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ORIGINAL PAPER

Severe Food Insecurity, Gender-Based Violence, Homelessness, and HIV Risk among Street-based Female Sex Workers in Baltimore, Maryland

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Abstract
Despite established links between food insecurity and HIV outcomes, no studies have examined the role of food insecurity among female sex workers (FSW) in the United States (US). The aim of this exploratory study was to identify correlates (structural vulnerability and health factors) of severe food insecurity among street-based FSW in Baltimore, Maryland using multivariable logistic regression. In adjusted models, FSW with severe food insecurity were at greater odds of recent homelessness, physical intimate partner violence, client condom refusal, and HIV infection. Multi-sectoral approaches must take into consideration the co-occurrence of structural and health vulnerabilities to food insecurity among FSW in the US, including those that address violence, housing, and HIV.

Keywords Food insecurity · Female sex workers · Homelessness · Gender-based violence · HIV

Introduction

Food insecurity refers to the uncertainty or inability to acquire an adequate quantity of food due to insufficient money or other resources [1]. Despite being a resource-rich country, food insecurity in the United States (US) is a significant human right and public health issue, especially among socioeconomically marginalized populations. The US Department of Agriculture estimates that during 2017, 12% of US households experienced food insecurity and 5% experienced severe food insecurity [1]. Vulnerable groups that experience elevated social and economic hardship are at greater risk for food insecurity than the general population. Among people who inject drugs in two urban cities in California, 58% reported food insecurity and 41% reported severe food insecurity [2]. Among persons living with HIV in San Francisco, 80% reported food insecurity in the past 90 days [3]. Disadvantaged women also face unique challenges in accessing food; in 2017, 30% of US households with children headed by a single woman reported food insecurity, compared to 20% among households headed by a single man [1]. Similarly, it has been shown that female sex workers (FSW) who are in violent relationships often face restrictions in acquiring food due to unequal power dynamics, leading to elevated levels of food insecurity [4].

Food insecurity has severe and long-lasting consequences on health, including on sexual health outcomes such as HIV [5]. Food insecurity is one of many reasons why individuals may engage in survival sex, which in turn can increase exposure to sexual risk [6]; those engaging in survival sex, as well as other FSWs who are food insecure, may experience constraints to their agency in effectively negotiating condom use, leading them to agree to sex without a condom for higher pay [7]. There are other biological and behavioral links specifically between food insecurity and HIV. Food insecurity can contribute to antiretroviral nonadherence [8], which likely stems from fears of and experiences in worsening side effects and exacerbation of hunger when receiving combined antiretroviral treatment (cART) on an empty stomach [9]. Food insecurity and malnutrition can also accelerate

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HIV disease progression by compromising immunity and interfering with the absorption of medications [10, 11].

In addition to its association with sexual risk behaviors and HIV outcomes, food insecurity also has an established link with intimate partner violence in both low- and high-income settings [12–14]. The directionality and the mechanisms that link food insecurity with intimate partner violence have not been firmly established; qualitative data from Uganda revealed that food insecure women often remain in violent relationships due to their reliance on the abuser for access to food [12]. In the US context, it has also been hypothesized that intimate partner violence could result in food insecurity because violence is often inclusive of economic abuse that constrains women's access to food [14]. The association may also be occurring because when women escape their abuser, they are often in financially precarious situations and are unable to afford food [14].

Food insecurity often co-occurs with other structural and psychosocial factors such as depression, homelessness, and substance use [2, 4, 14]. Yet, studies conducted among diverse populations have demonstrated that food insecurity is independently associated with violence victimization (e.g., intimate partner violence), sexual risk (e.g., client condom refusal) and sexual health outcomes (e.g., incomplete HIV suppression) even after controlling for these co-occurring factors [8, 14–16]. Thus, while food insecurity often cannot be viewed in isolation from these other factors, food insecurity merits independent examination in its own right as a determinant of adverse health.

The literature on food insecurity among marginalized populations is small but growing, including among FSW [17]. However, the majority of the data on food insecurity among FSW originate from a longitudinal cohort of women in an urban Canadian city [4]. To our knowledge, no studies in the US have examined the role of food insecurity among this multiply disadvantaged population who is at high risk for HIV. In Baltimore, there is a strong overlap in the street-based FSW population with the homeless and injecting drug user populations, providing a distinct setting in which to explore food insecurity and its intersection with other vulnerabilities and risk factors in these women's lives. Previous scholarly work demonstrated that women in the sex industry in Baltimore (i.e., female exotic dancers) experience inter-related structural vulnerabilities related to housing, financial insecurity, education, and criminal justice involvement but did not consider food insecurity [15]. Extending this work on the complex web of structural vulnerabilities, the aim of the current exploratory study was to identify correlates of severe food insecurity among street-based FSW in Baltimore, Maryland, US.

Methods

The Sex workers And Police Promoting Health In Risky Environments (SAPPHIRE) study is an ongoing prospective cohort study of FSW recruited using targeted sampling between April 2016 and January 2017 from street-based location across Baltimore, Maryland. A detailed description of the recruitment methods and study procedures are published elsewhere [18, 19]. Eligibility criteria for the SAPPHIRE cohort are as follows: age ≥ 15 years; ever sold or traded oral, vaginal or anal sex "for money or things like food, drugs, or favors;" picked up clients on the street or at public places ≥ 3 times in the past 3 months; and willing to undergo HIV and sexually transmitted infections (STI) testing. Exclusion criteria was identifying as a man. Eligible participants who provided informed written consent participated in a 50-min computer assisted personal interview with a trained interviewer. Participants were also tested for HIV using an OraQuick© Advanced Rapid HIV-1/2 test kit (Orasure Technologies, Bethlehem, PA, USA). Results were given at the end of the interview, along with the opportunity to receive referrals to a range of local health and social service organizations (e.g., case management, counseling, and drug treatment programs). In addition, biological specimens were collected for STI testing using self-administered vaginal swabs, which were sent for gonorrhea (GC), chlamydia (CT), and trichomonas (TC) laboratory testing. Baltimore City Health Department clinic specialists received positive STI results for follow-up. Participants were compensated with $70 for their participation. The study was approved by the [Johns Hopkins Bloomberg School of Public Health] Institutional Review Board.

Measures

Severe food insecurity was assessed with the following question: "In the past three months, how often did you go to sleep at night hungry because there was not enough food?" Response options were on a seven-point scale (never, once a month, a few times a month, at least once a week, 2–4 day/s a week, 5–7 days a week, and every day); the variable was dichotomized to >4 days/week versus ≤ 4 days/week so that the severe food insecurity category captured individuals who were hungry for the majority of the week. Correlates of food insecurity were selected based on a literature review [2, 4, 5, 8, 16, 20] and included six broad categories: structural vulnerability, sex work characteristics, violence victimization, mental health, HIV/STI infection, and substance use.

Structural vulnerability measures included recent homelessness (past 3 months), limited education (defined

as not completing high school), lifetime arrest, lifetime incarceration > 2 days, and receipt of any public benefit (e.g., food stamps, welfare). Sex work characteristics included total length of time in sex work (> 5 years vs. less) and current frequency of sex work (daily vs. less frequent).

Childhood (< 18 years old) abuse was defined as ever being pressured or forced into sexual intercourse or sexual touching (sexual), or being hit, punched, slapped, or otherwise physically hurt by someone causing marks or physical injury (physical). Adulthood violence items (two sets of items assessing physical and sexual intimate partner violence and a separate set of items assessing physical and sexual client violence) were derived from the Revised Conflict Tactics Scale [21] and was defined as either: (1) as being hit, punched, slapped, or otherwise physically hurt, or being threatened or hurt with a weapon (physical); or (2) as being involuntarily pressured or forced into sexual intercourse (sexual). Adulthood violence items assessed for victimization in the past 3 months. Reproductive coercion by clients and regular sexual partners (separate items) was measured by condom refusal in the past 3 months by asking whether a paying client or regular sexual partner refused to use a condom when the FSW wanted to use one.

PTSD symptoms were measured using the PTSD Checklist for Diagnostic and Statistical Manual of Mental Disorders-Fifth Edition (PCL-5), a 20-item self-reported screening scale that asks about symptoms in the past month, with responses for each symptom coded using a 5-point Likert scale (not at all, a little bit, moderately, quite a bit, extremely) [22]. Binary variables indicating reporting of DSM-5 clusters B-E were constructed. "Provisional PTSD symptoms" (yes/no) variable was defined as meeting all four clusters. Depression symptoms were measured using the widely used Revised Center for Epidemiologic Studies Depression 10-item scale (CESD-10) [23]. Symptoms were assessed on a 4-point Likert scale (rarely/none of the time, some/a little of the time, occasionally/moderate amount of the time, most/all of the time). Total CESD-10 scores indicating "depression symptom severity" was calculated with scores ≥ 15 indicating moderate to severe symptoms.

Alcohol use was captured using the 3-item alcohol use disorders identification test (AUDITC) [24]. Binge drinking was defined as having "four or more drinks on one occasion in the past year" on a daily/almost daily basis. All other substance use items measured past 3 month-use and included any injection drug use, prescription opioid pills (e.g., heroin, Percocet, Morphine, OxyContin, Codeine, Fentanyl, but not over the counter pills), benzodiazepines (e.g., benzos, Xanax, klonopin, Ativan, valium), crack cocaine, and powder cocaine.

Statistical Analyses

The analytic sample was restricted to women who were assigned as female at birth (n = 249). Bivariate differences between FSW experiencing severe food insecurity vs. no/moderate food insecurity were calculated using Pearson's Chi square tests. Covariates significant $p < 0.10$ at the bivariate level were considered for inclusion in multivariable logistic regression models with variance clustered for zone of recruitment. Backwards stepwise selection was used with covariates at $p > 0.10$ removed in selecting the final model. Statistical significance was set at $p < 0.05$ for final multivariable results. Multicollinearity was assessed by calculating Variance Inflation Factors (VIF); none of the VIF exceed a value of 4 and all covariates were considered for the final multivariable model. All analyses were conducted in Stata/SE 13.1.

Results

The mean age of the sample was 35.7 years old and the majority of women identified as being non-Hispanic White (66%). Severe food insecurity was prevalent with over 26% of the women reporting going to sleep hungry at night most days of the week because there was not enough food. In addition to severe food insecurity, results showed high prevalence of other vulnerabilities (see Table 1); the majority of the women reported recent homelessness (62%), less than high school education (53%), lifetime arrest (82%), and lifetime incarceration (70%). The majority of the sample experienced depressive and PTSD symptoms (86% and 61%, respectively), along with high rates of substance use (e.g., 71% reported injection drug use in the past three months). Experiences of lifetime and recent violence victimization were similarly high; most notably, 43% of women reported childhood sexual violence, 14% reported physical intimate partner violence, 32% reported client condom refusal, and 19% reported physical client violence. Lastly, the prevalence of HIV infection was high, with 5% of women testing positive.

Compared to those reporting no or moderate food insecurity, women experiencing severe food insecurity were more likely to: be younger ($p = 0.035$); sell sex on a daily basis ($p = 0.016$); be homeless ($p < 0.001$); and less likely to receive public benefits ($p = 0.019$). Further, women experiencing severe food insecurity were more likely to: be injecting drug users ($p = 0.025$); experience physical intimate partner violence ($p = 0.004$); experience client condom refusal ($p = 0.004$); and be living with HIV ($p = 0.020$). After performing backwards stepwise selection, the model dropped age, frequency of sex work, and injection drug use. In adjusted analyses, women with severe food insecurity

Table 1 Characteristics of female sex workers in Baltimore, Maryland (N = 249): comparison of no/moderate to severe hunger, N(%) and results from multivariable logistic regression models with severe hunger as outcome

	Total (N = 249)	No or moderate hunger (n = 184)	Severe hunger (n = 65)	*p* value (Pearson Chi square)	Adjusted odds ratio (95% CI)
Demographic					
Age, mean (SD)	35.7 (9.0)	36.4 (9.5)	33.6 (7.0)	0.035	
Race/ethnicity					
Non-Hispanic White	165 (66.3)	114 (62.0)	51 (78.5)	0.052	
Non-Hispanic Black	57 (22.9)	48 (26.1)	9 (13.9)		
Hispanic or other	27 (10.8)	22 (12.0)	5 (7.7)		
Structural vulnerability					
Homeless, past 3 months	155 (62.3)	98 (53.3)	57 (87.7)	< 0.001	7.36 (5.19, 10.45)
Did not complete high school	131 (52.6)	91 (49.5)	40 (61.5)	0.094	
Ever arrested	205 (82.3)	153 (83.2)	52 (80.0)	0.567	
Ever incarcerated > 2 days	173 (70.0)	127 (69.8)	46 (70.8)	0.881	
Receives public benefits	127 (51.0)	102 (55.4)	25 (38.5)	0.019	0.50 (0.36, 0.69)
Sex work characteristics					
Sex work > 5 years	129 (51.8)	93 (50.5)	36 (55.4)	0.502	
Daily sex work	165 (66.3)	114 (62)	51 (78.5)	0.016	
Reasons for current sex work					
To buy drugs	214 (85.9)	158 (85.9)	56 (86.2)	0.955	
To buy food	133 (53.4)	97 (52.7)	36 (55.4)	0.711	
Substance use, past 3 months					
Binge drinking[a]	84 (33.7)	60 (32.6)	24 (36.9)	0.527	
Injection drug use	176 (70.7)	123 (66.9)	53 (81.5)	0.025	
Prescription opioid pills	70 (28.4)	50 (27.3)	20 (31.3)	0.548	
Benzodiazepines	72 (28.9)	56 (30.4)	16 (24.6)	0.374	
Smoked crack cocaine	208 (83.5)	152 (82.6)	56 (86.2)	0.508	
Sniff/snorted cocaine	49 (19.7)	33 (17.9)	16 (24.6)	0.244	
Mental health					
Depressive symptoms (CESD-10 ≥ 15)	209 (85.7)	151 (83.9)	58 (90.6)	0.187	
PTSD symptoms (PCL-5 ≥ 33)	140 (61.1)	101 (59.4)	39 (66.1)	0.364	
Violence victimization, past 3 months					
Lifetime childhood violence, physical	81 (33.6)	55 (31.1)	26 (40.6)	0.166	
Lifetime childhood violence, sexual	102 (42.5)	73 (41.0)	29 (46.8)	0.429	
Intimate partner violence, physical	35(14.1)	19 (10.3)	16 (24.6)	0.004	2.25 (1.33, 3.78)
Intimate partner violence, sexual	14 (5.6)	11 (6.0)	3 (4.6)	0.682	
Intimate partner condom refusal	16 (6.4)	12 (6.5)	4 (6.2)	0.917	
Client condom refusal	79 (31.7)	49 (26.6)	30 (46.2)	0.004	2.39 (1.45, 3.93)
Client violence, physical	47 (18.9)	31 (16.9)	16 (24.6)	0.169	
Client violence, sexual	39 (15.7)	26 (14.1)	13 (20.0)	0.263	
HIV/STI infection					
HIV-infected	13 (5.2)	6 (3.3)	7 (10.8)	0.020	6.73 (4.24, 10.71)
Chlamydia	24 (10.1)	18 (10.2)	6 (9.7)	0.902	
Gonorrhea	30 (12.6)	22 (12.5)	8 (12.9)	0.934	
Trichomoniasis	117 (49.0)	83 (46.9)	34 (54.8)	0.281	

[a]Defined as ≥ 4 drinks in one sitting in the past 12 months

were less likely to receive public benefits (aOR 0.50; 95% CI 0.36–0.69) and more likely to be: homeless (aOR 7.36; 95% CI 5.19–10.45); a victim of physical intimate partner violence (aOR 2.25; 95% CI 1.33–3.78); to have experienced client condom refusal (aOR 2.39; 95% CI 1.34–3.93), and to be HIV-infected (aOR 6.73; 95% CI 4.24–10.71).

Discussion

This study explored correlates of severe food insecurity among street-based FSW in an urban US city. Prevalence of severe food insecurity in our sample was much higher than the general US population and comparable to other socioeconomically disadvantaged populations such as households headed by single women in the US and FSW in urban Canada [1, 4]. The study sample also exhibited alarmingly high rates of multiple and reinforcing vulnerabilities, including homelessness, incarceration, violence victimization, mental health symptomology, and substance use. It is likely that these vulnerabilities are driven and exacerbated by the same underlying structural causes, including gender inequity and poverty. In our adjusted models, women with severe food insecurity were at greater odds of homelessness, physical intimate partner violence, client condom refusal, and HIV infection. Unlike other studies among FSW, we did not see significance for mental health symptomology or injecting drug use (dropped from the final multivariable model) most likely due to lack of statistical variation in the responses (i.e., majority of sample reporting high rates of the condition or behavior).

The receipt of public benefits was a protective factor; while targeted food assistance in the form of public benefits should continue, we believe that the underlying root cause of poverty should also be addressed. The study results also bring to focus the intersection of violence and food insecurity. Previous literature shows that women experiencing violence, regardless of perpetrator, are at increased risk for food insecurity likely due to diminished autonomy, including the ability to access food [4]. Greater rates of client condom refusal among food insecure FSW may reflect greater structural vulnerability among an already vulnerable group, including the acceptance of condomless sex to cover food expenses [7].

In line with existing literature, our study results showed that living with HIV is independently associated with food insecurity but the directionality of the association still remains unclear. Literature demonstrates that food insecurity among FSW has been linked to HIV infection likely through behavioral and biological mechanisms [8, 10, 11]. Although less established, studies conducted in Africa have demonstrated the reverse impact of HIV on food insecurity through loss of income [25] and experiences of discrimination related to HIV [26]. Further research is needed to disentangle the potential bidirectional relationship between food insecurity and HIV infection, as well as research exploring mediating and moderating mechanisms to clarify the pathways between these two factors. Although injection drug use was dropped for the final model, it was significant at the bi-variate level and may influence HIV infection. Specifically, the contribution of unsafe needle sharing as well as contribution of injection drug use on unsafe sexual practices as it relates to food insecurity and HIV infection should be further explored.

It is important to note the criminalized context of sex work in the US, and the role that it plays in potentiating FSWs' risk of HIV and other sexually transmitted infections [27]. While criminalization is not directly responsible for food insecurity, it is difficult not to acknowledge its role in shaping women's risk as well as its impact on women who are already characterized by structural vulnerabilities, including elevated rates of homelessness, intimate partner violence, and HIV, all of which are significantly associated with food insecurity in the current study. Although it is not possible to examine the impact of criminalization in the current study, decriminalization would have a number of beneficial outcomes and greatly reduce a number of risks [28].

This study has a few limitations. Because of the cross-sectional nature of the data, we are unable to establish directionality between food insecurity and its correlates. We assessed receipt of public benefits without being able to disaggregate the specific contribution of food stamps. We can, however, infer that receipt of any type of public benefit directly or indirectly improves food intake. Lastly, we employed a single item to measure individual-level food insecurity, which may have not adequately captured the multidimensional and multi-level nature of the construct such as items that capture both quality and quantity of food as well as both individual- and household-level hunger.

Despite these weaknesses, our exploratory study provides new insights into yet another impact of food insecurity into the health and wellbeing of a vulnerable population. We were able to ascertain HIV serostatus through lab testing rather than relying on self-report. In comparison to other studies looking at food insecurity among FSW, our study performed a more granular examination of violence by perpetrator and type (e.g., intimate partner vs. client; physical vs. sexual), adding to our knowledge base of violence and food insecurity.

Conclusion

The current study is the first to explore correlates of severe food insecurity among a vulnerable group of street-based FSW in the US. Study results showed that there are multiple co-occurring vulnerabilities that FSW face, which likely share a common root cause, including gender inequity and poverty. Food insecurity should be considered one of the important markers of extreme vulnerability and certainly one that is modifiable, yet rarely discussed in the context of HIV let alone among the few programs focused on FSW. Study results suggest that food insecurity is not a factor that should

be overlooked in policy recommendations and interventions when working with FSW. Multi-sectoral approaches that combine efforts of violence reduction, anti-hunger, and HIV programming could greatly advance the health and well-being of vulnerable women whose basic right to food is not being met.

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