

Hepatitis C Prevalence, Correlates, and Social Networks among Cisgender Women who
Participate in Sex Work in Seattle, WA

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Abstract

Hepatitis C Prevalence, Correlates, and Social Networks among Cisgender Women who Participate in Sex Work in Seattle, WA

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Background: Globally, injection drug use (IDU) is common among cisgender women who participate in sex work (CWSW), placing them at heightened risk of HCV acquisition and transmission. However, the epidemiology of HCV among CWSW in the United States is not well understood. In this study among CWSW in Seattle, we sought to estimate HCV prevalence, identify correlates of HCV seropositivity, and characterize recruitment networks by serostatus and IDU history.

Methods: This study is a secondary analysis of data from the 2016 National HIV Behavioral Surveillance (NHBS) survey in Seattle, WA, a cross-sectional survey which used respondent-driven sampling (RDS) methods to recruit women who reported exchanging sex for money or drugs. We estimated HCV seropositivity among CWSW and used log binomial regression to estimate prevalence ratios (PRs) for correlates of HCV seropositivity at an α -level of 0.05. Using RDS recruitment chain data, we computed homophily indices to estimate the extent to which

participants were likely to recruit another participant with the same HCV serostatus and history of IDU, beyond random chance.

Results: We estimated HCV seropositivity prevalence to be 60.5% (95% CI: 54.6, 66.1) among the sample of largely (61%) street-based CWSW in Seattle. In bivariate models, CWSW who were HCV seropositive were more likely than those who were HCV seronegative to report ever injecting drugs (PR: 7.51 [3.33, 16.96]) and less likely to report using only drugs other than opioids or methamphetamine by non-injection routes in the past 12 months (PR: 0.53 [0.31, 0.91]). In the multivariate model, the association between HCV seropositivity and IDU remained (PR_{adj}: 8.03 [3.45, 18.66]) and there was no association with non-injection drugs. The RDS-based homophily scores for HCV-seropositivity (0.07) and ever injecting drugs (0.02) suggested that participants did not tend to recruit others with the same characteristics much beyond chance.

Conclusion: Among CWSW in Seattle, HCV prevalence is high and is strongly associated with a history of IDU. The high burden of HCV among CWSW motivates the provision of health services developed with a harm reduction lens for this population as well as the opportunity to target this population with treatment by direct acting antiviral (DAA) drugs. The analysis of RDS recruitment chains revealed little evidence of preferential recruitment among CWSW who were HCV-seropositive or reported a history of IDU, which suggests the potential futility of peer- or network-based referrals for HCV treatment.

Introduction

Existing public health research among cisgender women who participate in sex work (CWSW) has found that drug use, including injection drug use (IDU), is common globally.^{1,2,3} Studies from international settings have documented that sex work is associated with hepatitis C virus (HCV) acquisition.^{4,5} Among CWSW who do not inject drugs, HCV risk is attributed to sexual exposure facilitated by the presence of sexually transmitted infections and to non-injection drug use.⁴ Further, the experiences of sex work and having multiple sexual partners also intersect with IDU to increase risk of HCV acquisition.^{4,6} Among people who inject drugs (PWID), women are more likely than men to engage in risky injection behaviors such as sharing injection equipment and having drugs prepared by another person,^{7,8} and may be less likely to be treated for HCV.⁹ Such findings highlight the vulnerability of CWSW who inject drugs to HCV acquisition, chronic infection, and resulting sequelae. Most previous research has been among populations outside of the United States and little analogous research has been conducted on the epidemiology of HCV among CWSW in the US.

The availability of direct-acting antiviral (DAA) drugs that cure HCV more safely and reliably than interferon-based treatments¹⁰⁻¹² provide an opportunity to prevent HCV-related sequelae and community transmission among CWSW others at risk of HCV acquisition,¹³ much like antiretroviral drugs (ARVs) treat HIV and prevent its transmission.¹⁴ The HCV-specific interplay between IDU and sex work in an American setting must be better understood to reach populations of CWSW with targeted, culturally appropriate public health services, given the documented associations between HCV and experiences common in this population.^{4,5,15} The vulnerability of CWSW to blood-borne pathogen transmission associated with IDU is further reflected in the HIV outbreaks among PWID that have been identified throughout the United States in the past five years.¹⁶⁻¹⁹ Previous studies among PWID have found peer referral to be an effective means of linking PWID with HCV care,^{20,21} but most of this research has been

conducted outside of the US. The feasibility of such HCV interventions in American cities would be better understood with study on social networks.

Designed to address these knowledge gaps, the aims of this study were to, among CWSW in Seattle (1) estimate the prevalence of HCV seropositivity, (2) identify correlates of HCV seropositivity, and (3) characterize social networks by analyzing participant recruitment trees, measuring whether and to what extent, beyond chance, individuals were likely to recruit others with the same HCV serostatus and history of IDU.

Methods

Subjects

The present study is a secondary analysis of cross-sectional data from the 2016 National HIV Behavioral Surveillance (NHBS) survey in Seattle, WA conducted by Public Health – Seattle & King County (PHSKC). PHSKC staff identified participants using respondent-driven sampling (RDS),²² a recruitment method that uses incentivized peer referrals. Between June and December 2016, staff interviewed participants at a site located in the Pioneer Square neighborhood of Seattle and a homeless services center in North Seattle. Leadership suspended the latter after a short time due to limited recruitment success. Potential participants were eligible if they (1) had not already participated in the 2016 NHBS survey (2) lived in King County, WA or Snohomish County, WA (3) were 18-60 years old at time of their study visit (4) reported having vaginal or anal sex with a person of the opposite sex in the past 12 months (5) were cisgender women and (6) were able to complete the NHBS survey in English or Spanish. In accordance with RDS methods which involve the use of structured incentives,²² participants received \$50 for completing the survey and having a rapid HIV test, plus \$10 (adjusted to \$20 midway through the recruitment process) for each additional participant they referred. Twenty-seven seed participant recruiters were identified by PHSKC during a formative assessment process, per NHBS guidelines. Respondents who reported exchanging sex for money or drugs

could recruit up to five other individuals, and participants were linked to their recruiter by a unique identifier associated with the recruitment coupon. The limited number of referrals allowed by each participant was set by CDC to minimize potential for bias. In total, recruitment efforts yielded 383 participants, which includes those who did and did not report exchanging sex for money or drugs. Of those, 298 reported exchanging sex and were the focus of this analysis. After further restricting to those for whom an HCV serostatus was available, the final sample for the present study was 291. The Washington State Institutional Review Board approved all study activities. The University of Washington Human Subjects Division approved the present analysis.

Data Collection

PHSKC staff conducted face-to-face structured surveys with participants using portable computers. Project coordinators trained staff to administer questionnaires in a standardized manner and question logic was applied automatically by the questionnaire computer interface. Staff members administered both core and local questionnaires. Core questionnaires are common to all NHBS sites and consist of demographic, behavioral, and health questions. Staff administered local questionnaires upon the completion of core questionnaires. These addressed partner violence, sexual practices, condom use, intentions to get pregnant, and interactions with local service agencies. Core and local questions used for the present study are detailed in the *Measures* sub-section. Staff offered incentivized OraQuick® rapid HIV and HCV testing upon completing questionnaires and uploaded test results to a secure data transfer portal. At time of testing, participants received pre- and post-test counseling, with referrals as needed.

Measures

The primary outcome of interest for the present study was HCV seropositivity, measured by rapid HCV test result. Study staff also collected survey data on history of HCV infection (e.g.

“Has a doctor, nurse or other healthcare provider ever told you that you had hepatitis C?”) and treatment (e.g. “Have you ever taken medicine to treat your hepatitis C infection?”).

The NHBS core and local questionnaires afforded the study team the opportunity to analyze many exposures of interest. We organized these into demographic, behavioral, health, and experiential characteristics. Unless otherwise noted, we treated exposure variables in analyses as they were collected by PHSKC staff (i.e., analyses used data exactly as they were originally coded) and were specific to the 12-month period preceding a study visit.

Demographic characteristics included: housing instability, area of residence measured by ZIP code, age, country of birth, primary language, racial and ethnic identity, marital status (made binary and analyzed as “married/live-in partner” and “not married/no live-in partner”), highest level of education attained (aggregated into three categories from the original six collected), and income (aggregated into three categories from the original five collected).

Behavioral characteristics included: ever injected drugs and, among those with a history of IDU, age at injection debut, specific drugs injected (aggregated into four categories: opioids and no methamphetamines, methamphetamines and no opioids, both opioids and methamphetamines, and neither methamphetamine or opioids), shared syringes, and shared non-syringe injection equipment. Other behavioral characteristics of interest: drugs used but not injected (aggregated into the same four categories as specific drugs injected, plus a fifth “none” category), report of vaginal sex and of anal sex in the context of sex work, and report of condomless sexual intercourse in any setting.

Health characteristics included: HIV status (measured by rapid HIV test results when available and self-reported HIV status otherwise), having seen a healthcare provider, and self-reported diagnosis of syphilis, gonorrhea, and/or chlamydia.

Experiential characteristics included: incarceration, violence transgression by a client, sexual coercion (e.g. being forced into sexual activity without consent), and the venues/means through which sex clients were met.

Analysis

We conducted statistical analyses in the *RStudio* environment²³ and made all estimates with an α -level of 0.05. Using the *EpiR* package,²⁴ we estimated prevalence of HCV among CWSW in Seattle. We used bivariate log binomial regression models to estimate prevalence ratios (PRs) for HCV seropositivity comparing individuals in terms of the demographic, behavioral, health, and experiential characteristics previously described. With variables that were significantly associated with HCV seropositivity in bivariate analyses, we constructed a multivariate model to adjust for potential confounding. Using *RDS Analysis Tool*²⁵ we analyzed participant recruitment trees by calculating homophily indices²⁶. Although RDS analytic methods can include an adjustment for the recruitment method,²⁷ the present study was analyzed as a convenience sample. Using *RDS Analyst*,²⁸ a program of *RStudio*, we visualized these recruitment trees (Figures 1 & 2).

Results

Among the 291 participants included in the present analysis, 22% were American Indian & Alaska Native, 27% were Black, 11% were Hispanic or Latinx, and 65% were White. (Participants could identify as more than one race). Challenging socioeconomic circumstances were common; half (50%) of participants were unstably housed or homeless, 67% had obtained a high school education at most, and 79% reported an annual income of under \$20,000. Most participants (79%) reported a lifetime history of injection drug use, among whom 57% reported injecting primarily heroin/opioids in the past 12 months, 60% reported sharing injection equipment of any kind in the same period, and the median age at first injection was 22 years. Eleven (4%) participants were HIV-positive, 32% reported having been incarcerated in the past 12 months, and violence was common; 11% reported physical violence transgressed by a client and 17% reported sexual coercion by any partner in the past 12 months. The most common

venues/means through which participants reported meeting sex clients were on the street (61%), public places such as shopping centers and bars (53%), through drug connections (53%), and through family/friends (51%). Healthcare engagement was high with 93% of participants reporting any healthcare provider visit in the past 12 months. Still, among HCV-positive participants, only 13% had ever been treated for that infection. Table 1 provides detailed data on participant characteristics.

We estimated an overall HCV seropositivity prevalence of 60% (95% CI: 55, 66) among CWSW in Seattle. Prevalence was 74% (95% CI: 68, 79) among those who reported ever injecting drugs and 10% (95% CI: 4, 20) among those who never injected drugs.

CWSW who were HCV seropositive were more likely than those who were HCV seronegative to report ever injecting drugs (PR: 7.51 [95% CI: 3.33, 16.96] $p < 0.0001$) and less likely to report using only non-injection drugs besides opioids and methamphetamines in the past 12 months (PR: 0.53 [0.31, 0.91], $p = 0.022$). No racial identity was strongly associated with HCV seropositivity, but among participants who identified as Black, there was a borderline significant ($p = 0.059$) negative association with HCV seropositivity (PR: 0.70 [0.49, 1.01]). All prevalence ratios calculated in this study are presented in Table 1.

The multivariate model (Table 2) found that a history of HCV seropositivity remained independently associated with a history of IDU (PR_{adj}: 8.03 [3.45, 18.66]). Non-injection use of non-opioid and non-methamphetamine drugs was no longer significantly associated with HCV seropositivity (PR_{adj}: 1.00 [0.57, 1.74]).

Figures 1 and 2 depict recruitment trees of participants, color-coded by their HCV status (Fig. 1) and IDU history (Fig. 2). The RDS-based homophily scores for HCV-seropositivity (0.07) and ever injecting drugs (0.02) suggested that participants did not tend to recruit others with the same characteristics much beyond chance. Based on the homophily indices, we found that: (1) participants who were HCV-seropositive recruited other HCV-seropositive participants preferentially 7% of the time, (2) HCV-seronegative participants recruited other HCV-

seronegative participants preferentially 24% of the time, (3) participants with a history of IDU recruited others with a history of IDU preferentially 3% of the time, and (4) participants with no reported history of IDU recruited others with no history of IDU preferentially 26% of the time. Affiliation matrices and associated homophily indices are presented in Tables 3 & 4.

Discussion

This study found a very high prevalence of HCV seropositivity among CWSW in Seattle, highlighting the need for targeted HCV services and interventions for this population. IDU was also common in this population and, not surprisingly, HCV prevalence was estimated to be 7.5 times higher among those with a history of IDU than those without. Only 10% of participants who did not endorse a history of IDU were HCV-seropositive. It is difficult to comment on whether these individuals acquired HCV sexually, or perhaps through another route of exposure. It is possible that participants may have underreported IDU history due to social desirability bias. Were this so, our PR_{adj} estimate of 8.03 was biased toward the null and is higher in truth.

Among participants whose rapid HCV test was positive, 13% reported a history of HCV treatment. This is approximate to a 2019 estimate of HCV treatment coverage among PWID in the Seattle area of 17%²⁹ but lower than a 2021 estimate of 26%.⁹ It is difficult to comment on the speed with which people living with HCV are linked to DAAs locally, since no such analogous work has been done. It is likely that most participants in 2016 who reported history of HCV treatment were treated with interferon rather than DAAs. Still, considering the safety of DAAs and Washington State's plans to eliminate HCV,³⁰ there is a clear need to reach any populations with high HCV prevalence – including CWSW – with these medications to prevent HCV-related morbidity and community transmission.

Data used in the present study did not permit further investigation into active HCV infection, as HCV antigen and/or RNA testing was not available. Based on prior work,^{31,32} we

estimate that 75% of those who were HCV seropositive had an active infection. Accounting for misclassification of HCV serostatus based on spontaneous clearance or cure by treatment, we expect that our estimate of the association between HCV seropositivity and IDU is biased toward the null. This would not meaningfully influence our conclusions about the IDU/HCV relationship, as the true association would be stronger than our estimate.

The only other variable that was significantly associated with HCV seropositivity was the non-injection use of drugs besides opioids and methamphetamines. We hypothesize that this is likely due to the correlation between any heroin/opioid use and IDU. For example, it is likely that people who use heroin/opioids in non-injection settings are more likely to inject than those who do not use heroin/opioids. This association was only significant in bivariate analyses; in the multivariate model, a history of IDU was the only factor independently associated with HCV seropositivity.

Results of the homophily index calculations suggest that CWSW who are HCV seropositive and those who had a history of IDU were only marginally more likely to recruit others who shared these qualities; thus, our findings do not suggest particularly strong recruitment homophily among CWSW who are HCV-seropositive or those who have ever injected drugs. These findings suggest that CWSW may build social links on their shared experience of engagement in sex work, rather than along lines of drug use behaviors or health experience. Notably, few (21%) participants reported never having used injection drugs, and 40% of participants were HCV-seronegative. As these groups had the stronger homophily scores (+0.26 and +0.24, respectively), it may be inferred that CWSW who do not use injection drugs and those who do not have HCV are distinct from the majority who do have HCV and who do inject drugs. We had hypothesized that HCV treatment interventions involving peer referral may be beneficial to this population, but these data do not support this.

There were several limitations to this study. While this cross-sectional study precludes temporal or causal inference in terms of HCV seropositivity, it is likely that most of the HCV

seropositivity in the study sample is attributable to remote injection drug use, rather than recent use. This implies that experiences of the past 12 months, the time constraint of many questions used for this analysis, may not be relevant to the outcome of interest since they may have happened after people became HCV-seropositive. Though the study sample is small, it likely is representative of a subset of largely street-based CWSW in Seattle in 2016, given the success of RDS in studying this population in another American setting.³³ Still, CWSW is a vulnerable population deserving of more robust research work than irregular cross-sectional surveys. That data were collected before this analysis was conceived presented further challenges in classifying some outcomes of interest; for example, variables regarding drug use were constructed using multiple variables from the original analysis rather than a single original variable. These data were collected in 2016, so it is not clear how they apply to the present. In the context of the COVID-19 pandemic and the displacement experienced by many people because of it, it is not possible to know how the population of interest has changed since primary data collection was conducted. It is conceivable that the profile of this small and likely transient population has shifted since that time.

The results of this study among CWSW in Seattle largely confirm what others from around the world have found: a high burden of HCV and a strong association of HCV-seropositivity with IDU. This study found that the likelihood of ever having been exposed to HCV among CWSW was not associated with sexual risk or other experiential characteristics in bivariate models, suggesting that interventions for PWID in general terms may be appropriate for a population of CWSW. This vulnerable and marginalized population, wherein this study confirmed housing instability and intimate partner violence are common, is worthy of in-depth public health study and attention from health departments nationally. This is particularly so in the context of the opioid epidemic in the United States³⁴ which is strongly associated with increases in HCV incidence.³⁵ As the opioid epidemic persists, populations of CWSW may continue to carry high burdens of HCV and IDU and further study is warranted to mitigate these

potential public health crises for people in this population. In the context of widely available DAA treatment, public health agencies and medical providers are equipped to intervene in the spread of HCV among CWSW, and future studies should further explore the best way to approach this public health problem.

Tables & Figures

Table 1: Characteristics & HCV Seropositivity Prevalence Ratios among CWSW in Seattle (NHBS HET4 2016)
N = 291

Characteristic	HCV-positive (176, 60.5%)	HCV-negative (115, 39.5%)	Overall	PR (95% CI)	p-value
	N (%)				
Age					
18 – 29	10 (6%)	17 (15%)	27 (9%)	reference	
30 – 39	41 (23%)	35 (30%)	76 (26%)	1.46 (0.73, 2.91)	0.286
≥ 40	125 (71%)	63 (55%)	188 (65%)	1.80 (0.94, 3.42)	0.750
Race & Ethnicity*					
American Indian & Alaska Native	43 (24%)	22 (19%)	65 (22%)	1.12 (0.80, 1.59)	0.505
Asian	4 (2%)	5 (4%)	9 (3%)	0.73 (0.27, 1.96)	0.531
Black & African American	36 (20%)	44 (38%)	80 (27%)	0.70 (0.49, 1.01)	0.059
Hispanic or Latinx	18 (10%)	13 (11%)	31 (11%)	0.96 (0.71, 1.56)	0.855
Native Hawaiian & Pacific Islander	6 (3%)	0	6 (2%)	1.68 (0.74, 3.78)	0.214
White	122 (69%)	67 (58%)	189 (65%)	1.22 (0.89, 1.68)	0.225
Country of birth					
United States	168 (96%)	110 (96%)	278 (96%)	reference	
Another country	8 (5%)	4 (4%)	12 (4%)	1.1 (0.54, 2.24)	0.786
Language Spoken					
English	147 (83%)	106 (92%)	253 (87%)	reference	
Spanish	29 (17%)	9 (7%)	38 (13%)	1.31 (0.88, 1.96)	0.180
Housing Status					
Stable	88 (50%)	56 (49%)	144 (50%)	reference	
Unstable or homeless	88 (50%)	59 (51%)	147 (50%)	0.98 (0.73, 1.32)	0.891
Marital Status					
Not married/no live-in partner	19 (11%)	15 (13%)	34 (12%)	reference	
Married/live-in partner	157 (89%)	100 (87%)	257 (88%)	0.91 (0.57, 1.47)	0.531
Highest level of education					
High school/GED or less	126 (72%)	69 (60%)	195 (67%)	reference	
2-year college/technical school/some college	47 (26%)	40 (35%)	87 (30%)	0.84 (0.60, 1.17)	0.295
4-year college and beyond	3 (2%)	6 (5%)	9 (3%)	0.52 (0.16, 1.62)	0.257
Income (annual)					
Less than \$20,000	136 (77%)	94 (82%)	230 (79%)	reference	
\$20,000 – \$39,999	26 (15%)	12 (10%)	38 (13%)	1.16 (0.76, 1.76)	0.495
\$40,000 and higher	14 (8%)	9 (8%)	23 (8%)	1.03 (0.59, 1.78)	0.918
Neighborhood/Suburb					
Seattle (city proper)	164 (93%)	105 (91%)	269 (93%)	reference	
South King Co. Communities	6 (3%)	5 (4%)	11 (4%)	0.89 (0.40, 2.02)	0.789
North King Co. & East Side King Co. Communities	2 (1%)	3 (3%)	5 (2%)	0.66 (0.16, 2.65)	0.554
Snohomish County	2 (1%)	2 (2%)	4 (1%)	0.82 (0.20, 3.31)	0.780
Injection drug use, ever					
	170 (97%)	60 (52%)	230 (79%)	7.51 [§] (3.33, 16.96)	<0.0001
Age at injection debut**					
Mean (SD):	22 (7)	25.7 (8)	23 (8)	0.98 (0.96, 1.01)	0.143
Median	21	24.5	22		
(IQR):	(17, 28)	(19, 33)	(17, 29)		
Drugs injected most often***††					
Heroin/opioids	70 (41%)	14 (23%)	84 (37%)	reference	
Methamphetamines	8 (5%)	8 (13%)	16 (7%)	0.60 (0.29, 1.25)	0.373
Both	53 (31%)	16 (27%)	69 (30%)	0.92 (0.65, 1.32)	0.182

Neither	39 (23%)	22 (37%)	61 (27%)	0.77 (0.52, 1.14)	0.200
Drugs used but not injected[¶]					
Heroin/opioids	41 (23%)	16 (14%)	57 (20%)	<i>reference</i>	
Methamphetamines	28 (16%)	18 (16%)	46 (16%)	0.85 (0.52, 1.37)	0.496
Both	69 (39%)	39 (34%)	108 (37%)	0.89 (0.60, 1.31)	0.548
Neither; other drugs only	19 (11%)	31 (27%)	50 (17%)	0.53 [§] (0.31, 0.91)	0.022
No drug use in the past 12 months	18 (10%)	11 (10%)	19 (10%)	0.86 (0.50, 1.50)	0.602
Report of vaginal sex with clients[¶]	171 (97%)	112 (97%)	283 (97%)	1.06 (0.39, 2.85)	0.912
Report of anal sex with clients[¶]	80 (46%)	35 (30%)	115 (40%)	1.28 (0.95, 1.73)	0.102
Condomless sex[¶]	144 (82%)	99 (86%)	243 (84%)	0.97 (0.56, 1.69)	0.924
Shared syringes^{***¶}	74 (44%)	20 (33%)	94 (41%)	1.12 (0.82, 1.51)	0.481
Shared other injection equipment^{***¶}	99 (58%)	27 (45%)	126 (55%)	1.15 (0.85, 1.56)	0.366
HIV status					
Positive	7 (4%)	4 (4%)	11 (4%)	1.05 (0.50, 2.25)	0.891
Negative	169 (96%)	111 (96%)	280 (96%)	<i>reference</i>	
History of HCV treatment^{***}	23 (13%)	N/A	23 (8%)	N/A	
Saw a healthcare provider[¶]	165 (94%)	105 (91%)	270 (93%)	1.17 (0.63, 2.15)	0.621
STI diagnosis[¶]	17 (10%)	13 (11%)	30 (10%)	0.93 (0.57, 1.54)	0.784
Incarceration[¶]	59 (34%)	34 (30%)	93 (32%)	1.02 (0.74, 1.41)	0.887
Violence from a client[¶]	19 (11%)	13 (11%)	32 (11%)	0.98 (0.61, 1.58)	0.932
Sexual coercion[¶]	35 (20%)	15 (13%)	50 (17%)	1.25 (0.85, 1.84)	0.527
How sex clients were met[¶]					
Walking on the street	116 (66%)	62 (54%)	178 (61%)	1.03 (0.73, 1.44)	0.882
Public places	93 (53%)	56 (49%)	149 (51%)	0.92 (0.67, 1.25)	0.591
Online	38 (22%)	25 (22%)	63 (22%)	0.91 (0.63, 1.31)	0.619
Strip club	8 (5%)	5 (4%)	13 (4%)	0.95 (0.47, 1.93)	0.885
Through drug dealer/drug house	93 (53%)	53 (46%)	146 (50%)	0.96 (0.71, 1.32)	0.820
Massage parlor/brothel	3 (2%)	2 (2%)	5 (2%)	0.93 (0.30, 2.90)	0.895
Escort service	22 (13%)	6 (5%)	28 (10%)	1.25 (0.80, 1.96)	0.333
Manager/pimp/madame	11 (6%)	7 (6%)	18 (6%)	0.94 (0.51, 1.73)	0.845
Through boyfriend/husband	30 (17%)	21 (18%)	51 (18%)	0.89 (0.60, 1.32)	0.560
Through family/friend	90 (51%)	56 (49%)	146 (50%)	0.90 (0.66, 1.22)	0.482

* Individual participants could indicate multiple categories for this variable. Participants who reported categories are included in each of those groups; some individuals appear in multiple cells and PR estimates.

** Among those with a lifetime history of injection drug use.

*** Among those with evidence of past or current HCV infection.

¶ Indicates that participants were asked about only the past 12 months.

§ Indicates that estimate is significant at an alpha-level of 0.05.

Table 2: Multivariate Log Binomial Regression Model Results estimating HCV seropositivity prevalence ratios among women who participate in sex work in Seattle, WA (NHBS HET4 2016)
N = 290*

<i>Characteristic</i>	<i>PR_{adj} estimate (95% CI)</i>	<i>p-value</i>
Injection Drug Use, ever	8.03 [§] (3.45, 18.66)	<0.0001
Drugs used but not injected[¶]		
Heroin/opioids	<i>reference</i>	
Methamphetamines	0.88 (0.54, 1.42)	0.602
Both	0.82 (0.56, 1.20)	0.310
Neither; other drugs only	1.00 (0.57, 1.74)	0.988
No drug use in the past 12 months	0.85 (0.49, 1.57)	0.554

*One observation deleted by model due to missingness in *drugs used* variable

[¶] Indicates that participants were asked about only the past 12 months.

[§] Indicates that estimate is significant at an alpha-level of 0.05.

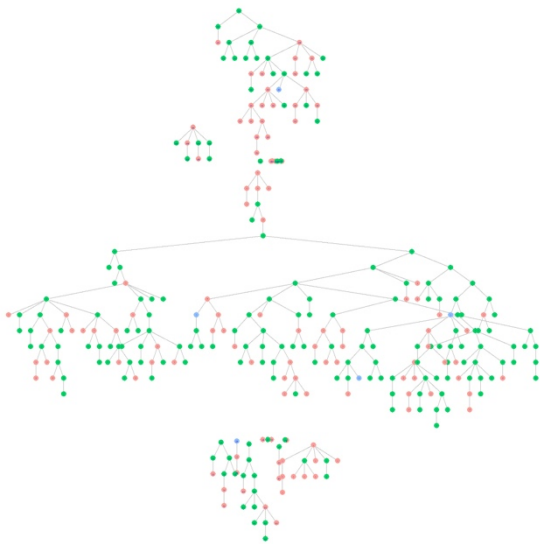
Table 3: Affiliation Matrix & associated homophily scores among CWSW in Seattle (NHBS HET4 2016)
HCV Status

		Recruited HCV status	
		Positive	Negative
Recruiter HCV status	Positive	119 (0.07)	55 (-0.07)
	Negative	46 (-0.24)	46 (0.24)

Table 4: Affiliation Matrix associated homophily scores among CWSW in Seattle (NHBS HET4 2016)
History of IDU

		Recruited IDU history	
		Ever injected	Never injected
Recruiter IDU history	Ever injected	187 (0.03)	40 (-0.03)
	Never injected	26 (-0.26)	17 (0.26)

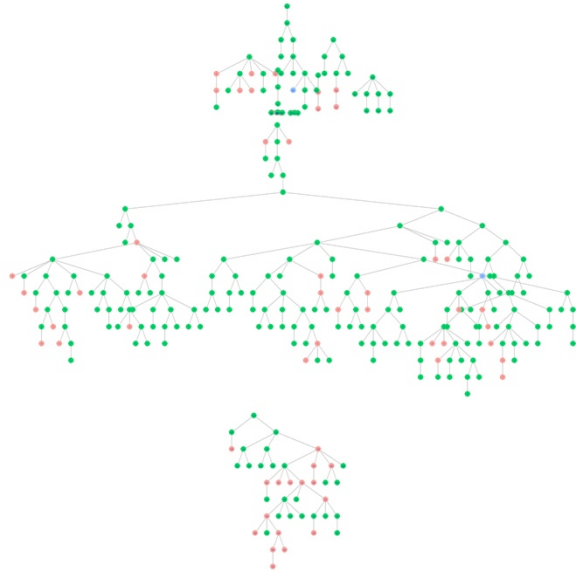
Figure 1: Recruitment Tree of HCV Status among CWSW in Seattle (NHBS HET4, 2016)



Legend

- Red:** HCV-negative
- Green:** HCV-positive
- Blue:** No valid HCV serostatus data

Figure 2: Recruitment Tree of IDU History among CWSW in Seattle (NHBS HET4, 2016)



Legend

- Red:** No history of IDU
- Green:** History of IDU
- Blue:** No valid IDU history data

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