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Correlates of HIV and Inconsistent Condom Use among Female Sex Workers in Ukraine

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Abstract

While female sex workers (FSWs) carry one of the highest risks of HIV transmission, little is known about predictors of HIV and risky behavior of FSWs in Ukraine. In this study of 4806 Ukrainian FSWs, the prevalence of HIV was 5.6 %. FSWs had higher odds to be HIV infected if they had lower income, were older, injected drugs, experienced violence, and solicited clients on highways. Inconsistent condom use with clients was reported by 34.5 % of FSWs. FSWs who solicited clients at railway stations, via media, through previous clients and other FSWs, and on highways reported lower consistency of condom use. Furthermore, inconsistent condom use was related to younger age, alcohol use, having fewer clients, not being covered with HIV prevention, and experiences of violence. The present study expands on the rather limited knowledge of correlates of the HIV and inconsistent con-dom use among FSWs in Ukraine.

Abstract

A pesar de que las trabajadoras del sexo (TDS) llevan uno de los mayores riesgos detransmisión del VIH, se sabe poco sobre los predictores de VIH y los comportamientosde riesg1o de las TDS en Ucrania. En este estudio de 4,806 TDS en Ucrania, laprevalencia del VIH fue el 5.6%. TDS tenían mayores probabilidades de ser infectadospor el VIH si tenían ingresos más bajos, eran de mayor edad, se inyectaron drogas,con experiencia de la violencia, y solicitan los clientes en las carreteras. El usoinconstantede condones con sus clientes fue reportado por 34.5% de las TDS. TDSque reportaron solicitaron clientes en estaciones de tren, a través de medios decomunicació n, a través de clientes anteriores y otras TDS, y carreteras reportaronmenor uso sistemático del condón . Por otra parte, el uso inconstante de condones serelaciona con la menor edad, el consumo de alcohol, el hecho de tener menos clientesde sexo, no tener protecció n contra la prevención del

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Compliance with Ethical Standards

Conflict of Interest Author O. Iakunchykova declares that she has no conflict of interest. Author V. Burlaka declares that he has no conflict of interest.

Ethical Approval All procedures performed in this study were in accordance with the ethical standards of the 1964 Helsinki declaration and its later amendments or comparable ethical standards. The study protocol was approved by Commission of professional ethics of sociologist of Sociological Association of Ukraine and by Commission for medical ethics of Institute of Epidemiology and Infectious Diseases named after L.V. Gromashevsky of Academy of Medical Sciences of Ukraine.

Informed Consent All respondents have signed the informed consent after the detailed description of the study purposes and procedure.

Human and Animals Rights This article does not contain any studies with animals performed by any of authors.

VIH, y las experiencias deviolencia. El presente estudio se expande sobre el escaso conocimiento de loscorrelatos de la epidemia del VIH y el uso inconstante de condones entre TDS en Ucrania.

Keywords

HIV; Condom use; Sex work; Ukraine

Introduction

Human immunodeficiency virus (HIV) is a significant public health problem in Ukraine. According to the Min-istry of Health of Ukraine and the State Service of Ukraine on Combatting HIV-infection/AIDS [1], 238,000 Ukrainians aged 15 and above have an HIV-positive status. Only 134,300 out of those have been tested and linked to care [2]. High-risk behaviors remain to be the most significant predictors of HIV risk in Ukraine. In 2011, 10 % of female sex workers (FSW) had HIV-positive status and 45.5 % of FSWs, who inject drugs were HIV-positive [1]. Although between 2001 and 2012 the incidence of HIV in Ukraine declined 68 % [3], over 20,000 new HIV cases are registered each year [1]. While HIV cases among people who inject drugs (PWID) dominated during the previous decade, heterosexual transmission has been the predominant attributed route of transmission among newly registered HIV cases since 2008 [4].

Effective HIV prevention strategies need to follow the changing nature of epidemics. FSWs are a group sharing most risks for HIV through heterosexual route. An estimated 80,000 or 0.7 % of all Ukrainian female population aged 15–49 were involved in sex work in 2012 [5]. HIV prevalence among FSWs was generally higher in regions with higher prevalence of HIV among PWID and FSWs' HIV-positive status was associated with a personal history of intravenous drug use (IDU) [6]. Likewise, the prevalence of HIV was higher for FSWs' clients who had a history of IDU (23 %) as compared to clients denying IDU (3 %) while overall prevalence of HIV among FSWs' clients was 7.4 % [7]. Taran et al. [8] reported 32 % prevalence of HIV among 3711 (25 % females) Ukrainian IDUs. That study also reported higher odds of HIV infection for participants who paid for sex services. Furthermore, every third female injection drug user admitted being involved in transactional sex suggesting that this particular subpopulation may both contract and spread HIV through shared needles and sex with clients [8].

Because HIV acquisition through heterosexual contacts becomes increasingly common, prevention work must be more sensitive to the settings in which women practice sex work. Such research focusing on service locations is often programmatically useful and can enhance HIV prevention efforts [9, 10]. Several studies focused on environments in which sex services were provided. In fact, international studies described over 80 sex work arrangements, such as streets, brothels, clubs, via escort, through media, brothels, lodges, dhabas, and highways [10–12]. Similarly to these findings, researchers found that Ukrainian FSWs worked at brothels, streets, clubs, hotels, parlors, homes, in escort services, and on-line [13].

Several studies examined the link between sex work locations and health and behavior outcomes of Ukrainian FSWs. In one qualitative study, FSWs reported that in less sheltered locations such as highways and railway stations there was a greater risk for physical violence from customers who can beat FSWs, tie them, cut their face, and force drugs use, anal and group sex, and sex without a condom [14]. Every second FSW reported experiences of violence in another study carried out in one Ukrainian city [13]. Other researchers used in-depth interviews with 45 Ukrainian FSWs [15]. In that study, FSWs, who worked on the highways, reported higher substance use, more violence victimization, and lower frequency of medical checkups than their colleagues from more sheltered locales. Clearly, such contextual correlates of HIV among FSWs as expo-sure to violence at work, work locations, and substance use may influence FSW's ability to use condoms even when women have access to condoms.

In addition to work locations, prior research found that women who were new to sex work lacked knowledge about HIV prevention practices and had weaker beliefs about their ability to enforce these practices during sex work [16]. Older age was another factor associated with higher prevalence of HIV, syphilis infections, unprotected sex, and injection drug use [17, 18]. Furthermore, low-tier FSWs with lower formal education levels were the more vulnerable for acquiring and transmitting HIV, HCV, and syphilis [19]. The number of clients FSWs served was positively related with increased risk of HIV infection [20]. The HIV epidemic affects different territories of Ukraine unequally. Large, predominantly South-Eastern cities of Ukraine, such as Odessa, Dnipro, Donetsk, Mykolaiv oblasts, and Crimea, carry the highest burden of disease [21]. Cities that are mainly located in the Central Ukraine (e.g., Poltava, Zhytomyr, Cherkasy) are less affected by the HIV epidemic. Territories in the Western (e.g., Zakarpattya, Lviv, Ivano-Frankivsk) and in the North-Eastern Ukraine (e.g., Kharkiv, Chernihiv, Sumy) have the lowest HIV rates. Some researchers [22] believe that high industrialization of South-Eastern Ukrainian cities may have complicated their economic restructuring and led to elevated rates of rates of substance use and HIV. Additionally, at the beginning of epidemics, there was a high rate of HIV transmission among PWID, and the Southern regions of Odesa and Mykolayiv were particularly vulnerable because of the wide availability of injection drugs that were either locally manufactured or imported through several large seaports located in these regions.

The assessment of individual and contextual factors can be helpful in building a better understanding of the Ukrainian FSW's health status and risky sex behaviors. The present study aims to expand a rather limited knowledge of correlates of the HIV and inconsistent condom use among Ukrainian FSWs. Based on the reviewed literature, we hypothesized that HIV-positive status or inconsistent condom use would be related to older FSW age, lower education and income, provision of sex services at less sheltered venues such as highways, higher client load and substance use, violence victimization, living in regions with higher prevalence of HIV, and non-involvement with HIV/AIDS prevention programs.

Methods

Study Design

For this study, we performed a secondary analysis of cross-sectional Integrated Biological and Behavioral Survey (IBBS) data collected from 4806 FSWs in Ukraine in 2013 using an interviewer-administered questionnaires and blood samples. The IBBS was conducted by the International HIV/AIDS Alliance in 25 Ukrainian cities and the target group comprised females who received money for sex during last six months.

Participants

Following a pilot study that helped to determine which sampling method would be the most appropriate for each participating city, three sampling methods were used to recruit FSW participants.

Respondent-Driven Sampling (RDS)—RDS was used to recruit participants in the cities that had a vast network of mobile, interacting with non-governmental organizations FSWs who worked at different places and were willing to recruit their peers to the study. A total of 751 respondents were recruited using RDS approach in Donetsk (n = 200), Zaporizhzhia (n = 101), Kyiv (n = 150), Mykolaiv (n = 150), and Sumy (n = 150). The RDS sampling method is based on social network theory and it is used to recruit hard-to-reach populations, such as FSWs [23]. Respondent-driven sampling uses peer networks for recruitment of participants and involves payment of purposively recruited ‘seed’ participants, who then refer other participants. For this study, the seed participants had to meet certain criteria. Participating women had to be between 14 and 24 years of age, be acquainted with least seven other FSWs that could be recruited to the study, and work at different venues in the city. Furthermore, women were invited to the study as ‘seed’ participants if they had not been participants in any study during past six months, were free from injection drug use and reported an HIV-negative status. For the RDS sample, the seed was required to be connected to a large network of FSWs (at least seven peers) to ensure continuous recruitment after the first stage. To balance out the age distribution of participants, the upper age was limited to 24 years because the pilot study revealed greater willingness of older FSWs to engage in the study. Also, study team encouraged FSWs from various venues as well as clients and non-clients of NGOs, to participate in the study. Women who worked at different venues in the city were more likely to spread recruitment coupons to wider networks. Although the pilot study showed that FSWs tended to solicit clients in one principal location, there was still some mobility both within the same-type and across different-type locales. All seed participants were given three uniquely coded coupons to recruit three eligible participants from their personal networks. The new recruits were invited to attend a nominated RDS site, taking along their coded coupons. These new participants were, in turn, provided with recruitment coupons to share within their networks. This peer-to-peer participant recruitment process continued until the desired sample size was achieved.

Time-Location Sampling (TLS)—If a city did not have a large network of FSWs, FSWs did not agree to recruit their friends to the study and visit NGOs or AIDS center to take part

in the study, most FSWs did not move between places for work but rather stayed at the same place, TLS method was used to recruit participants to the study. TLS sampling method begins with compiling, using a random number approach, a list of sites where FSWs provide their services or solicit clients. TLS was used in 17 cities (n = 3154). In the cities of Donetsk, Zaporizhzhya, Kyiv, and Mykolaiv both RDS and TLS sampling methods were used, when the FSWs population was heterogeneous and required both approaches for recruiting (n = 551).

Key Informants (KI)—In Kirovohrad, Ternopil, and Khmelnytskyi (n = 350), KI was used because neither RDS nor TLS were suitable. KI were the representatives of NGO or other persons who had access to target groups and ensured the recruitment of the required number of respondents. Data from the earlier population size study was used to determine sample sizes for each city that ranged from 50 to 400 respondents per city (total n = 4806). The "seed" participants were paid an incentive of UAH50 (~USD6) and additional UAH20 (~USD2) for newly recruited participants. All other participants received UAH20.

Data Collection

The IBBS data were collected in 2013 and included two components: 1) an interviewer-administered survey with questions about sex work practice, condom use, and exposure to NGO-delivered HIV prevention interventions, demographic and behavioral questions, and 2) collection of blood samples that were subsequently tested for HIV with the immunochromatographic test systems 0/CITOTEST HIV 1/2/0. Pretest and posttest consultations and the survey of respondents were provided by the certified representatives of AIDS centers or NGOs.

Measures

Outcome Variables—Two outcome variables were chosen for this study. The HIV status was determined in the biological component of the study. Consistent condom use with clients was determined from three questions: "Recall all your clients during last month (30 days). How often have you used the condom during [1] oral sex, [2] vaginal sex, [3] anal sex?" The answers had the following pre-coded answers: "always (100 %)," "in most cases (75 %)," "in half of the cases (50 %)," "sometimes (25 %)," "rarely (less than 10 %)," "never," "did not have such type of contact". Only those FSWs who answered "always 100 %" for all three questions (or did not have such type of contact) were deemed consistent condom users. All other FSWs were classified as inconsistent condom users.

Predictors—Several items from the questionnaire part of the study were examined as potential predictors of HIV status and condom use with clients. Age included such categories as young (14–21 years old), middle (22–35 years old), older age (36–62 years old). Participants also reported their educational level, including elementary (<9 classes) or basic level of education (9 classes), secondary education (11–12 classes), vocational school, and higher education. FSWs reported their income in these categories: UAH3000 (~USD366) or less, UAH3001–5000 (~USD366–610), UAH5001–7000 (~USD610–854), UAH7001 (~USD854) and more. FSWs answered a question about the number of clients during last 30 days, and then this variable was categorized into quin- tiles. Participants also

answered questions about their alcohol use (never, 1–5 times, 6–19 times, 20 times and more), injection drug use (yes/no) during last 30 days, being a client of NGO providing HIV prevention services (yes/no), exposure to any violence during sex work (yes/no).

Participants were also asked, “Where do you generally solicit/pick-up your clients?” Participants were given a range of options to choose from (bars or restaurants; casinos; discos or night clubs; streets; bus stops; hotels; saunas or massage parlors; railway stations; highways; via Internet, telephone; TV-advertisements; with help of earlier clients; with help of other FSWs; with help of agents; and other. Then they were asked to name one main place where they solicit clients. The answer to this question was used to make a variable “place of solicitation.” Some similar places of solicitation were merged to create nine categories: (1) Entertainment places (bars, restaurants, casinos, discos, nightclubs); (2) Streets, bus stops; (3) Hotel, saunas, massage parlors; (4) Railway stations; (5) Via Internet, telephone, TV-advertisements; (6) With a help of previous clients and other FSWs; (7) With a help of agents; (8) Highways; and (9) Other.

The official prevalence rates of HIV in 2013 [2] were used to break participating cities into three categories by the prevalence of HIV (1) low prevalence of HIV; (2) middle prevalence of HIV; (3) high prevalence of HIV.

Data Analysis

Data obtained by the respondent-driven sampling approach are typically analyzed with a statistical software package called RDSAT. However, RDSAT has limited abilities for cross-tabulation or multivariate analysis as required for the objectives of this paper. RDSAT is capable of generating individualized weights that can be used in multivariate analyses. However, there is divided opinion regarding the utility of such weights and findings generated with them are to be treated with caution [23]. Also, part of the sample was recruited using TLS and KI sampling methods. Therefore, it was impossible to use weights generated for different methods in one analysis. Thus, all analyses were performed with SAS 9.4 without adjustment for the complex sampling design. Consequently, the results should be treated as if they were derived from a convenience sample. Bivariate associations between exposure and outcome variables were tested using Pearson's Chi-square test with two-sided p-values generated at the 95 % significance level. Multivariate binary logistic regression analysis was used to examine the predictors of rare outcome (<10%): positive HIV status among FSW. Modified Poisson regression models with cluster-robust error variances [24] were used to assess predictors of inconsistent condom use among FSW. This type of regression analysis can produce adjusted prevalence ratios (PRs) with 95 % confidence intervals for the outcomes that have a prevalence of more than 10 % [25]. Crude and adjusted models were run for both outcomes. Multivariable regression models were adjusted for all covariates significantly associated with both the exposure and outcome in the bivariate analysis. The best fit model was identified using a backward elimination building approach. Factors were removed one at a time if they were not associated with the outcome of interest at a 5 % level of significance using Wald Chi-square test statistics. Model fit was assessed using a Chi- square goodness of fit test.

Results

Socio-Demographic Characteristics of FSW

Out of 4806 participants, 1354 (28 %) respondents were recruited in the low-HIV prevalence cities, 1202 (25 %) were from the middle-HIV-prevalence cities, 2250 (47 %) were from the high-HIV prevalence cities. Next, 680 (14 %) participants were aged 14–21, 3433 (72 %) were aged 22–35 and 693 (14 %) were between 36–62 years of age. Fourteen percent (n = 651) of participants completed elementary (<9 classes) or basic level of education (9 classes), 34 % (1629) finished secondary school (11–12 classes), 33 % (n = 1576) completed vocational school and 20 % had some higher education.

The most frequently reported places of sex solicitation were highways (24 %) and streets/bus stops (17 %). The smaller number of participants searched for clients at various entertainment establishments (15%), via Internet/telephone/TV-adds (13%), and with the help of agents (12%). There were fewer participants who reported seeking clients at hotels/saunas/massage parlors (8 %), railway stations (3 %), and with a help of previous clients/other FSWs (6 %) or in other ways (2%).

During last 30 days, 32% of participants earned UAH3000 (~USD366) or less, 29% of participants earned UAH3001–5000 (~USD366–610), 25% reported earning UAH5001–7000 (~USD610–854), and 14% earned over UAH7001 (~USD854). The medium number of clients reported by one woman was 25 during last 30 days (min = 1, max = 200).

Only seven percent of FSWs did not use alcohol during last month while 23 % indicated using alcohol 1–5 times, 46 % consumed alcohol-containing drinks 6–19 times and 24 % had alcohol 20 times or more. Next, six percent of participating women were intravenous drug users, and 61 % were clients of NGOs providing HIV prevention services. Every second woman experienced violence during sex work. Positive HIV status was confirmed in 270 (5.6 %) FSWs. Inconsistent condom use with clients during last 30 days was reported by 1651 (34.5 %) study participants.

Results of Logistic Regression Predicting HIV Status among FSWs

Table 1 presents results of binary logistic regression analyses for HIV status. Both unadjusted and adjusted ORs are shown in the tables to visualize the attenuation effect attributable to confounding by other variables entered in the model. In the multivariate model place of client solicitation, age, income level, the region of work, current injection drug use and exposure to violence remained the significant predictors of positive HIV status. Soliciting clients at highways increased odds of HIV by 1.66 times (95 % CI 1.05–2.62). Older FSWs were more likely to be infected, OR 4.63 (95 % CI 2.39–8.96) for the oldest group. The lowest income (~UAH3000) category FSW had a higher odds of HIV, OR 1.45 (1.05–2.00), compared to the middle reference category (UAH3001–5000). An experience of violence during sex work increased the odds of HIV by 1.45 (95 % CI 1.09–1.93). Current injection drug use was the strongest predictor of positive HIV status among FSWs (OR 4.87, 95 % CI 3.47–6.84). FSWs working in the region with a middle and high prevalence of HIV also had the higher odds of testing HIV positive, OR 1.58 (1.04–2.41) and OR 2.24 (1.53–3.28), respectively.

Results of Poisson Regression Predicting Inconsistent Condom Use with Clients

The Poisson regression with robust error variance estimates suggested that several predictors were associated with inconsistent condom use among FSWs (Table 2). Specifically, FSWs who completed vocational schools had 1.15 (95 % CI 1.05–1.25) higher prevalence of inconsistent condom use compared to those who completed secondary school. Those FSWs, who had a basic level of education (9 years and less), only had lower prevalence inconsistent condom use PR 0.83 (95 % CI 0.73–0.95). If FSW was not registered as a client of NGO providing prevention services she had 1.59 (95 % CI 1.47–1.72) higher prevalence of inconsistent condom use. Ever experiencing violence only slightly increased prevalence of inconsistent condom use in this study (PR 1.18, 95 % CI 1.09–1.28). A higher number of clients (more than 50) and an older age (more than 35 years old) were associated with less risky sexual behavior (PR 0.63, 95 % CI 0.53–0,75 and PR 0.82, 95 % CI 0.73–0.92, respectively). Very young FSWs (14–21 years old) had slightly higher risks of using condoms with their clients inconsistently PR 1.12, 95 % CI 1.01–1.25). Income category was also associated with risky sexual behavior. Compared to the middle-income category (~UAN3000) women making UAH5001–7000 had a lower risk (PR 0.85, 95% CI 0.76–0.95) of inconsistent condom use. While alcohol consumption by FSWs was associated with inconsistent condom use with clients, injection drug use was not. FSWs working at railway stations and high- ways were more likely to use condoms inconsistently (PR 2.63, 95% CI 2.19–3.16 and PR 1.39, 95% CI 1.21–1.61, respectively). Also, FSWs, who searched for their clients via Internet/telephone or with a help of previous clients or other FSWs, had a higher risk of using condoms inconsistently (PR 1.76, 95% CI 1.51–2.06 and PR 2.53, 95% CI 1.84–3.39, respectively). FSWs working in regions with middle prevalence of HIV were more likely exhibit risky sexual behavior, PR 1.26, 95% CI 1.14–1.40.

Discussion

The aim of this study was to explore correlates of HIV-positive status and inconsistent condom use among Ukrainian FSWs. Our findings suggest that 5.6 % of sex workers have a positive HIV status. Results of previous surveys in Ukraine showed higher HIV prevalence among FSW (12.9 % in 2009 and 10 % in 2011) [4]. Possible reduction of prevalence may be attributed to differences in sampling procedures, effective prevention efforts [1] or mortality of the FSWs. Additionally, every third woman in this study reported inconsistent condom use. With so many Ukrainian FSWs not using condoms regularly, understanding factors that correlate with this risky behavior becomes imperative.

Our findings suggest that several socio-demographic characteristics were linked with FSWs HIV-positive status and inconsistent condom use. First, estimated HIV risk was higher for FSWs aged 22 and older. This finding is consistent with previous research that associated older female sex workers' age with higher rates of infectious diseases including HIV [17, 18]. This finding can be explained by the fact that older women could simply have a longer exposure to risky behaviors since a considerable number of Ukrainian FSWs do not use condoms.

Next, in our study, women's risk of testing HIV-positive was related to lower income. On one hand, it is possible that women from the lower-income category are not able to buy condoms

and select work environments with clients who exhibit more risky behaviors. On the other hand, even when condoms are available free of charge, low tier FSWs may agree to the client's request to provide sex services without a condom because of economic hardship. Since clients pay less for sex with a condom, FSWs earning very little for every intercourse may agree to sex without a condom for an extra fee. These women may have lower self-esteem and initially insufficient budgets to purchase clothes and enhance their body appearance enough to be accepted in work locations with more affluent clients who might have a higher motivation to use condoms. There was no significant association between inconsistent condom use and high income. These findings may indicate a higher motivation to take care of health and avoid dangers of unprotected sex on the part of well-paid FSWs.

We expected to see a negative relationship between education and inconsistency in condom use, and positive HIV status [19]. Contrary to our expectation, however, the risk of contracting HIV was not significantly different among more educated FSWs and FSWs who spent fewer years in educational systems. However, our findings indicated that women with vocational education were less likely to use condoms consistently. These results warrant an increased in HIV and condom use education among students of these educational institutions.

Our study supported the hypothesis that HIV-positive status would be significantly related to living in geographic regions with high prevalence of HIV. Still, our findings indicate that those FSWs who live in regions with a middle-level prevalence of HIV are most likely to use condoms inconsistently. Women from high HIV prevalence cities also had slightly elevated risk for inconsistent condom use; however, the risk was somewhat smaller than in middle HIV-prevalence cities. This finding may be explained by the longer history of HIV prevention programs and wider coverage with condom distribution programs in high prevalence region.

Place of solicitation of clients is another environmental factor that we included in our model. Our results suggest that women who worked on the highways were more likely to be HIV infected. Soliciting clients at railway stations and on the highways was also significantly related with inconsistent condom use. The finding that the FSWs working at railways and highways are less likely to use condoms consistently can be explained by the fact that these locations are often locales of choice of the lower tier FSWs [15] who have a higher risk of being abused and may pay less attention to personal health [14]. Additionally, women who solicited clients via the Internet, previous clients and through other FSWs were also less likely to use condoms in a consistent manner. It is a troubling finding given the limited opportunities to reach out to these women with traditional prevention services as well as the fact that this group of FSWs is rapidly growing [13, 15]. Overall, these findings highlight the importance of changing social and geographic environments for prevention of HIV and risky sex behaviors. The knowledge of high-risk settings can help use scarce resources in a more optimal way.

The number of clients served is another correlate that we believed would be significantly related to FSWs positive HIV status, and inconsistent condom use [20]. There was no significant relationship between the number of clients served and women's HIV-positive

status. However, women who served over 51 clients during past 30 days had a lower risk for inconsistent condom use. One possible explanation for this finding may be that women who attempt to provide services to vast numbers of clients are more likely to keep higher standards of safety. Still, additional research is needed to understand better what characteristics diminish the risk of inconsistent condom use in this group.

Substance use had an intricate relationship with the dependent variables in this study. In agreement with prior research on HIV among PWID [4], injection drug use was associated with HIV-positive status. Current IDU was the strongest predictor of positive HIV status among FSWs followed by an older age of study participants. The relationship between IDU and inconsistent condom use was present in the bivariate model but disappeared in the model that included all other variables. As for the risk of inconsistent condom use, frequent alcohol consumption had the highest adjusted odds-ratios, followed by providing sex services at the railway stations. FSWs at these locations often share alcohol drinks with their clients, and it is possible that alcohol use leads to cognitive disinhibition and prioritizing immediate biological cues over long-term consequences of unprotected sex.

Of particular concern was a finding that exposure to violence during work was a strong predictor of both inconsistent condom use and the positive HIV status. Not only it violates women rights but also serves as a power mechanism that drives the HIV risks. For example, abuse can effectively limit women's ability and freedom to negotiate condom use or regulate the number and type of clients. Also, it is possible that abuse can instigate or exacerbate injecting drugs as a mechanism to cope with emotions caused by abuse, which, in turn, can increase the HIV risks.

In addition to the influence of violence, our findings also suggested that FSWs, who were not clients of the NGOs, had a higher risk for inconsistent condom use. This finding underscores the importance of the continued provision of prevention services through the non-governmental sector.

Study Strengths and Limitations

Tailoring interventions requires a comprehensive understanding of the local sex industries that operate within country-specific cultural frameworks and legislative systems [11]. This study makes a significant contribution to the global knowledge of factors associated with HIV and sex risk behaviors by utilizing a large sample of FSWs, who provide services in a difficult-to-reach and relatively unstudied context of Ukraine. To our knowledge, this is the first study, which reported prevalence and correlates of HIV and inconsistent condom use among FSWs in Ukraine. Although this study brings important evidence about programmatically important correlates of HIV-positive status and condom use, several limitations need to be kept in mind when interpreting these findings.

Information bias is possible in this study due to insincere answers of FSWs to some sensitive questions like illicit substance use or condom use. Some FSWs may have been afraid of repercussions related to spreading STDs, potentially criminal behavior in Ukraine, and overreported the rates of condom use. As in any study of potentially stigmatic behaviors,

some participants of the present study could have provided biased and socially desirable answers. Due to the cross-sectional design of this study, we were not able to make any definite causal inferences. Some study participants were aware of their HIV-positive status at the time of the survey, which may also have influenced their current behaviors, including condom use and using services of NGOs. Nonetheless, characteristics found to be significantly associated with HIV status and inconsistent condom use in a cross-sectional study can provide insightful hypotheses about risk factors and socio economic determinants of HIV.

RDS, TLS and KI sampling methods used in this study are considered the first-choice for a hard-to-reach population. Although the developers of RDS methodology claim it to produce unbiased estimates, it could not be used in all cities in Ukraine. Hence, the most accessible part of the target population is more likely to be sampled. So, conclusions may not be validly generalized to the entire population of FSWs in Ukraine.

Although quantitative studies allow estimating the magnitude of the association between a variety of characteristics and condom use, they fail to see a more in-depth picture of risk behaviors and their possible causes. Future studies employing mixed methods approach would lead to the clearer picture of circumstances when risky sex occurs.

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Table 1

Logistic regressions predicting HIV status among FSWs (N = 4764)

Characteristic	Bivariate logistic regression			Multivariate logistic regression		
	OR (95 % CI)	Wald Chi square	P value	Adj OR (95 % CI)	Wald Chi square	P value
Place of solicitation						
Entertainment places (bars, restaurants, casinos, discos, nightclubs)	1.00			1.00		
Streets, bus stops	1.41 (0.85–2.33)	1.80	0.180	1.01 (0.59–1.71)	0.0004	0.984
Hotel, saunas, massage parlors	1.51 (0.83–2.74)	1.84	0.176	1.26 (0.68–2.33)	0.54	0.464
Railway stations	*2.33 (1.12–4.84)*	*5.15*	*0.023*	1.86 (0.87–3.98)	2.54	0.111
Via internet, telephone. TV-advertisements	0.90 (0.50–1.62)	0.11	0.736	0.74 (0.41–1.35)	0.95	0.331
With a help of previous clients and other FSW	1.07 (0.53–2.15)	0.04	0.845	0.86 (0.42–1.75)	0.18	0.668
With a help of agents	1.05 (0.59–1.87)	0.03	0.872	0.89 (0.49–1.62)	0.15	0.703
Highways	*2.85 (1.84–4.42)*	*22.03*	*0.001*	*1.66 (1.05–2.62)*	*4.69*	*0.030*
Other	1.16 (0.44–3.09)	0.09	0.763	1.19 (0.44–3.21)	0.11	0.738
Age (years)						
14–21	1.00			1.00		
22–35	*3.58 (1.94–6.62)*	*16.63*	*0.001*	*2.92 (1.57–5.44)*	*11.47*	*0.001*
36–62	*6.62 (3.47–12.63)*	*32.84*	*0.001*	*4.63 (2.39–8.96)*	*20.59*	*0.001*
Education						
Elementary (9 classes) or basic level of education (9 classes)	1.29 (0.89–1.85)	1.83	0.176	NA		
Secondary education (11–12 classes)	1.00			NA		
Vocational school	1.94 (0.70–1.27)	0.15	0.697	NA		
Higher education (with or without a earning the degree)	0.82 (0.57–1.18)	1.12	0.291	NA		
Income (last 30 days)						
UAH 3000 and less	1.35 (0.99–1.83)	3.60	0.058	*1.45 (1.05–2.00)*	*5.16*	*0.023*
UAH 3001–5000	1.00			1.00		
UAH 5001–7000	0.98 (0.70–1.39)	0.01	0.926	0.94 (0.65–1.35)	0.11	0.738
UAH 7001 and more	0.70 (0.44–1.10)	2.31	0.129	0.67 (0.42–1.08)	2.67	0.102
Region						
Low prevalence of HIV	1.00				1.00	
Middle prevalence of HIV	*1.71 (1.20–2.44)*	*8.63*	*0.003*	*1.58 (1.04–2.41)*	*4.60*	*0.0319*
High prevalence of HIV	*2.08 (1.50–2.89)*	*19.01*	*0.001*	*2.24 (1.53–3.28)*	*16.95*	*0.001*
Number of clients during last 30 days						
1–12	0.96 (0.63–1.45)	0.04	0.843	NA		
13–20	1.04 (0.70–1.55)	0.03	0.856	NA		
21–30	1.00			NA		
31–50	1.18 (0.79–1.76)	0.68	0.411	NA		
51?	1.16 (0.74–1.83)	0.43	0.514	NA		

Characteristic	Bivariate logistic regression			Multivariate logistic regression		
	OR (95 % CI)	Wald Chi square	P value	Adj OR (95 % CI)	Wald Chi square	P value
Alcohol use during last 30 days						
Never	1.00			NA		
1–5 times	1.10 (0.62–1.94)	0.10	0.75	NA		
6–19 times	0.97 (0.57–1.67)	0.01	0.92	NA		
20 times and more	*1.78 (1.03–3.08)*	*4.33*	*0.040*	NA		
Injection drug use during last 30 days	*6.70 (4.92–9.12)*	*145.99*	*0.001*	*4.87 (3.47–6.84)*	*83.875*	*0.001*
Ever experienced violence during sex work	*1.91 (1.48–2.47)*	*24.67*	*0.001*	*1.45 (1.09–1.93)*	*6.659*	*0.001*

Italic indicates the significant associations at $p<0.05$

Table 2

Poisson regression with robust error variance estimates predicting inconsistent condom use with clients among FSWs (N = 4759)

Characteristic	Bivariate Poisson regression			Multivariate Poisson regression		
	PR (95 % CI)	z score	P value	Adj PR (95 % CI)	z score	P value
Place of solicitation						
Entertainment places (bars, restaurants, casinos, nightclubs)	1.00			1.00		
Streets, bus stops	0.97 (0.83–1.14)	−0.36	0.717	1.05 (0.89–1.24)	0.58	0.560
Hotel, saunas, massage parlors	1.02 (0.84–1.25)	0.21	0.834	1.12 (0.92–1.35)	1.14	0.254
Railway stations	*2.12 (1.78–2.55)*	*8.21*	*<0.001*	*2.63 (2.19–3.16)*	*10.32*	*<0.001*
Via internet, telephone, TV-advertisements	*1.45 (1.24–1.68)*	*4.83*	*<0.001*	*1.76 (1.51–2.06)*	*6.38*	*<0.001*
With a help of previous clients and other FSWs	*1.93 (1.65–2.25)*	*8.28*	*<0.001*	*2.53 (1.84–3.39)*	*7.13*	*<0.001*
With a help of agents	0.90 (0.75–1.08)	−1.11	0.267	1.03 (0.86–1.24)	0.37	0.7115
Highways	*1.29 (1.12–1.49)*	*3.60*	*<0.001*	*1.39 (1.21–1.61)*	*4.47*	*<0.001*
Other	1.25 (0.96–1.65)	1.63	0.103	*1.35 (1.04–1.76)*	*2.25*	*0.0246*
Age (years)						
14–21	1.09 (0.98–1.21)	1.54	0.124	*1.12 (1.01–1.25)*	*2.16*	*0.031*
22–35	1.00			1.00		
36–62	0.89 (0.79–1.00)	−1.89	0.058	*0.82 (0.73–0.92)*	*−3.26*	*0.001*
Education						
Elementary (<9 classes) or basic level of education (9 classes)	*0.86 (0.75–0.99)*	*−2.04*	*0.042*	*0.83 (0.73–0.95)*	*−2.72*	*0.007*
Secondary education (11–12 classes)	1.00			1.00		
Vocational school	*1.20 (1.09–1.31)*	*3.83*	*<0.001*	*1.15 (1.05–1.25)*	*3.00*	*0.003*
Higher education (with or without a earning the degree)	0.98 (0.87–1.09)	−0.42	0.674	0.95 (0.85–1.07)	−0.82	0.412
Income (last30 days)						
UAH 3000 and less	*1.10 (1.00–1.21)*	*1.96*	*0.049*	1.05 (0.96–1.16)	1.07	0.286
UAH 3001–5000	1.00			1.00		
UAH 5001–7000	*0.85 (0.76–0.95)*	*−2.75*	*0.006*	*0.85 (0.76–0.95)*	*−2.93*	*0.003*
UAH 7001 and more	1.04 (0.92–1.17)	0.57	0.567	0.99 (0.88–1.13)	−0.08	0.933
Region						
Low prevalence of HIV	1.00			1.00		
Middle prevalence of HIV	*1.85 (1.67–2.06)*	*11.79*	*<0.001*	*1.26 (1.14–1.40)*	*4.36*	*<0.001*
High prevalence of HIV	*1.18 (1.07–1.31)*	*3.23*	*0.001*	*1.13 (1.02–1.26)*	*2.40*	*0.0163*
Number of clients during last 30 days						
1–12	1.05 (0.93–1.19)	0.77	0.4434	0.94 (0.82–1.06)	−1.05	0.294
13–20	1.10 (0.98–1.24)	1.64	0.101	0.98 (0.87–1.10)	−0.35	0.725
21–30	1.00			1.00		
31–50	0.91 (0.84–1.07)	−1.38	0.168	0.95 (0.81–1.04)	−0.80	0.4217
51?	*0.61 (0.51–0.72)*	*−5.57*	*<0.001*	*0.63 (0.53–0.75)*	*−5.22*	*\0.001*
Alcohol use during last 30 days						
Never	1.00			1.00		

Characteristic	Bivariate Poisson regression			Multivariate Poisson regression		
	PR (95 % CI)	z score	P value	Adj PR (95 % CI)	z score	P value
1–5 times	*2.17 (1.63–2.89)*	*5.29*	*<0.001*	*2.04 (1.54–2.71)*	*4.97*	*<0.001*
6–19 times	*2.65 (2.01–3.50)*	*6.89*	*<0.001*	*2.41 (1.83–3.17)*	*6.26*	*<0.001*
20 times and more	*3.15 (2.38–4.17)*	*8.04*	*<0.001*	*2.95 (2.22–3.90)*	*2.95*	*<0.001*
Injection drug use during last 30 days	*1.22 (1.05–1.41)*	*2.66*	*0.008*	*NA*	*NA*	*NA*
Not being a client of NGO providing HIV prevention services	*1.68 (1.55–1.81)*	*13.16*	*<0.001*	*1.59 (1.47–1.72)*	*11.42*	*<0.001*
Ever experienced violence during sex work	*1.21 (1.12–1.31)*	*4.77*	*<0.001*	*1.18 (1.09–1.28)*	*3.93*	*<0.001*

Italic indicates the significant associations at $p<0.05$