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ORIGINAL PAPER

Factors Related to Pregnancy Among Female Sex Workers Living with HIV in the Dominican Republic

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Abstract Female sex workers (FSWs) living with HIV are a vulnerable population for multiple health concerns and have been vastly understudied 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 had been pregnant since HIV diagnosis. Multivariate analysis revealed significant associations between pregnancy after HIV diagnosis and 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), older age (AOR 0.91; 95 % CI 0.87, 0.95) and a more negative perception of their health provider (AOR 0.56; 95 % CI 0.34, 0.93). Results indicate noteworthy associations between having been pregnant and the health provider experience and ART interruption, indicating a significant need for further research on this population to ensure both maternal and child health.

Keywords Sex work · HIV · Pregnancy · Dominican Republic

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Introduction

The discovery of antiretroviral treatment (ART) changed the face of the HIV epidemic, extending the length and quality of life for people living with HIV and preventing mother-to-child transmission (MTCT) of HIV during pregnancy and delivery [1–4]. For women of reproductive age living with HIV, ART allows for both 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 [5, 6]. Currently, many women globally living with HIV desire to have (more) children [7–11] 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 [9, 12–15].

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 [16]. On the social level, pregnancy has been associated with partner and family influence, religiosity [15–19] and cultural and traditional factors [15, 19–21]. 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 [11, 18, 24, 25]. Additionally, for both individual and social reasons, the desire for motherhood has been found to be a strong driver for pregnancy, particularly for marginalized populations where pregnancy is potentially a particularly salient way to feel valued in society [22, 23].

Understanding more about pregnancy among women living with HIV is critical, because even on ART, 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 [26, 27], poor maternal mental health and sub-optimal adherence to ART [28]. Further, pregnant women living with HIV, particularly of a lower socioeconomic position, face challenges to care- reporting discrimination or even refusal of service in maternity wards, health centers and obstetric services in many different settings [14, 29–34].

Pregnancy Among Female Sex Workers

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 [35–41], which may also place them at greater risk for unintended pregnancy and complications associated with reproductive health, pregnancy and childbearing [42, 43]. While there is a lack of research on pregnancy experiences of FSWs, prevalence estimates in different settings indicate many FSWs have been pregnant and have children [36, 44, 45]. 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 exit [36, 46–49] as well sexual risk taking during sex work, mainly due to financial pressures of raising children [45, 50]. Studies have also found that FSWs who are pregnant or parenting face barriers to social and health services [51], and may continue to engage in sex work throughout pregnancy [52], increasing risk for maternal-child health and need for access to non-discriminatory health services. In addition, FSWs face substantial challenges to care and treatment, including non-judgmental access to health services [53–56].

Pregnancy Among Female Sex Workers 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 % [57]. 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 HIV status and occupational risks [35, 36, 41, 58–60]. FSWs living with HIV have been shown to have an increased likelihood of experiencing discrimination in health care settings, reporting 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 [59]. FSWs living with HIV have also described being humiliated and demeaned by health workers while seeking health services [58]. In addition, a study found that FSWs living with HIV in Russia faced higher levels of stigma and barriers to care as compared to women living with HIV who were not FSWs [59].

Research on pregnancy and maternal health for FSWs living with HIV is almost non-existent, yet given the barriers to care and multiple stigmatized identities outlined above it is important to understand more about the reproductive health of this population. 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

As of 2010 the population of the DR was about 9.4 million people [61]. Family and childbearing is a central part of the culture, providing a sense of stability and support, particularly in low-income populations [62–65]. Sex work, defined as the exchange of sex for money, among those over 18 years of age is not explicitly criminalized and in some areas organizations exist to support, educate and empower FSWs. The number of sex workers is estimated to be around 100,000 [46] and the estimated prevalence of HIV among sex workers in the DR is 2.86 % [66]. This study was conducted in Santo Domingo, the capital city with a population of about 2.3 million [61].

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 described [41]. The aim of the study was to assess the feasibility and initial effects of a multi-level integrated intervention to promote HIV/STI protective behaviors and foster adherence care and treatment among FSWs living with HIV over a 10-month period.

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 participants. Enrollment occurred from November 2012 to February 2013, resulting in a sample 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 including the HVRU at the Instituto Dermatalogico y Cirugia de Piel Dr. Humberto Bogart Diaz and the nongovernmental organizations Movimiento de Mujeres Unidas (MODEMU) and the Centro de Orientacion e Investigacion Integral (COIN). Participants provided oral consent to participate in the study. Trained interviewers recorded participant consent responses and signed for the participants. Participants were compensated 10 USD for completion of the survey. The study was approved by the Johns Hopkins Bloomberg School of Public Health, University of North Carolina 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 and included those who were currently pregnant (n = 5).

Independent Variables

Independent variables were chosen through consultation with 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. [67] and Zelaya et al. [68, 69] with guidance from Earnshaw's HIV Stigma Framework [70]. Stigma scales included questions such as, "You feel ashamed of having HIV" and "People's attitudes about HIV make you feel worse about yourself" for HIV related questions and similar questions were used in sex work-related stigma scales. 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 in the scales (Table 1). Coding was reversed for certain questions to ensure standardization of directionality. The provider satisfaction scale, adapted from the validated Patients Reactions Assessment scale [71] differed in that a higher score meant a greater satisfaction with their providers. The provider satisfaction scale asked participants about satisfaction with their primary health provider- specifically the health provider that provides most care for the participant. Data reduction occurred through principal components analysis. Once items were chosen for removal, reliability tests were conducted in order to measure internal consistency of the final scale using the Cronbach's alpha statistic (Table 1). When scales were finalized, the items included were averaged across participant to create each final variable, ranging from 1 to 4.

The primary scale used for this paper is the provider satisfaction scale. The provider scale asked about their primary general health care provider. Table 2 highlights the questions included in the final scale.

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

Table 1 Stigma and provider scale characteristics

Scale name	Number of final items/original number items	Cronbach alpha score	Without weighting n (mean)	With weighting n (mean)
HIV related internalized stigma	7/8	0.8819	266 (2.40)	268 (2.40)
Sex work related internalized stigma	12/15	0.9089	256 (3.12)	268 (2.38)
Provider satisfaction	8/10	0.9550	240 (3.33)	268 (3.24)

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 doctor's questions about your care
4	You trust your doctor's 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

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 important 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 resided 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 USD) per *salida*, or sex work date, seeing an average of 4 clients per week (range: 0 to 25 clients). Most participants reported 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, including phone and through internet contact. About a third of the participants (n = 94) responded that they had a conflict with a partner in the past 6 months. Slightly more than half 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 trichtomiosis) 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 an ART interruption.

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

Socio-demographic characteristics	N	Percent	Mean (SD)	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	21	7.84		
Other	42	15.67		
Education (ever)	262	97.76		
Primary	167	64.55		
Secondary	81	30.00		
Tertiary	14	5.20		
Current residence				
Santo Domingo	210	78.40		
Other area	58	21.60		

Stigma and Provider Scales

Internalized stigma and provider scales are also highlighted in Table 4. Among participants, the average score was 2.42/4.0 (SD: 0.54; range: 1 to 4) for the HIV-related internalized stigma scale, 2.38/4.0 (SD: 0.64; range: 1 to 4) for the sex work related internalized stigma scale (1 = least amount of stigma and 4 = highest amount of stigma) and 3.32/4.0 (SD: 0.61; range: 1 to 4) on the provider perception scale, with 1 being most negative and 4 the most positive provider perception.

Pregnancy and Childbearing

Fertility and childbearing characteristics are explored in Table 5. Almost all of the participants had been pregnant (95.90 %) averaging 4 or 5 lifetime pregnancies (SD: 2.2; range: 1 to 12). The mean number of times pregnancy resulted in a live birth was 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 %) currently had children, reporting an average of 3 children (SD: 1.4; range: 1 to 8) among participants. Pregnancy after HIV diagnosis was reported in 34.3 % of the population, with 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 an average desire of between one and two more children (range: 1 to 5; SD: 0.86). About 3 % (n = 8) of participants reported being pregnant or possibly pregnant at the time of the study. 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." and for those who disagreed with the statement (n = 153) about 30 % had been pregnant since HIV diagnosis. About 52 % of participants feels that their partner would be ok or supportive if they got pregnant, and among those approximately 63 % reported having disclosed their HIV status to a partner.

Factors Related to Having Been Pregnant Since HIV 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; 95 % CI: 0.93, 0.99), ever an ART interruption (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). 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 correct knowledge that ART reduced MTCT (OR: 1.83; 95 % CI: 0.97, 3.44).

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

	N	Percent	Mean (SD)	Range
Sex work characteristics				
Age first engaged in sex work			21 (7.9)	10, 56
Avg price per date (pesos)			870 (528.7)[a]	200, 4000
Number of clients/wk			4.1 (3.7)	0, 25
Work locations				
Establishment	152	56.67		
The street	150	55.97		
Other	84	31.34		
Any conflict with a partner in the last 6 months	94	35.07		
Alcohol use (last 30 days)				
Never/Rarely	165	61.57		
Sometimes/often	103	38.43		
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	48.10		
Detectable	137	51.89		
Current ARV use (n = 267)	194	72.66		
Ever a break in ARV treatment	76	28.57		
Stigma and provider scales				
HIV related internalized stigma scale			2.42 (0.54)	1, 4
Sex work related internalized stigma scale			2.38 (0.64)	1, 4
Perception of provider scale			3.32 (0.61)	1, 4

[a] 870 Dominican pesos approximately equal 20 USD

Multivariate logistic regression results are highlighted in Table 7 and revealed that older age (AOR: 0.91; 95 % CI: 0.87, 0.95), living with HIV longer (AOR: 1.13; 95 % CI: 1.05, 1.20), any ART interruption (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) adjusting for education, civil status and education, had significant associations at the $p \leq 0.05$ level, with having been pregnant since HIV diagnosis.

Discussion

This study aimed to understand factors related to pregnancy among FSWs living with HIV, a population vastly understudied, particularly with regard to reproductive health. In addition to the high number of participants that have children, have been pregnant and have experienced pregnancy loss, key associations were found with having been pregnant since HIV diagnosis. Health provider perception, social barriers to service provision and ART interruption associations are of particular interest and importance in relation to FSWs living with HIV and pregnancy.

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

Fertility and childbearing characteristics	N	Percent	Mean (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[a]	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		
Feels partner would be supportive/ok about pregnancy	140	52.24		
And reported HIV disclosure to a main partner (n = 140)	88	62.86		

[a] Reason not specified

Participants who reported a more negative perception of their primary health provider were more likely to have been pregnant since HIV diagnosis. Experiences with discrimination, stigma and poor treatment from health providers among pregnant women living with HIV has been described in many settings [29–34], and female sex workers who are pregnant have also described barriers to social and health services [51]. More research is needed into the health care and experiences of FSWs living with HIV and pregnancy to understand these associations more completely, with a particular focus on health care service provision and patient-provider experience.

The significant association between participants who reported an interruption in ART and having been pregnant after HIV diagnosis is also of concern. It is not known if ART was interrupted during or after pregnancy, however in prior studies associations with ART interruption have been found to be associated with physical, economic and emotional stress, alcohol or drug use and depression among women living with HIV [28]. For FSWs living with HIV, who have increased risk for ART interruption, mental health issues, barriers to care and adverse pregnancy outcomes as compared to the general population [35, 36, 41] this is of particular importance to address in order to ensure both maternal and child health.

At a time when pregnancy can be safe and healthy for women living with HIV, the fact that a majority of these women do not feel that it is good to try to get pregnant if you are living with HIV is also noteworthy. 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. Issues of stigma and discrimination as barriers to care have been found among people living with HIV as well as FSWs. While HIV status cannot be concealed to HIV care providers, FSWs may not disclose their work due to fear of stigma and judgment [53–55], creating a barrier to health education and appropriate and tailored clinical care. Future studies are needed to further explore the associations with communication between patients and providers to understand potential barriers to health services, particularly in relation to pregnancy.

While stigma has been shown to play a large role among women living with HIV who desire pregnancy and become pregnant in prior studies [9, 29–34], neither the HIV or sex work stigma scale was significant in this study. This lack of association could be due to a number of reasons, including temporality. Almost all pregnancies in this population occurred at some time prior to the study, therefore stigma related to pregnancy may have reduced upon recall, particularly if pregnancies occurred long before the study. In addition, among women living with HIV, having children can foster feelings of self-esteem and confidence [11] therefore participants may have gained a sense of pride and self-esteem after birth. This effect may be even more salient in a culture that places high importance on fertility and childbearing [9, 12–14]. Lastly, many participants were exposed to FSW rights organizations and children and pregnancies were common, therefore having children may be more normalized among this population of FSWs living

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 % CI	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)[a]	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)[b]	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

[a] Category of those never been on ART is not shown

[b] Categories of "neither agree or disagree" and "Don't know" 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 % CI	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
ART interruption (ever)[a]	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

[a] Compared to no break in ART, category of never on ART not shown

with HIV. However, future studies are needed to better understand the influence of stigma specifically for this population, particularly in areas where sex work is criminalized.

Distinct from prior studies [9], number of current children was not significantly associated with having been pregnant since HIV diagnosis; however we did 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. Consistent with prior research, 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.

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. However living with HIV and actively selling sex place these women at increased risk for pregnancy related health concerns as studies have shown with both FSWs and women living with HIV independently [26–28, 42, 43]. In addition to the high number of pregnancies, the high level of pregnancy loss (which may be due to a number of reasons), particularly in a country with very strict abortion laws, is of concern. While the sterilization levels are high among participants, it is also high among married women in the general population at 40.9 % [72].

Limitations

There are a number of limitations to this study that should be considered. First, the analysis conducted was cross-sectional in nature, 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. Scale weighting may have affected the sex work internalized stigma association, however analysis was run with and without weighting to check the integrity of the measure. Stigma scales were specific to participants, and therefore cannot be compared to broader populations. 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.

Conclusions

As this study shows, pregnancy and child bearing are a prevalent part of the lives of FSWs living with HIV in this setting and yet studies on this population are lacking globally. The role of service provision and experiences with health providers throughout pregnancy is particularly noteworthy and warrants further research. Future studies among FSW living with HIV should further examine care seeking experienced during pregnancy and ART adherence during and after pregnancy. Interventions should focus on health provider sensitization and tailored communication and care related to pregnancy decision-making for FSW living with HIV.

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