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## SHORT REPORT

# Female sex workers incarcerated in New York City jails: prevalence of sexually transmitted infections and associated risk behaviors

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**ABSTRACT**

**Objectives** Sexually transmitted infections (STIs) are an important cause of morbidity among incarcerated women and female sex workers (FSW). Little is known about FSW incarcerated in New York City (NYC) jails. We reviewed jail health records to identify the STI and HIV prevalence among newly incarcerated FSW in NYC jails. We also examined the relationship of demographics and self-reported clinical and risk behaviour history with FSW status and compared FSW with non-FSW incarcerated women to identify FSW predictors and, guide NYC jail programme planning and policy.

**Methods** We retrospectively reviewed routinely collected jail health record data to identify the prevalence of chlamydia (Ct), gonorrhoea (Ng) and HIV infection among women newly incarcerated in NYC jails in 2009–2010 (study period) and studied the relationship of STIs, demographics and self-reported clinical and risk behaviour history with FSW status.

**Results** During the study period, 10 828 women were newly incarcerated in NYC jails. Of these, 10 115 (93%) women were tested for Ct and Ng; positivity was 6.2% (95% CI 5.7% to 6.7%) and 1.7% (95% CI 1.4% to 1.9%), respectively. Nine percent had HIV infection. Seven hundred (6.5%) were defined as FSW. FSW were more likely to have Ct (adjusted OR (AOR): 1.55; 95% CI 1.17 to 2.05;  $p < 0.0001$ ) but not Ng or HIV. FSW were more likely to report age 20–24 years, reside in boroughs other than Manhattan,  $\geq 6$  prior incarcerations,  $\geq 2$  incarcerations during the study period, condom use with current sex partners, multiple sex partners and current drug use.

**Conclusions** Women incarcerated in NYC jails had high rates of Ct, Ng, and HIV infection. FSW were at higher risk for Ct than non-FSW incarcerated women. These findings are being used to design targeted interventions to identify FSW, provide clinical and preventive services in jail and coordinate care with community partners.

women for STI. Correctional settings with comprehensive screening programmes identify high rates of human immunodeficiency virus (HIV), chlamydia (Ct) and gonorrhoea (Ng) infection among women.<sup>6</sup> As such, STI and HIV testing, treatment and prevention efforts are public health priorities for correctional settings and public health agencies.

Little is known about STI and HIV infection among FSW incarcerated in New York City (NYC) jails. Identifying FSW in jail is difficult; women may not disclose sex work, and currently, jail clinicians do not specifically inquire about it. Prostitution criminal charge is often the only available, though insufficient, FSW marker; other means to identify FSW are needed. We retrospectively reviewed NYC jail health records of newly incarcerated FSW (identified by prostitution charges) with medical intake examinations during 2009–2010 to identify their STI and HIV positivity. We also examined the relationship of demographics and self-reported clinical and risk behaviour history with FSW status and compared FSW to non-FSW incarcerated women to identify FSW predictors and guide NYC jail programme planning and policy.

**METHODS**

NYC's jail system is the second largest in the USA, annually receiving >80 000 new admissions, including >9 000 women. Facilities are operated by the Department of Correction (DOC); health-care delivery is overseen by Department of Health and Mental Hygiene (DOHMH). Within 24 h of jail admission, newly incarcerated women receive a medical history and physical (intake) including routine voluntary rapid HIV testing and urine- or endocervical swab-based Ct and Ng screening. Median length of stay (LOS) is 7 days; ~25% of women are released  $\leq 3$  days after admission. Ct and Ng test results are available within 3 days, enabling treatment of >65% of STI-diagnosed women with appropriate antimicrobials prior to release. During testing, women are educated about DOHMH STI clinics where they may receive test results, treatment and partner notification assistance. HIV-infected women receive treatment if indicated and discharge planning.

Routine jail electronic health record (EHR) data were extracted for newly incarcerated women having  $\geq 1$  medical intake from 1 January 2009 to 31 December 2010 (study period) and included demographics, self-reported HIV history, sexual

**INTRODUCTION**

Sexually transmitted infections (STI) are an important cause of morbidity among incarcerated women and female sex workers (FSW).<sup>1–3</sup> Incarcerated women, particularly FSW, are at increased risk for STI and often report risk behaviours including unprotected sex, sex for drugs or money or multiple sex partners.<sup>2–4</sup> Inadequate health insurance coverage and access to needed clinical and social services are commonly reported.<sup>4–5</sup> Incarceration, thus, provides a unique opportunity to screen high-risk



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**Table 1** Factors associated with being a female sex worker among women incarcerated in New York City jails, 2009–2010

	Total N	Female sex worker-Yes N	(Row %)	Univariate logistic regression OR (95% CI)	Multivariate logistic regression OR (95% CI)
TOTAL	10828	700	(6.5)		
<i>Demographic/incarceration characteristics</i>					
<i>Age, years*</i>					
16–19	1070	69	(6.4)	0.96 (0.72 to 1.28)	1.07 (0.77 to 1.49)
20–24	1689	136	(8.1)	1.22 (0.97 to 1.53)	1.42 (1.09 to 1.85)
25–34	2595	198	(7.6)	1.15 (0.94 to 1.42)	1.26 (1.00 to 1.58)
35–44	2852	191	(6.7)	Reference	Reference
45–54	2258	102	(4.5)	0.66 (0.52 to 0.84)	0.83 (0.64 to 1.08)
≥55	354	4	(1.1)	0.16 (0.06 to 0.43)	0.33 (0.12 to 0.91)
Unknown	10	0	(0.0)	<0.01 (<0.01 to >999.99)	<0.01 (<0.01 to >999.99)
<i>Race/ethnicity*</i>					
NH Black	6406	414	(6.5)	Reference	Reference
Hispanic	2810	176	(6.3)	0.97 (0.81 to 1.16)	1.00 (0.82 to 1.23)
NH White	1239	85	(6.7)	1.07 (0.84 to 1.36)	0.96 (0.73 to 1.27)
NH API/American Indian/Other	353	24	(6.8)	1.06 (0.69 to 1.62)	1.68 (1.06 to 2.66)
Unknown	20	1	(0.1)	0.76 (0.10 to 5.71)	0.26 (0.03 to 2.42)
<i>Borough of Residence*</i>					
Bronx	2336	144	(6.2)	2.57 (1.81 to 3.64)	2.73 (1.90 to 3.94)
Brooklyn	3415	232	(6.8)	2.85 (2.04 to 3.98)	2.47 (1.75 to 3.50)
Manhattan	1683	42	(2.5)	Reference	Reference
Queens	1561	141	(9.0)	3.88 (2.73 to 5.52)	4.93 (3.41 to 7.14)
Staten Island	446	27	(6.1)	2.52 (1.53 to 4.13)	2.43 (1.44 to 4.11)
Other	1387	114	(8.2)	3.50 (2.44 to 5.02)	4.53 (3.03 to 6.76)
<i>Ever homeless during study period</i>					
Yes	791	94	(11.9)	2.10 (1.67 to 2.64)	0.70 (0.52 to 0.95)
No	10037	606	(6.0)	Reference	Reference
<i>Marital status*</i>					
Single, never married	8616	600	(7.0)	Reference	Reference
Married/Cohabiting	1617	72	(4.5)	0.62 (0.49 to 0.80)	0.73 (0.56 to 0.95)
Divorced/Separated	371	15	(4.0)	0.56 (0.33 to 0.95)	0.72 (0.41 to 1.27)
Widowed	158	6	(3.8)	0.53 (0.23 to 1.20)	0.94 (0.40 to 2.25)
Unknown	66	7	(10.6)	1.59 (0.72 to 3.49)	2.15 (0.84 to 5.52)
<i>Education*</i>					
<High school diploma/equivalent	4960	362	(7.3)	1.00 (0.84 to 1.19)	0.98 (0.81 to 1.18)
High school diploma/equivalent	2921	214	(7.3)	Reference	Reference
Some college	1756	74	(4.2)	0.56 (0.42 to 0.73)	0.70 (0.52 to 0.93)
≥College degree	483	12	(2.5)	0.32 (0.18 to 0.58)	0.42 (0.23 to 0.79)
Unknown	708	38	(5.4)	0.72 (0.50 to 1.02)	0.79 (0.47 to 1.33)
<i>Number of prior incarcerations (in last 3 years)</i>					
0	7866	427	(5.4)	Reference	Reference
1	1268	62	(4.9)	0.90 (0.68 to 1.18)	0.76 (0.57 to 1.01)
2	628	51	(8.1)	1.54 (1.14 to 2.08)	1.01 (0.73 to 1.41)
3–5	713	73	(10.2)	1.99 (1.53 to 2.58)	1.05 (0.78 to 1.40)
≥6	353	87	(24.6)	5.70 (4.39 to 7.40)	1.81 (1.32 to 2.47)
<i>Number of incarcerations during study period</i>					
1	7657	263	(3.4)	Reference	Reference
2	1752	135	(7.7)	2.35 (1.89 to 2.91)	2.32 (1.84 to 2.93)
3	652	101	(15.5)	5.15 (4.03 to 6.59)	4.86 (3.66 to 6.45)
≥4	767	201	(26.2)	9.98 (8.15 to 12.23)	8.61 (6.59 to 11.25)
<i>Current drug use</i>					
Yes	4411	403	(9.1)	2.07 (1.77 to 2.42)	1.24 (1.02 to 1.50)
No	6417	297	(4.6)	Reference	Reference
<i>Physical assault history</i>					
Yes	2501	179	(7.2)	1.12 (0.93 to 1.33)	0.88 (0.69 to 1.11)
No	7641	494	(6.5)	Reference	Reference
Unknown	686	27	(3.9)	0.59 (0.40 to 0.88)	1.53 (0.84 to 2.78)

Continued

Table 1 Continued

	Total N	Female sex worker-Yes		Univariate logistic regression OR (95% CI)	Multivariate logistic regression OR (95% CI)
		N	(Row %)		
Sexual abuse history					
Yes	1890	159	(8.4)	1.38 (1.14 to 1.66)	1.00 (0.79 to 1.28)
No	8309	520	(6.4)	Reference	Reference
Unknown	629	21	(3.3)	0.52 (0.33 to 0.81)	1.02 (0.49 to 2.11)
Intimate partner violence history					
Yes	1558	140	(9.0)	1.48 (1.22 to 1.80)	1.01 (0.79 to 1.29)
No	8585	536	(6.2)	Reference	Reference
Unknown	685	24	(3.5)	0.55 (0.36 to 0.83)	1.23 (0.73 to 2.07)
Condom use with current sex partner(s)*					
Yes	3330	349	(10.5)	2.36 (2.01 to 2.77)	1.76 (1.47 to 2.10)
No	6453	305	(4.7)	Reference	Reference
Unknown	1045	46	(4.4)	0.93 (0.68 to 1.28)	1.00 (0.64 to 1.54)
Number of current sex partners*					
0	2112	75	(3.6)	Reference	Reference
1	6833	425	(6.2)	1.80 (1.40 to 2.31)	1.53 (1.17 to 2.00)
2–3	703	91	(12.9)	4.04 (2.94 to 5.56)	2.56 (1.80 to 3.63)
4+	284	70	(24.6)	8.88 (6.23 to 12.67)	4.57 (3.05 to 6.89)
Unknown	896	39	(4.3)	1.24 (0.83 to 1.84)	1.69 (1.01 to 2.83)
Pregnant during study period					
Yes	639	66	(10.3)	1.71 (1.31 to 2.24)	1.00 (0.74 to 1.35)
No	9963	628	(6.3)	Reference	Reference
Unknown	226	6	(2.7)	0.41 (0.18 to 0.92)	0.91 (0.38 to 2.18)
<i>Clinical status</i>					
Ever Chlamydia-positive					
Yes	623	85	(13.6)	2.34 (1.84 to 2.99)	1.55 (1.17 to 2.05)
No	9492	600	(6.3)	Reference	Reference
Not tested	713	15	(2.1)	0.32 (0.19 to 0.54)	N/A†
Ever Gonorrhoea-positive					
Yes	167	30	(18.0)	3.11 (2.08 to 4.65)	1.46 (0.92 to 2.33)
No	9948	655	(6.6)	Reference	Reference
Not tested	713	15	(2.1)	0.31 (0.18 to 0.51)	0.41 (0.22 to 0.78)
HIV status					
Positive	975	76	(7.8)	1.03 (0.80 to 1.33)	0.95 (0.71 to 1.27)
Negative	6585	499	(7.6)	Reference	Reference
Unknown	3268	125	(3.8)	0.49 (0.40 to 0.59)	0.94 (0.76 to 1.18)

\*Reported at first incarceration during study period.

†OR not generated as parameter set to 0 in model (equal to linear combination of other parameters).

NH, non-Hispanic, API, Asian/Pacific Islander.

risk behaviours, current drug use, lifetime physical assault/sexual abuse/intimate partner violence (IPV) history; current pregnancy; and jail Ct, Ng and HIV testing (table 1). Demographics (age, race/ethnicity, borough of residence, marital status, education) and sexual risk behaviours (current condom use, number of sex partners) were tabulated from the first incarceration during the study period. Remaining variables were computed across all incarcerations during the study period and counted as 'yes'/positive if ever so in any incarceration. HIV positivity was determined using self-reported history, EHR documentation of infection and jail testing data. Ct and Ng positivity with exact binomial 95% CIs were calculated using jail testing results (no. of unique women testing positive/no. of unique women tested). Women with multiple positive tests were counted once as 'positive'. DOC provided data on self-reported homelessness, LOS, prior NYC jail incarceration ( $\leq 3$  years) and criminal charges. 'Ever homeless' status was assigned by report of homelessness at any incarceration. Cumulative LOS was calculated by summing all incarceration days. FSW were identified by  $\geq 1$  prostitution charges (New York Penal Law §110–230.00, 110–

240.37, 230.00, 240.37) among the top five charges occurring across all incarcerations.

Data were tabulated;  $\chi^2$ -statistics were used to identify factors associated with FSW status. Unadjusted ORs and 95% CIs were calculated for all variables in table 1. Variables significant in bivariate analysis ( $p < 0.10$ ) were analysed using multivariate logistic regression to determine predictors of FSW status; adjusted ORs (AORs) and 95% CIs were calculated. Variable 'unknown' values were retained to maximise statistical power because some variables had  $> 500$  unknown observations. Analyses were conducted using SAS V9.2 (SAS Institute Inc., Cary, North Carolina, USA).

This study was deemed research-exempt by the NYC DOHMH Institutional Review Board.

## RESULTS

During the study period, there were 19 677 admissions to NYC jails among 12 078 unique women. Of 12 078 women, 10 828 (89.7%) received medical intake; the remainder were released from jail prior to intake. Median age was 35 (range:

16–78) years. Mean number of incarcerations per woman was 1.6 (range: 1–18). Median cumulative LOS was 16 (range: 0–819) days. The majority of women were non-Hispanic Black (59.2%) and Hispanic (26.0%). Women self-reported homelessness (7.3%), current drug use (40.7%), and lifetime physical assault (23.1%), sexual abuse (17.5%), and IPV (14.4%). Over 25% were previously incarcerated in NYC jails. Women reported multiple current sex partners (9.1%); only 30.8% reported condom use with current partners. Seven hundred (6.5%) women were defined as FSW; mean incarcerations per FSW was 2.97 (range: 1–18).

Of 10 828 women, 10 115 (93.4%) received 15 950 tests for Ct and Ng prior to jail release. Of 10 115 women, 723 (7.1%) had  $\geq 1$  STI: Ct 6.2% (n=623; 95% CI 5.7% to 6.7%); Ng 1.7% (n=167; 95% CI 1.4% to 1.9%); both 67 (0.66%). Of 723 women, 478 (66.1%) were treated with antimicrobials prior to jail release. Fourteen percent (103/723) of all Ct and Ng were among FSW; of these, 76% (78/103) were treated in jail. Of 10 828 women, 975 (9.0%) had HIV infection; the majority were identified by self-report (n=923) and EHR documentation of prior infection (n=25). In addition, 6612 (61.1%) women were HIV-tested in jail; 27 (0.4%) tested positive. Among FSW, 76 (10.9%) had HIV infection, with 67 (88.2%) identified by self-report. Of 10 828 women, 1525 (14.1%) had Ct, Ng or HIV infection; 114 (1.1%) had two, and 4 (0.04%) had all three infections.

FSW status was associated with all descriptive variables in table 1 in bivariate analysis ( $p < 0.05$ ) except race/ethnicity ( $p = 0.96$ ), which was retained in multivariate analysis for study-level interest. In multivariate analysis, Ct (AOR: 1.55; 95% CI 1.17 to 2.05;  $p < 0.0001$ ), but not Ng or HIV infection, remained associated with FSW status, as did age 20–24 years, residing in boroughs other than Manhattan,  $\geq 6$  prior incarcerations,  $\geq 2$  incarcerations during study period, condom use with current sex partners, multiple sex partners and current drug use (table 1). FSW status was less likely with age  $\geq 55$  years, ever homelessness, married/cohabiting status and  $>$ high school education.

## DISCUSSION

This is the first study to examine STI prevalence among FSW in NYC jails. We found many women had Ct, particularly FSW, consistent with published reports.<sup>6–9</sup> FSW were more likely to be age 20–24 years, the age often at highest Ct risk.<sup>3–7</sup> While the association between FSW and increased STI rates is not new, the high Ct prevalence detected among FSW in our study merits further attention. Nearly 25% of STI-positive FSW were released from jail prior to treatment, increasing risk of STI sequelae and transmission to sex partners. Similarly, though HIV infection was not independently associated with FSW status in our study, the high positivity (10.9%) among FSW is concerning. FSW often lack access to needed clinical and social services, making jail-based and community-based interventions imperative.<sup>4–5–8</sup>

As expected, FSW status was associated with multiple sex partners;  $>20\%$  of FSW reported  $\geq 2$  current partners. FSW status was also associated with recidivism before and during the study period, reflecting the social instability experienced by many FSW. FSW also reported violent histories, with  $\geq 20\%$  reporting sexual abuse, physical assault or IPV. FSW often experience gender-based violence, which is associated with Ct STI.<sup>10</sup> Lack of safe work venues may endanger women by creating access barriers to condoms, a cornerstone of preventive STI efforts.<sup>10</sup> We found that FSW status was associated with

condom use with current sex partners, perhaps reflecting that NYC DOHMH sex worker outreach and free condom provision is working; however, only 50% of FSW reported using condoms. Inconsistent condom use by FSW has been previously reported.<sup>9–10</sup> Sexual violence by clients is a noted barrier to condom negotiation. Threats of imminent violence create difficulties in negotiating safe sex practices, increasing HIV and STI risk. Women who are substance-addicted may be at higher risk for violence.<sup>10</sup> The majority (57.6%) of FSW in our study reported current drug use. The observed relationships between violence exposure, condom use and STI risk among FSW warrant further study, as do the findings that FSW were more likely to reside outside of Manhattan and less likely to report homelessness.

Our study has limitations. Our FSW definition may underestimate the true prevalence as women engaging in sex work may not be charged with prostitution. However, currently, jail clinicians do not inquire about sex work; as such, prostitution criminal charges are the only proxy available for defining FSW. Another limitation is that many descriptive variables were self-reported and subject to recall and social desirability bias. Finally, our study was conducted in a large urban jail; thus, findings may not be generalisable to FSW in other settings.

We found that incarcerated FSW were at higher risk for Ct than non-FSW incarcerated women in NYC jails. FSW with multiple sex partners, inconsistent condom use, and lack of community-based health care access may be at increased risk for STI sequelae and transmission.<sup>4</sup> Prevention interventions including peer outreach services, HIV counselling and testing, harm reduction education, and STI testing and management are associated with declines in HIV and STI prevalence among FSW.<sup>8</sup> In NYC jails, our study findings are being used to design similar targeted interventions to identify FSW, provide clinical and preventive services in jail, and coordinate care with community partners. Interventions will be designed to address not only the medical, but also mental health and social services needs of this medically vulnerable population.<sup>4–5–8</sup>

## Key messages

- ▶ Sexually transmitted infections (STI) are an important cause of morbidity among correctional populations in the USA.
- ▶ Incarcerated women, particularly female sex workers (FSW), are at high risk for STI and report sexual behaviours such as unprotected sex, sex for drugs or money or multiple sex partners.
- ▶ FSWs incarcerated in New York City (NYC) jails were at higher risk for chlamydia STI than non-FSW incarcerated women.

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**Contributors** FP, MK, HA and HV designed the study. FP, MK, HA and RL collected and analysed the data. All authors contributed to writing and revising the manuscript.

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