related to decision-making regarding pregnancy. Those that had a higher degree of internalized stigma related to HIV were more likely to want more children, suggesting the importance of counseling, care and communication for women who are at high risk for pregnancy complications and barriers to care. Also of concern, although not significant in the final model, were the bivariate associations between the desire for more children and having a detectable viral load and not currently being on ART. FSWs who felt badly about having HIV and those who were clinically worse off (viral load as well as not on treatment) were more likely to want children. While similar associations have been seen in some studies, others studies have contradicted those findings.⁴ Motherhood has been shown to play a protective role in some ways, building self-esteem, a sense of normalcy and purpose in life.⁵⁻⁸ FSWs living with HIV who are feeling mentally or physically less well may desire this sense of esteem or purpose and may be more likely to want children in their lives, however, specific associations can not be determined.

These studies show that the desire for more children were linked to more individual and interpersonal level factors, while those who have been pregnant since HIV

diagnosis focused more on health services level characteristics, namely perceptions of their health provider as well as and interruption in ART, along with risk behaviors. It is difficult to determine temporality, whether pregnancy came first or when the interruption in treatment or risk behaviors occurred. However, it is the case that those who have been pregnant since diagnosis are more likely to drink often or occasionally now, and have a much lower current perception of their health providers than the population sample who may or may not have been pregnant since diagnosis. Although it was not possible to parse out pregnancies that were planned as compared to those that were unplanned, there may be nuanced differences in those populations associated with having been pregnant since HIV diagnosis.

An overarching need, whether desiring to have more children or having been pregnant while living with HIV, is communication with a health provider about pregnancy among women living with HIV. It is concerning that only a little more than half of these women reported ever having a conversation with a provider about pregnancy. Whether women have had permanent contraceptive procedures, as half of the population has had, or even if they do not want any more children, addressing the issue of pregnancy among women living with HIV who are of reproductive age is crucial. This conversation can avoid unwanted pregnancies, which considering the structural barriers of strict abortion laws, community level influences of social norms can avoid unprepared mothers from giving birth, risky termination of pregnancy or further judgment or isolation from those who do not approve. If planned, this can provide patient specific information about the importance of ART through pregnancy and other prevention measure for MTCT, provider resources if needed for those who seek mental

support and guidance. Results from manuscript 3 highlight significant associations with having had a conversation about pregnancy among women living with HIV. As seen in manuscript 2, provider perceptions are significantly associated with the outcome, however it seems that those who have had a discussion have a better perception of their providers than those who have not had that conversation. This difference in perception of providers may suggest that negative experiences with pregnancy, incorporating labor and delivery experiences, may affect provider perceptions, while those who have had a conversation with a health provider about pregnancy have had a more positive experience with that conversation. Individual level risk behaviors are also associated with having had a provider conversation, which may involve a number of explanations, which are discussed in manuscript 3. However, again these associations highlight the need for care of those who are most at risk, even within the high-risk population of FSWs living with HIV.

The results strongly highlight HIV related characteristics as compared to sex work related characteristics when considering pregnancy. However, as discussed, many women may not disclose their sex work to their health providers and therefore feel less stigma or influence from their occupation than HIV, which is disclosed to health providers. Even though there does not seem to be strong evidence of influence on sex work related characteristics, the fact that these women may not be disclosing occupational health concerns with providers that place them at increased risk for violence, STIs among other concerns that relate to compromised health issues during both pregnancy and delivery and should not be overlooked.

There are number of limitations to the study that should be considered. Many limitations specific to each manuscript have already been highlighted, however general limitations should be discussed. This study was cross-sectional in nature and therefore only captures one moment in time, when, in reality perceptions, desires for children and other subjective measures can be dynamic. The questionnaire covered a number of topics and reproductive health was one of many sections in the survey. Future research should more specifically target reproductive health, paired with a qualitative portion in order understand experiences in a more contextual way, picking up nuances that were not possible in this study. The sample was one of convenience, therefore selection bias may have occurred. There may be elements of the sample that do not reflect the broader experiences of FSWs living with HIV. For example, many women were recruited out of health centers and NGOs that work with sex workers and/or HIV prevention. Women who are accessing health services and who are involved in sex work organizations may be more active in seeking care or more comfortable with their occupation. However, in areas where sex work is criminalized or where there is limited access to sex work organizations and HIV services, issues with reproductive health care and service provision in general may be even more severe. Recall bias may have occurred for questions that ask about health history. History also may have occurred, exposure to varied health programs, policies or services may have changed over time and exposure to varied influences were not measured. Temporality for each manuscript, particularly manuscript 2 may have also influenced the findings. Having been pregnant and living with HIV was based on recall and there was not measure of when they were pregnant or where these pregnancies or deliveries occurred. There have been vast changes in

treatment, knowledge and care over time in the DR and those who had pregnancies before the availability of ART or proper care may have experienced more negative experiences than those who had more recent pregnancies. Since the mean number of years that participants have been diagnosed is around 5 or 6 years, which was about the time of ART for prevention of MTCT, women may have had varied experiences. Related variables, such as civil status ask about current status and may have changed over time. Lastly, this questionnaire asked about sensitive and personal topics. There may have been response bias of the participants towards healthier behaviors.

General conclusions

Implications for future research

This research highlights the significant need for research for a population that is most at risk for many health concerns. Although it is a population that is difficult to reach, it is a population that is clearly having children, planning to have children and face barriers to proper care. Even on a descriptive level, it is clear that more research is needed on this population, and surprising that there is such a lack of existing research on pregnancy, or even reproductive health among FSWs living with HIV. Future research should incorporate qualitative interviews with FSWs living with HIV and their health providers to better understand temporality and contextual influences that were not captured in this cross-sectional quantitative assessment. In terms of patient-provider communication, an understanding of why this conversation is not occurring and when it is, who is initiating the conversation would be important. The information exchange would be interesting and important to note- whether providers are encouraging of pregnancies or what advice is given to the patient. This could also be assessed using a

mixed methods longitudinal analysis, assessing women from pregnancy through deliver and post-partum, measuring mental and physical health outcomes, risk behaviors, stigma, provider conversation among other outcomes. This approach would allow for an assessment of health providers experience as well as experiences in the maternity ward during labor and delivery. Further, disclosure and conversations surrounding sex work and pregnancy would be interesting to assess. Since HIV is typically disclosed to a health provider and due to the fact that HIV is of prime importance with regard to MTCT risk, it may be considered of more importance than sex work related issues, even if sex work is disclosed. Sex work related health concerns are of increased concern, particularly relating to pregnancy in combination with HIV related issues.

While not the focus of this study, descriptive characteristics highlight a number of other areas for further research. More specifically with regard to contraception and sterilization. About half the sample reported a permanent contraceptive procedure, with most still in their reproductive years. While sterilization is typically high in the general population of the DR, there has been controversy surrounding forced sterilization or sterilization without consent, particularly for women living with HIV.⁹⁻¹¹ Since a number of women in this study reported wanting more children, and also reported having a permanent contraceptive procedure, this warrants further attention to be sure that when sterilization procedures are conducted, they are done safely and with proper consent. Another extremely important area to explore further is mental health. While this study did assess internalized stigma, it did not explore mental health outcomes which have been found to play a significant role in the lives of women living with HIV, particularly in relation to all stages of pregnancy- including delivery and post-partum.¹²

Policy implications

The aim of this study is to contribute to a better understanding of the needs of a population with regard to attention and tailored care, both in research and in practice. There are several implications for service provision and care for FSWs living with HIV and pregnancy. Health service provision is associated with both having had a pregnancy conversation with a provider as well as having been pregnant after HIV diagnosis. The role of the health provider, particularly with a population at such great need is crucial. Care and communication with a provider that is non-judgmental, courteous and empathetic to the lives of FSWs as well as women living with HIV can have significant impacts on decision-making and experiences concerning pregnancy. Further, ensuring that conversations surrounding pregnancy among women with HIV is essential for MTCT, and maternal child health, whether for contraception or for planned pregnancies. FSWs in this study who do want children are more likely to have negative self-stigma, which may be related to mental health concerns. Those that have been pregnant and those who are less likely to have spoken to a provider about pregnancy also show associations with substance use. Comprehensive and tailored care in health services provision, specifically relating to pregnancy by incorporating clinical assessments of mental health, substance use, acknowledgement of barriers to treatment adherence relating to pregnancy among other health concerns that FSWs and women living with HIV face is crucial for providing proper care. Communication with health providers who are compassionate and show non-judgmental attitudes towards patients can provide the opportunity for patients to disclose risk behaviors and get the resources that they may

need. This level of comprehensive care will not only protect the health and lives of women who need it most, but their children and families as well.

References

1. King EJ, Maman S, Bowling JM, Moracco KE, Dudina V. The influence of stigma and discrimination on female sex workers' access to HIV services in st. petersburg, russia. *AIDS Behav.* 2013;17(8):2597-2603.
2. Donastorg Y, Barrington C, Perez M, Kerrigan D. Abriendo puertas: Baseline findings from an integrated intervention to promote prevention, treatment and care among FSW living with HIV in the dominican republic. *PLoS One.* 2014;9(2):e88157.
3. Kerrigan D, Wirtz A, Baral S, et al. *The global HIV epidemics among sex workers.* World Bank Publications; 2012.
4. Nattabi B, Li J, Thompson SC, Orach CG, Earnest J. A systematic review of factors influencing fertility desires and intentions among people living with HIV/AIDS: Implications for policy and service delivery. *AIDS Behav.* 2009;13(5):949-968.
5. Kennedy VL, Serghides L, Raboud JM, et al. The importance of motherhood in HIV-positive women of reproductive age in ontario, canada. *AIDS Care.* 2014;26(6):777-784.
6. Cooper D, Harries J, Myer L, Orner P, Bracken H, Zweigenthal V. "Life is still going on": Reproductive intentions among HIV-positive women and men in south africa. *Soc Sci Med.* 2007;65(2):274-283.
7. Smith DJ, Mbakwem BC. Life projects and therapeutic itineraries: Marriage, fertility, and antiretroviral therapy in nigeria. *AIDS.* 2007;21 Suppl 5:S37-41.
8. Kanniappan S, Jeyapaul MJ, Kalyanwala S. Desire for motherhood: Exploring HIV-positive women's desires, intentions and decision-making in attaining motherhood. *AIDS Care.* 2008;20(6):625-630.

9. Maccarthy S, Rasanathan JJ, Crawford-Roberts A, Dourado I, Gruskin S. Contemplating abortion: HIV-positive women's decision to terminate pregnancy. *Cult Health Sex.* 2014;16(2):190-201.
10. Loaiza E. Sterilization regret in the dominican republic: Looking for quality-of-care issues. *Stud Fam Plann.* 1995;26(1):39-48.
11. Human Rights Watch (HRW). A test of inequity: Discrimination against women living with HIV in the dominican republic. . *Human Rights Watch.* 2004;16(4(B)):May 10, 2014.
12. Kapetanovic S, Dass-Brailsford P, Nora D, Talisman N. Mental health of HIV-seropositive women during pregnancy and postpartum period: A comprehensive literature review. *AIDS and behavior.* 2014;18(6):1152-1173.

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Education

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 Department of Health, Behavior and Society, Baltimore, MD
 PhD in Public Health

May 2006 Brown University
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 Master in Public Health

May 2000 University of Delaware
 Newark, DE
 Bachelor of Arts Biology and fine art (painting)
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Certifications

2010 – 2013 Health Finance and Management, JHSPH
 2008 HIV testing and counseling, Cicatelli Associates, NYS Department of Health

Employment History

Independent Consultant for Public Health Research 10/06 to 7/11
 Warren Alpert Medical School of Brown University; Lifespan/Tufts/Brown, Center for AIDS
 Research; Lutheran Medical Center
 Responsibilities and time commitments varied. Responsibilities included data management,
 qualitative, quantitative and mixed methods analysis and report writing on various health topics.

Director of Special Projects, Coordinator for Public Health Research 2/07 to 7/09
 Lutheran Medical Center, Department of Dental Medicine, Brooklyn, NY
 Responsibilities included co-writing and coordinating federal and local grants, budget development,
 research study coordination, development and implementation of rapid oral HIV testing into dental
 clinics, health worker training in HIV counseling and testing, resident research paper review, survey
 development, outcomes assessment and residency program development.

Research Assistant 12/04 to 5/06
 Brown University Medical School, Providence, RI
 Assisted the Associate Dean of Medicine in representing Brown University in disaster related
 activities for RI, including the development and implementation of a medical emergency distribution
 system for Brown University campus. Authored an assessment report and presented outcomes
 assessment to local and statewide authorities.

Clinical Assistant in Obstetrics and Gynecology 10/01 to 6/03
 North County Ob-gyn at Scripps Hospital, La Jolla, CA
 Assisted physicians in an obstetrics and gynecology practice with daily patient care. Responsible for
 counseling women on sexual health issues, taking vital signs, phlebotomy, ICD-9 coding, and minor
 surgery assistance.

Sessions Assistant 8/00 to 6/01
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Worked with a medical/ research team and with stage IV gastrointestinal oncology patients enrolled in clinical trials.

Publications and manuscripts

- Babalola S., John A.N., & **Cernigliaro D.** (2014). Perceptions about survivors of sexual violence in eastern DRC: conflicting descriptive and community-prescribed norms. *Journal of Community Psychology*. Accepted.
- Mead E., **Cernigliaro D.**, Lilleston P., Sherman SG. Addressing Safer Sex in Pornography: Need for a Socioecological Perspective. *Sexually Transmitted Diseases*. *In review*.
- Cernigliaro D.**, John A.N. & Babalola S. Understanding community perceptions about current legal processes for perpetrators of sexual violence in eastern DRC: a mixed methods study. *Social Science and Medicine*. *Submitted*.
- Babalola, S., John A. N., & **Cernigliaro D.** (2011) Community perspectives on sexual and gender-based violence in Eastern DRC. *Report prepared for the International Medical Corps*. Baltimore, MD: Center for Communication Programs.
- Cernigliaro D.**, Doyle-Moss N, Wetle T. (2009) Handbook for the Development of a Point of Distribution System/Medical Emergency Distribution System for College and University Campuses. Department of Health, Providence, RI.
- Cernigliaro D.**, Harrison A. (2006) Antecedent factors in relation to HIV/AIDS and risk taking behaviors: A study of very young adolescents in rural South Africa. Master's thesis, Brown University, Providence, Rhode Island.

Teaching experience

- 2011 Teaching assistant: Implementation and Sustainability of Community-Based Health Programs, JHSPH
- 2012 Teaching assistant: Integrating Social Behavioral Theory into Public Health, JHSPH
- 2008 Instructor: HIV epidemiology, testing and counseling, Lutheran Medical Center
- 2007 Instructor: Public Health Research Methodology, Lutheran Medical Center
- 2006 Instructor: Qualitative Methodology, Nvivo 2.0 and 7.0 Workshop, Brown University
- 2000 Teaching Assistant, Biology, University of Delaware

Grant writing and activities

- 2008-2009 Co-writer and coordinator for Samuel D. Harris Grant for Children's Dental Health. Funds received by Lutheran Medical Center (LMC), funded by American Dental Association Foundation.
- 2008-2009 Evaluation coordinator for SPNS awarded grant to increase access to oral health care for HIV positive individuals in the USVI. Funds received by LMC, funded by Health Resources and Services Administration (HRSA).
- 2007-2009 Co-writer and coordinator for grant awarded Residency Training in Primary Care Medicine and Dentistry grant, for Pediatric Dentistry and Interdisciplinary Training in Medicine and Dentistry. Funds received by LMC, funded by HRSA.
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- 2005-2006 Co-writer for a medical and public health student clerkship to provide learning and service assistance to people in the Katrina disaster affected area, funded by Brown University.

Oral and Poster Research Presentations

- 2013 **Cernigliaro D.**, John N., Babalola S. (2013) Role of law enforcement in community preferences for addressing incidents of sexual violence against women in the eastern Democratic Republic of Congo (DRC). American Public Health Association. Oral presentation.

- 2013 **Cernigliaro D.**, Mead E., Lilleston P., Sherman SG. (2013) Protecting the health of adult film performers: Industry perspectives on the “Safer sex in the adult film industry act” (Measure B). American Public Health Association. Poster presentation.
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- 2008 **Cernigliaro D.** HIV Epidemiology, Counseling and Rapid Oral HIV Testing. LMC Development Conference, Las Vegas, NV
- 2006 **Cernigliaro D.**, Harrison A. (2006) HIV risk and Very Young Adolescents in KwaZulu/Natal, South Africa. Research Symposium, Brown University, Providence RI. Poster presentation.
- 2005 Monroe-Wise A., **Cernigliaro D.**, Harrison A. *Social instability and violence in relation to the risk-taking behaviors of young adolescents in rural KwaZulu/Natal, South Africa*. American Public Health Association. Oral presentation.
- 2005 Statewide presentation of MEDS research evaluation to the Rhode Island Department of Health.

Awards, Contributions and Recognition

- 2013 Distinguished doctoral award, JHSPH.
- 2013 Contributing author, Footnote¹ online media outlet.
- 2012 Research to Prevention doctoral student publications award, USAID.
- 2012 Special project award, Johns Hopkins Bloomberg School of Public Health.
- 2012 Award for outstanding service, HRSA Special Projects of National Significance, LMC.
- 2008 TV interview (NY1) on implementing HIV rapid oral testing into dental clinics.
- 2007-2009 Selected judge for the annual hospital medical and dental resident research competition, LMC.
- 2005 Presenting author for Outstanding Student Papers in Maternal and Child Health, American Public Health Association.
- 2005 Population Studies and Training Center assistantship, Brown University.
- 2005 Letter of recognition for outstanding student effort received by Ruth Simmons, President of Brown University.
- 2005 Awarded two research assistantships with the Associate Dean of Medicine of the Warren Alpert Medical School of Brown University.

Memberships and representations

- 2004-2007, 2013-2014 Member, American Public Health Association
- 2013-2014 Member, Center for AIDS Research, JHPSH
- 2009- 2010 Co-chair, Health, Behavior and Society Student Organization, JHSPH
- 2009-2011 Student representative, Department Life Committee, JHSPH
- 2006- 2010 Alumni Council member, Brown University, Program in Public Health
- 2007-2009 Clinical Research and Grant Committee member, LMC
- 2008 Advisory council representative for dental residency admissions, LMC.
- 2007-2008 Institutional Review Board member, LMC
- 2005-2006 Curriculum committee student representative, Brown Medical School.