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Title: Negative consequences of workplace inspections for indoor and im/migrant sex workers: Enhanced barriers to health access among sex workers in a Canadian setting

Authors:

Bronwyn McBride
Gender and Sexual Health Initiative, British Columbia Centre for Excellence in HIV/AIDS, St. Paul's Hospital, 608-1081 Burrard Street, Vancouver, BC V6Z 1Y6
Faculty of Health Sciences, Simon Fraser University, 8888 University Drive, Burnaby, BC V5A 1S6
bmcbride@cfenet.ubc.ca

[TBD]

Dr. Shira Goldenberg – corresponding author
Gender and Sexual Health Initiative, British Columbia Centre for Excellence in HIV/AIDS, St. Paul's Hospital, 608-1081 Burrard Street, Vancouver, BC V6Z 1Y6
Faculty of Health Sciences, Simon Fraser University, 8888 University Drive, Burnaby, BC V5A 1S6
sgoldenberg@cfenet.ubc.ca

Abstract – Maximum of 350 words

Background: New Canadian sex work legislation (Bill C-36) was passed in 2014, criminalizing many activities of third parties within indoor establishments. Despite community reports of frequent inspections by authorities experienced by indoor sex workers (SWs), few quantitative or longitudinal studies have examined workplace inspections or their potential impacts. This study aimed to examine correlates of experiencing or worrying about workplace inspections by police, municipal or immigration authorities amongst indoor SWs in Vancouver, BC from 2014-2016, and to examine the independent effect of worrying about inspections on SWs' health access.

Methods: Longitudinal data were drawn from AESHA, a prospective cohort of SWs in Vancouver. Analyses were restricted to SWs who worked in indoor environments. Descriptive, bivariate and multivariable regression with generalized estimating equations (GEE) and an exchangeable correlation matrix were used to investigate factors associated with (a) experiencing any type of workplace inspection, and (b) worrying about the negative consequences of inspections. A separate confounder GEE model was used to examine the independent impact of worrying about inspections on barriers to health access.

Results: Across the study period, 25.6% of SWs experienced workplace inspections, and 35.2% reported worry about inspections. In multivariable GEE analyses, experiencing an inspection was correlated with recent im/migration (adjusted odds ratio [AOR] 2.19; 95% confidence interval [CI] 1.12–4.28) and HIV/STI seropositivity (AOR 1.90; 95% CI 1.20–3.00). Worry about inspections was correlated with recent im/migration (AOR 2.00; 95% CI 0.85 – 4.67) and police harassment (AOR 2.63; 95% CI 1.53 – 4.54). In a multivariable GEE confounder model, worry about inspections was independently associated with experiencing barriers to health access (AOR 2.16, 95% CI 1.53 - 3.05) after adjusting for key confounders.

Conclusions: Recent im/migrants may be disproportionately targeted by venue inspections and are more likely to worry about their consequences. The effect of worry about inspections on enhanced barriers to health access suggests that current criminalization measures may exacerbate health inequities faced by racialized and marginalized indoor SWs, particularly recent im/migrants. Legal reforms that support im/migrant SWs' access to formal indoor workspaces, which have been shown to provide crucial health and safety protections, are recommended.

Key words: Migrant sex workers, immigrant health, indoor sex work, Criminalization, HIV/AIDS

Background

Globally, immigrant and migrant (im/migrant) women are overrepresented in sex work, and evidence suggests that im/migrant sex workers (SWs) in Canada are significantly more likely to work in indoor settings (such as massage parlours, body rub studios or informal in-call spaces) than more visible public settings[1–4]. Reasons for this include the precarious legal status of some im/migrant women which may be jeopardized by criminal charges, motivation against interacting with law enforcement, and motivation against disclosing sex work activities to family or others [2,5]. Socio-structural factors related to im/migrant status, such as barriers to formal employment, racial and ethnic discrimination, language barriers and social isolation present unique health and safety risks for im/migrant SWs globally [6–8]. Concerningly, im/migrant SWs also face barriers to approaching authorities for legal protection [1–3] and in seeking and accessing health and social services, including reproductive health, primary health services, and HIV care [9–11]. A Canadian study found that recent im/migrant SWs (migration in the last 5 years) faced a three-fold increased odds of unmet health needs relative to non-migrant SWs [12].

In Canada, sex work is the only form of work explicitly prohibited on open work permits for im/migrants [13]. As such, for at least two decades, im/migrant SWs have been a target for raids and inspections by Canadian police and immigration authorities with the aim of identifying illegal migrants for deportation [14–17]. Inspections and surveillance of indoor venues and im/migrant SWs also occur through policy enforcement activities by municipal authorities, who exert regulatory power over venues in which sex work may occur through licensing fees, strict licensing requirements, and venue inspections. Massage parlours and body rub studios face exorbitant licensing fees relative to other businesses – in the city of Burnaby, BC, the annual registration costs for a body rub salon and an acupuncture studio are $3,000 and $129, respectively [8]. Further, body rub studio and massage parlour licenses are subject to strict requirements such as keeping the premises' doors unlocked and prohibiting locking devices on massage rooms, mandating clothing which covers employees' elbows and reaches the top of their knees, prohibiting the covering of windows, and maintaining lighting of at least 550 lux [1,8]. These municipal regulations represent a subtler form of criminalization through targeting sex work establishments with burdensome fees and restrictions, and enforcing these restrictions through venue inspections.

In 2014, new Canadian legislation (Bill C-36) was passed, criminalizing new aspects of sex work, including many activities of third parties within indoor establishments such as advertising sexual services and receiving material benefits from sex work exchanges [18]. The implementation of Bill C-36 has thus provided a crucial opportunity to examine macrostructural changes in federal Canadian law, resulting local enforcement and policing activities, and how these shifts have translated into changes in health and safety for SWs, particularly in indoor work environments. In Canada, up to 80% of sex work takes place in indoor venues [19], and despite the estimated hundreds of indoor sex work venues across Metro Vancouver [20], the large majority of research on the impacts of sex work criminalization in Vancouver has focused

on street-involved SWs [21–23]. Further, literature on indoor sex work in high income settings has found that features of such occupational environments can act to enable SWs' health and safety [24–26]. Despite their lack of legal support, multiple studies have found that indoor venues promote safer sex practices through supporting condom use negotiation, and reduced violence against workers [26–28].

Indoor sex work spaces employing racialized women are likely to be heavily impacted by Bill C-36 due to its reification of anti-human trafficking discourse and conflation of consensual adult sex work with victimization, and recent qualitative research has found that Asian-owned massage parlours and venues employing im/migrant workers are disproportionately and increasingly targeted by inspections and surveillance by police, immigration and municipal authorities [1,2,5,25]. Since the implementation of Bill C-36, raids on massage parlours in multiple Canadian cities, often involving the Canadian Border Services Agency, have resulted in multiple arrests, threats of deportation, and deportation of workers [17,29,30]. However, few quantitative studies have examined the impacts of workplace inspections on indoor SWs' health and safety, or the interactions of criminalization experiences with other facets of marginalization related to im/migrant status, with a particular dearth of longitudinal research.

The intersecting factors influencing SWs' health and safety in indoor environments are well captured through a structural determinants approach. To better contextualize and respond to SWs' still disproportionate HIV/STI rates and health inequities, recent research has applied a structural determinants framework for analysis, considering macrostructural determinants (e.g. laws, policies, migration trends and sociocultural factors), community organization factors (e.g. sex worker collectivization) and work environment determinants (e.g. policing practices and municipal workplace policies) to examine the multiple levels of risk and protective factors shaping SWs' health and safety outcomes [31]. This approach is particularly relevant to investigating the impacts of criminalization on indoor and im/migrant SWs, who represent a hidden population and have received relatively little research attention. As previously described, im/migrant SWs in Canada also face heightened social and economic barriers to health associated with migration, legal and minority status [2,32]. Structural factors applicable to indoor and im/migrant SWs include the work environment level, as managerial practices, venue policies and physical structures of indoor venues can act to support or constrain workers' health [24,26,28], while determinants at a macrostructural level relate to migration (e.g. financial vulnerability, ethnic/racial discrimination, global anti-trafficking discourse) and criminalization (e.g. workplace inspections, enforcement policies), which also contribute to a psychological burden of stigma at the individual level. Because fear of inspections by authorities has also been documented amongst indoor SWs in Vancouver [33,34] , the current study chose to examine worry about inspections to acknowledge this psychological burden.

In light of the dearth of research on inspections of indoor sex work venues or their particular impacts on im/migrant SWs facing heightened barriers to health access, and the critical need for evidence documenting the impacts of law enforcement practices in indoor sex work venues since the implementation of Bill C-36, this study aimed to examine correlates of experiencing or

worrying about workplace inspections by police, municipal or immigration authorities amongst SWs servicing clients in indoor venues in Metro Vancouver, BC from 2014-2016. Secondarily, it aimed to examine the independent effect of worrying about inspections on indoor SWs' health access.

Methods

Study design

Data for this study was drawn from an open prospective community-based cohort, An Evaluation of Sex Workers Health Access (AESHA), that initiated recruitment in late January 2010. AESHA was developed based on community collaborations with sex work organizations since 2005 [35] and continues to be monitored by representatives of 15+ community agencies. Eligibility criteria include identifying as a woman (inclusive of trans women), having exchanged sex for money within the last 30 days, and providing written informed consent. Time-location sampling was used to recruit SWs aged 14 and up through day and late night outreach to outdoor/public sex work locations (i.e. streets, alleys) and indoor sex work venues (i.e. massage parlours, micro-brothels, and in-call locations) across Metro Vancouver. In addition, online recruitment was used to reach SWs working through online solicitations spaces. Indoor sex work venues and outdoor solicitation spaces are identified through ongoing community mapping conducted together with current/former SWs.

After informed consent, participants completed interviewer-administered questionnaires at baseline and semiannual follow-up visits by a trained interviewer. The interview team also included members with previous sex work experience. The primary questionnaire elicited responses related to socio-demographics, interpersonal factors, sex work patterns, physical work environment factors, and structural environment factors. A shorter pre-test counseling questionnaire and voluntary HIV/STI serology testing (i.e., syphilis, gonorrhea, and chlamydia) was administered by a project nurse to facilitate education, support, and referral. All participants received $40 CAD at each biannual visit for their time, expertise, and travel expenses. The study holds ethical approval through Providence Health Care/University of British Columbia Research Ethics Board.

For this analysis of workplace inspections in indoor venues, analyses were restricted to the post-C-36 study period (January 2014-February 2016) and included AESHA participants who serviced clients in formal or informal indoor environments during this timeframe.

Inspection and inspection worry outcomes

Primary outcomes for analysis were time-updated measures of 1) experiencing a work venue inspection and 2) worrying about the negative consequences of a venue inspection, at each semiannual study visit. Experiencing an inspection was defined as having police, health, city or

immigration authorities inspect a participant's workplace during the prior 6 months. Worry about inspections was based on participants reporting worry about the economic consequences (e.g. clients being scared away or harassed by police, workers losing income), social consequences (e.g. family finding out about sex work) or legal consequences (e.g. loss of visa, threat of deportation, arrest) of interacting with inspectors within the past 6 months.

Independent variables of interest

Based on our structural determinants conceptual framework [31], variables of interest at individual, workplace and structural levels were explored. Variable selection was based on the literature and previously published AESHA data, and included factors hypothesized to be linked to criminalization, health, and/or safety for indoor SWs. Time-fixed variables included potential confounders such as age, education, and migration history and duration (<5 years vs. 5+ years in Canada). All other variables were time-updated at each semiannual follow-up and included events occurring during the past 6 months. Individual and biological factors included alcohol, injection and non-injection drug use (such as crack cocaine, crystal meth, heroine, prescription drugs), and HIV/STI seropositivity status (assessed through biolytical INSTI rapid tests for HIV screening, urine sample testing for gonorrhea and chlamydia, and blood sample testing for syphilis, herpes simplex virus-2 (HSV-2) antibody, and HCV). Structural factors included Canadian citizenship status (yes vs. no), primary place of servicing clients (formal vs. informal/unsanctioned indoor venues), work stress (measured using a validated 13-item scale [24]), police harassment (defined as any experience of being told to move on, verbal harassment, detainment, physical assault, property confiscation or being coerced into providing sexual favours), and condom sources and practices (receiving the majority (>75%) of condoms from mobile outreach; number of condoms carried per shift). Barriers to healthcare was based on the question "In the last six months, what barriers to receiving health care have you experienced?" Participants were coded as having experienced barriers to health care if they responded 'yes' to any of a list of barriers including (but not limited to) lack of availability or limited clinic hours, long wait times, language or health coverage barriers, privacy concerns, low acceptability of services, or poor treatment by health professionals.

Statistical analyses

Two explanatory models were used to identify variables associated with 1) experiencing inspections, and 2) worrying about the consequences of inspections. Descriptive statistics were calculated, stratified by the outcomes of interest, and bivariate analyses were conducted using logistic regression with generalized estimating equations (GEE) to examine the relationship between these outcomes and a wide variety of individual, interpersonal and socio-structural factors during the study period. Variables hypothesized to be related to experiencing inspections or worrying about inspections and which were significant at $p<0.10$ in bivariate analyses were considered for inclusion in multivariable models. A complete case analysis was performed, where cases with any missing observations were excluded from the multivariable

model. A manual backward model selection process was used to identify the model with the best fit, as indicated by the lowest quasi-likelihood under the independence model criterion.

Given that im/migrant SWs face enhanced barriers to health access and unmet health needs [10–12] and previous evidence with primarily street-based SWs suggesting that law enforcement practices are a key barrier to health access, we constructed a confounder model to examine the independent effect of worrying about inspections on barriers to health. In this approach, using the process described by Maldonado and Greenland [36], potential confounding variables based on the bivariate associations identified in our initial explanatory model were removed in a stepwise manner, and variables that altered the association of interest by <5% were systematically removed from the model. This process was not repeated to assess the impact of actual exposure to inspections on health access, because no associations were present in bivariate analysis. All statistical analyses were performed in SAS version 9.4 (SAS, Cary, NC) and all p-values are two-sided.

Results

Longitudinal correlates of experiencing workplace inspections

Analyses on the incidence of inspections included 868 observations on 414 participants, and the median number of participant study visits was 2 (Interquartile range [IQR]: 1-3). Over the two-year study period, 25.6% of participants (n=106) experienced at least one workplace inspection in the last 6 months (Table 1). Among these, the median number of inspections experienced during the study was 1 (IQR = 1-2) and 61.3% reported being visited by municipal inspectors, 49.1% by health inspectors, 33.0% by police, and 1.9% by immigration, with a single inspection incident at times including multiple inspectors. The median age of the total sample was 37 (IQR: 29-43), and just over half had completed high school (51%), with no significant differences by exposure to workplace inspections. Over one-fifth (23.2%) of respondents were im/migrants to Canada, and of these, 36.1% were recent im/migrants (migrated in the last 5 years) and 54.6% were long term (migrated over 5 years ago). 75.9% of im/migrant respondents originated from China, while others had come from the US, Russia, Scotland, the Philippines, and several other countries.

Table 1 – Baseline individual and structural factors stratified by experiencing a workplace inspection among SWs serving clients in indoor venues in Metro Vancouver, BC (n = 414), 2014-2016

Characteristic	Total (*N* = 414) n (%)	Experienced a workplace inspection, L6M		*p-value*
		Yes (N=69) n (%)	No (N=345) n (%)	
Individual factors				
Age, median (IQR)	37 (29-43)	37 (32-43)	37 (29-43)	0.219
Limited English fluency	55 (13.3)	14 (20.3)	43 (62.3)	0.420

Alcohol use*	258 (62.3)	43 (62.3)	215 (62.3)	0.766
Non-injection drug use*	252 (60.9)	39 (56.5)	213 (61.7)	0.512
Injection drug use*	190 (45.9)	35 (50.7)	155 (44.9)	0.221
HIV/STI seropositive*	99 (23.9)	20 (29.0)	79 (22.9)	0.018
Completed high school	212 (51.2)	44 (63.8)	168 (48.7)	0.215
Structural determinants				
Canadian citizen	344 (83.1)	53 (76.8)	291 (84.4)	0.812
Migration status				
Non-migrant	307 (74.2)	42 (60.9)	265 (76.8)	Ref
Recent migrant (<=5 years)	38 (9.2)	11 (15.9)	27 (7.8)	0.049
Long-term migrant (>5 years)	58 (14.0)	13 (18.8)	45 (13.0)	0.646
Work environment				
Primarily serviced clients in a formal indoor venue (vs. informal indoor)*	92 (22.2)	21 (30.4)	71 (20.6)	0.128
Total work stress score*, median (IQR)	33 (30-36)	32 (30-36)	33 (30-36)	0.754
Health care access				
Experienced barriers to healthcare*	210 (50.7)	35 (50.7)	175 (50.7)	0.732
Most condoms came from mobile outreach	151 (36.5)	26 (37.7)	43 (62.3)	0.777
Number of condoms carried per shift, median (IQR)	5 (2-10)	4 (2-6)	5 (2-10)	0.238
Experienced physical/sexual/verbal violence from a client†	82 (19.8)	15 (21.7)	54 (78.3)	0.911
Experienced police harassment without arrest*	55 (13.3)	12 (17.4)	43 (12.5)	0.416

All data refer to n (%) of participants unless otherwise specified
*Time updated variables using last 6 months as a reference point.

In bivariate generalized estimating equations (GEE) analyses, being a recent im/migrant to Canada (odds ratio [OR] 1.94, 95% confidence interval [CI] 1.00 – 3.75), working primarily in a formal indoor venue (OR 1.43, 95% CI 0.90 – 2.28) and experiencing police harassment (OR 1.27, 95% CI 0.71 – 2.26) were positively correlated with experiencing a workplace inspection over the 2014-2016 study period (Table 2). In multivariable GEE analysis, being a recent im/migrant (adjusted odds ratio [AOR] 2.29; 95% confidence interval [CI] 1.12–4.28) was independently correlated with increased odds of experiencing a workplace inspection; additionally, being seropositive for HIV/STIs was significantly correlated (AOR 1.90; 95% CI 1.20–3.00) at $p<0.05$.

Table 2 – Bivariate and multivariable GEE analysis of factors associated with experiencing a workplace inspection among SWs serving clients in indoor venues in Metro Vancouver (n=414), 2014-2016

Characteristic	Unadjusted Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI)
Individual factors		
Limited English fluency (yes vs. no)	1.25 (0.73 – 2.15)	
HIV/STI seropositive† (yes vs. no)	1.68 (1.09 – 2.58)‡	1.90 (1.20 – 3.00)‡
Structural determinants		
Migration status		
Non-migrant (Ref)		
Recent migrant (<=5 years)	1.94 (1.00 – 3.75)‡	2.19 (1.12 – 4.28) ‡
Long term migrant (>5 years)	1.13 (0.67 – 1.92)	1.48 (0.85 – 2.59)
Work environment		
Primarily serviced clients in a formal indoor venue† (yes vs. no)	1.43 (0.90 – 2.28)	
Total work stress score†	0.99 (0.95 –1.04)	
Health care access		
Experienced barriers to health care† (yes vs. no)	1.07 (0.72 – 1.58)	
Most condoms came from mobile outreach† (yes vs. no)	0.94 (0.61 – 1.44)	
Number of condoms carried per shift† (continuous)	0.99 (0.97 – 1.01)	
Experienced police harassment without arrest† (yes vs. no)	1.27 (0.71 – 2.26)	

† Time-updated measures (serial measures at each study visit using last 6 months as reference point)
‡ Variables significantly associated with inspections at p = 0.05

Longitudinal correlates of worrying about the consequences of workplace inspections

Analyses on experiencing worry about inspections included 943 observations on 432 participants. 35.2% (n=152) reported worrying about inspections over the last six months, and of these, the majority (67.6%) worried about police scaring away clients, 43.7% about police harassing clients, and 39.7% about their family finding out about sex work. In addition, 38.4% worried about sex-work related arrest, 25.2% about non-sex-work related arrest, and 9.3% about arrest for having condoms. 22.5% worried that inspection would result in consequences for their family, and 21.9% about their workplace being shut down/fined. Finally, 12.6% worried about losing their visa or immigration status, and 10.6% about inspection resulting in their deportation.

In bivariate GEE analyses, worrying about the consequences of workplace inspections was independently correlated with having limited English fluency (Odds Ratio (OR) 3.04, 95% Confidence Interval (CI) 2.06 – 4.50) and experiencing violence from a client (OR 1.42, 95% CI 0.95 – 2.14) in bivariate GEE analysis (Table 3). In multivariable GEE analyses, worrying about workplace inspections was positively correlated with being a recent im/migrant to Canada (AOR 2.00, 95% CI 0.85 – 4.67); other variables significantly correlated included working primarily in a formal indoor venue (AOR 2.15, 95% CI 1.04 – 4.44) and experiencing police harassment (AOR 2.63, 95% CI 1.53 – 4.54).

Table 3 – Bivariate and multivariable GEE analysis of factors associated with worry about workplace inspections among SWs serving clients in indoor venues in Vancouver (n=432), 2014-2016

Characteristic	Unadjusted Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI)
Individual factors		
Limited English fluency (yes vs. no)	3.04 (2.06 – 4.50)‡‡	
HIV/STI seropositive† (yes vs. no)	0.79 (0.54 – 1.17)	
Structural determinants		
Migration status		
Non-migrant (Ref)		
Recent migrant (<=5 years)	3.27 (2.00 – 5.37)‡‡	2.00 (0.85 – 4.67)
Long term migrant (>5 years)	1.34 (0.81 – 2.20)	0.89 (0.47 – 1.71)
Work environment		
Primarily serviced clients in a formal indoor venue† (yes vs. no)	2.19 (1.50 – 3.20)‡‡	2.15 (1.04 – 4.44)‡‡
Total work stress† (total score on a continuous work stress scale)	1.04 (1.01 – 1.07)‡‡	
Health care access		
Most condoms came from mobile outreach† (yes vs. no)	1.45 (1.04 – 2.01)‡‡	
Experienced police harassment without arrest† (yes vs. no)	1.90 (1.15 – 3.14)‡‡	2.63 (1.53 – 4.54)‡‡
Experienced physical/sexual/verbal violence from a client† (yes vs. no)	1.42 (0.95 – 2.14)‡	

† Time-updated measures (serial measures at each study visit using last 6 months as reference point)
‡‡ Variables significantly associated with inspections at p = 0.05
‡ Variables significantly associated with inspections at p = 0.10

Confounding effect of worrying about inspections on experiencing barriers to healthcare

In a confounder model adjusted for recent and long term im/migration to Canada, working primarily in a formal indoor venue, and experiencing police harassment, worry about inspections remained an independent predictor of experiencing barriers to healthcare (AOR 2.16, 95% CI 1.53 - 3.05) (Table 4).

Table 4 – GEE confounder model of the independent effect of worry about workplace inspections on barriers to healthcare in the last six months among 417 SWs (891 observations) serving clients in indoor venues in Metro Vancouver (n=414), 2014-2016

Exposure	Barriers to healthcare Unadjusted Odds Ration (95% CI)	Barriers to healthcare* Adjusted Odds Ratio (95% CI)
Worry about inspections* (yes vs. no)	1.95 (1.38-2.74)	2.16 (1.53-3.05)

Confounder model adjusted for key confounders identified through explanatory analysis, including recent and long-term im/migration (vs. Canadian-born), working in a formal indoor venue*, and experiencing police harassment *
*in the last 6 months

Discussion

This 2-year study conducted after the implementation of Bill C-36 found that over one quarter of indoor SWs were exposed to workplace inspections and more than one third reported worrying about the consequences of inspections, with some overlap between groups. These results also suggest that recent im/migrants may be disproportionately targeted by venue inspections and are more likely to worry about their consequences. Given the independent effect of worrying about inspections on enhanced barriers to health access, these findings suggest that current measures criminalizing aspects of indoor sex work and their enforcement may exacerbate marginalization and health inequities faced by racialized and marginalized SWs, including recent im/migrants.

The current study builds on qualitative evidence from Vancouver and Toronto suggesting that formal sex work venues employing im/migrant women are more frequently heavily targeted by inspections [1,25]. Work venue inspections elicit significant psychological stress for im/migrant SWs, as language interpreters are infrequently available and search warrants are rarely presented, contributing to the likelihood of miscommunication and intimidation; inspectors explicitly seek out evidence of illicit sexual activities by searching for condoms and invading massage rooms during sexual exchanges; and recent news reports of deportation of im/migrant SWs make clear that immigration status revocation and even deportation are veritable potential consequences of workplace inspections [1,2,17,25]. These distressing experiences constitute an additional burden to be managed by racialized im/migrant SWs, particularly women who came

to Canada in the last 5 years, who also face a host of structural challenges in accessing formal employment avenues, economic security and health services due to language barriers; discrimination and stigma; and social isolation [6,8,10,35]. Given ample evidence suggesting that formal indoor venues offer critical health and safety protections for SWs [24,28,36,37], which have demonstrated to mitigate some of the facets of marginalization experienced by im/migrant SWs [3,8,25,38], there is serious concern that targeted inspections of indoor venues may undermine the protective effects of these work environments. Reduced access to licensed, safer indoor venues has been documented to result in SWs working independently and in less conspicuous indoor spaces (i.e., their homes), which can significantly increase their vulnerability to violence [2,8].

Our findings also suggest that workplace inspections were more likely to impact SWs living with HIV/STIs, who experience compounded stigma related to their occupational and health status due to globally prevalent stereotypes and a culture of social exclusion towards individuals living with sexually transmitted infections. Previous research from the Vancouver context has shown that increased criminalization and policing practices can displace SWs to less safe environments, resulting in disruptions in health care access and HIV treatment interruptions for SWs living with HIV [21,39]. As such, the finding that SWs living with HIV/STIs were more frequently targeted by inspections raises serious equity concerns about access to uninterrupted HIV treatment for marginalized SWs. These concerns are particularly salient for im/migrant women, who are less likely to be covered under universal health care which makes HIV treatment available to British Columbians [41]. Qualitative evidence from the Vancouver context also suggests that venues which have experienced inspections may be less likely to stock HIV prevention supplies [25,34], which may inform the association between HIV/STI infection and venue inspections.

Our study's investigation of the experience of worrying about the consequences of workplace inspections, in addition to exposure to venue inspections, was informed by concerns voiced at the community level and recommendations from the AESHA outreach team. The use of this outcome variable recognizes that the criminalization of women SWs' means of economic survival, even in the absence of direct interactions with law enforcement authorities, may have significant psychological impacts which can extend to impact health. Our finding that even worry about inspections was independently associated with over twofold increased odds of facing barriers to health care (while exposure to inspections was not) is alarming given that those worried about inspections were also more likely to be im/migrant women, who face documented inequities in health care access. Recent qualitative evidence from Vancouver suggests that health care workers have been denied entry into indoor sex work venues due to previous experiences of inspections and worry about their consequences [25]. Worry about inspections was also independently associated with heightened odds of experiencing police harassment, which carries further equity and human rights concerns for im/migrant SWs. The disproportionate enforcement attention to sex work establishments employing im/migrant women and noted lack of interpretation services during inspections contribute to intimidation

and a higher likelihood of perceived police harassment, which is likely to further exacerbate im/migrant SWs' avoidance of authorities and barriers to accessing legal protections [3,5].

This research suggests that there may be grave unintended health consequences of current policing approaches enacted due to Bill C-36's continued criminalization of many aspects of sex work, and critically, that these unintended consequences extend beyond SWs who have actually experienced inspections. It is notable that the multivariable and confounder models in this study suggest that worry about inspections may have greater detrimental effects on health access and police harassment than actual exposure to inspections, illustrating how shifting criminalization and enforcement practices can have significant inadvertent community impacts. While both Bill C-36 and local policing efforts hold the stated aims of protecting exploited persons and enhancing the safety of vulnerable SWs, our study found that those amongst the most marginalized of SWs (recent im/migrant women and those living with HIV/STIs) became the targets of objectionable law enforcement efforts. This quantitative research contributes to widening evidence on the harms of macrostructural factors such as criminalization and policing on SWs' health and safety – impacts which directly contrast against the purported aims of the sex work law in Canada [2,32]. This study adds to prior research emphasizing the need to remove the socio-legal barriers which restrict safer indoor sex work environments, and for labour and regulatory frameworks which support the health and safety of SWs in indoor spaces. The decriminalization of sex work promotes enabling structural conditions wherein SWs can access supportive indoor work spaces, work collectively with others, access police protections when needed, and access critical health care services, all of which have significant positive implications for SWs' health and for HIV prevention [42]. For these reasons, the WHO, UNAIDS, UNDP and Amnesty International have all called for full decriminalization of sex work as necessary to promoting the human rights of SWs [42–45]. The findings of this study support recommendations for legal reforms and community-based efforts which enhance SWs' access to supportive formal indoor workspaces.

Strengths and weaknesses

The weaknesses of this study include limited statistical power to differentiate between different classes of venue inspections (i.e., police, immigration, municipal) or between different types of indoor venues, such as micro-brothels and unlicensed in-call spaces, although this would have biased findings towards the null. Statistical power limitations also restricted a deeper examination of racialization and ethnicity related to sex work experience, and limitations on currently available data inhibited a more nuanced analysis of different migration measures (i.e., shifts in legal immigration status over time). Future research examining these categories more distinctly may be helpful for elucidating the impacts of criminalization on SWs in a variety of indoor environments, and its unique impacts on women with varying immigration experiences, legal status, and ethnic and racial minority identities. However, a meaningful strength of this study was its quantitative and longitudinal analysis of correlates associated with venue inspections as little research to date has examined the impacts of changing criminalization and enforcement practices on indoor SWs generally, and im/migrant SWs in particular. An

additional strength was its inclusion of worry about the consequences of inspections as an outcome, as this recognizes the significant psychological impacts of criminalization. The strong effect of worry about inspections on health care access is a critical finding, and further investigation into the psychological and mental health impacts of criminalization and law enforcement interactions is recommended.

Conclusions

The findings of this research highlight how macrostructural factors, such as criminalization and the increased policing of indoor venues, disproportionately impact recent im/migrant SWs in Vancouver, and indicate that worrying about the consequences of such inspections may pose a powerful barrier to SWs' access to health services. Due to growing literature on the protective supports offered by working collectively and within indoor sex work spaces, research institutions, advocacy groups and the Canadian Supreme Court have emphasized the need for full decriminalization of sex work as an evidence-based practice to support SWs' health and wellbeing. As noted, decriminalization can create an enabling socio-legal environment within which SWs' health and safety can be supported through accessing supportive indoor workspaces and health care. Legal and policy bodies should acknowledge the unacceptable gap between current inspections efforts aimed at worker health and safety and their actual effects, and Canadian legislation should recognize evidence-based recommendations from global health and human rights institutions who call for the complete decriminalization of sex work as necessary to the health and safety of indoor SWs.

List of abbreviations

SWs	Sex workers
AESHA	An Evaluation of Sex Workers' Health Access
GEE	Generalized estimating equations
AOR	Adjusted odds ratio
OR	Odds ratio
Im/migrant	Immigrant or migrant
HIV	Human immunodeficiency virus
STI	Sexually transmitted infection
WHO	World Health Organization
UNAIDS	Joint United Nations Programme on HIV/AIDS
UNDP	United Nations Development Programme

Declarations

Ethics approval and consent to participate

The study holds ethical approval through Providence Health Care/University of British Columbia Research Ethics Board. All participants in this study provided written informed consent.

Consent for publication

Not applicable.

Availability of data and material

In accordance with new PLOS ONE data access policy, our ethical obligation to research that is of the highest ethical and confidentiality standards, and the highly criminalized and stigmatized nature of this population, anonymized data may be made available on request subject to the UBC/ Providence Health Ethical Review Board, and consistent with our funding body guidelines (NIH and CIHR).

Competing interests

The authors declare that they have no competing interests.

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Appendix – Critical Reflection (capstone requirement)

The opportunity to focus my capstone project on the structural determinants impacting sex workers' health and rights was highly rewarding, as the process of conducting this study and completing its literature review allowed me to engage with major themes surrounding women's health, multilevel facets of marginalization including gender, sex worker and im/migrant status, and the various legal, labour and human rights perspectives on sex work. Issues concerning the health and human rights of individuals who sell sexual services are both complex and urgent - different fields and schools of thought within public health take varying approaches to this health equity challenge, and current legislative approaches to sex work in Canada and across the globe frame the issue of sex work in varying ways.

Completing this capstone project allowed me to consider many pertinent ethical and equity challenges that public health professionals may face when engaging with marginalized populations. Sex workers' rights to safe work and health access are areas I feel passionately about, and it has been an honour to conduct research which contributes to a widening evidence base on the systemic and structural barriers which impede sex workers' health and safety. However, I remain cognizant of the high potential for harm in research with women who have been marginalized in intersecting ways, and remain uncomfortable with my 'outsider' status in sex worker communities and im/migrant communities and my inability to adequately represent these communities in research of any form. I feel that this discomfort and difficult questions around ethics are critical for me to continue to engage with in order to support research and advocacy efforts that are genuinely aligned with the social and structural needs of women in sex work and im/migrant women in Canada.

With this significant limitation in mind, my formal capstone project research was also complemented by my weekly volunteer work at a safe haven and shelter for women sex workers in Vancouver, which I view as an essential avenue of connecting with this community and a very small way in which I aim to bridge the wide chasm between research with marginalized women and the lived experiences of women themselves. Throughout this research, a continued personal interrogation of my own assumptions and values in conjunction with reflexive conversations with both sex workers and other researchers helped me to acknowledge and address the limitations of my knowledge due to my own social location.

A meaningful challenge that I encountered and struggled with during the completion of my capstone project is the divergence between public health evidence and the political and moral perspectives about sex work in our society. This divergence is mirrored in many other health policy areas, such as around safe consumption sites for substances and harm reduction, and reflects the reality that many health inequities are not a result of biomedical determinants or even access to health services, but are rooted in macrostructural factors such as economic status, Canada's colonial history, class, gender and race. While it is disconcerting that public health policy does not follow a progressively upward trajectory based on continually improving research evidence, I am learning that developing this evidence and advocating for its

application remains very important. With this project, I have been grateful to play a small role in advocating for evidence-based policy which supports our collective larger vision for society: one in which all women live free from violence, enjoy choice and opportunity in their livelihoods and every other aspect of life, and where their inherent human rights to respect and dignity are upheld.