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Prevalence of bacterial sexually transmitted infections and coinfection with HIV among men who have sex with men and transgender women in Tijuana, Mexico

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Abstract

We estimated the prevalence of syphilis and *Chlamydia trachomatis* (CT) and *Neisseria gonorrhoeae* (NG) infections, as well as human immunodeficiency virus (HIV) coinfection among cisgender men who have sex with cisgender men (MSM) and transgender women (TW) in Tijuana, Mexico. MSM and TW (N = 212) recruited via respondent-driven and venue-based sampling for HIV testing underwent sexually transmitted infection (STI) testing and completed interviewer-administered surveys in this study (2017–2018). Treponemal rapid tests were used at the point-of-care with positives undergoing confirmatory testing following the reverse syphilis-testing algorithm. Nucleic acid amplification testing of urine and swabs (rectal and pharyngeal) was used to detect CT/NG at three anatomic sites. Chi-squared tests were used to compare STI prevalence by HIV status. Sexually transmitted infection prevalence was 39.6% overall but higher for newly diagnosed HIV-positive (55.7%; N = 88) than HIV-negative (28.2%; N = 124) participants (p-value < 0.0001). Among newly diagnosed HIV-positive participants, the prevalence of syphilis was 35.2% (31/88), CT infection was 27.3% (24/88; nine urethral; 16 rectal; four pharyngeal), and NG infection was 26.1% (23/88; six urethral; 19 rectal; nine pharyngeal). Among HIV-negative participants, the prevalence of syphilis was 12.1% (15/124), CT infection was 13.7% (17/124; seven urethral; nine rectal; two pharyngeal), and NG infection was 9.7% (12/124; three urethral; seven rectal; seven pharyngeal). Over 60% of all CT (25/41) and NG (26/35) infections in the full sample occurred extragenitally in the absence of urethral infections, and over 80% of rectal (30/37) and pharyngeal (16/18) infections were asymptomatic. The high prevalence of syphilis, CT, and NG infections among MSM and TW in Tijuana suggests STI screening that includes extragenital tests, particularly at HIV diagnosis, may help curb HIV/STI transmission.

Keywords

Sexually transmitted infection prevalence, *Chlamydia trachomatis*, *Neisseria gonorrhoeae*, HIV diagnosis, syphilis

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Introduction

Sexually transmitted infections (STIs) cause substantial morbidity and economic cost worldwide.[1] Syphilis, *Chlamydia trachomatis* (CT) infection, and *Neisseria gonorrhoeae* (NG) infection are among the most common bacterial STIs[2] and have received significant attention as potential drivers of HIV acquisition and transmission.[3] While having multiple sexual partners and condomless sexual intercourse can increase one's risk of acquiring both HIV and STIs, these STIs may also facilitate HIV acquisition via their damage to the genital or rectal epithelium and ability to increase the availability of HIV target cells in the genital or rectal tracts.[4,5] In people living with

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HIV, these STIs may enhance the probability of HIV transmission by increasing urogenital and rectal HIV shedding,[6] while syphilis may also increase viral load.[7]

Globally, cisgender men who have sex with cisgender men (MSM) and transgender women (TW) experience substantial risk for HIV/STIs.[8,9] HIV coinfection with STIs is also common, particularly at the time of HIV diagnosis,[10] with approximately 41.6% of primary and secondary syphilis cases reported in the United States in 2018 occurring among MSM living with HIV.[11] Current recommendations from the World Health Organization (WHO) for the control of STIs among MSM and TW include syndromic management (i.e., treatment based upon the presence of particular STI symptoms) and periodic testing for asymptomatic syphilis and urethral and rectal CT/NG infections.[12,13] Given that syphilis and CT/NG infections are frequently asymptomatic,[14] particularly extragenital (rectal and pharyngeal) CT/NG infections which often occur in the absence of urethral CT/NG among MSM and TW,[15] screening for syphilis and CT/NG (at all exposed anatomic sites—urogenital, rectum, and pharynx) infections is recommended in many high-income countries at HIV diagnosis and at least annually for all sexually active MSM and TW.[16] Yet, despite evidence from modeling studies suggesting that STI screening may be cost-effective, improve health outcomes, and prevent HIV transmission,[17,18] syndromic management remains the primary STI control strategy in many low- and middle-income countries (LMICs), including Mexico, where limited resources and laboratory capacity pose barriers to the implementation of STI screening programs.[19] Due to its inability to detect asymptomatic STIs, the reliance on syndromic management in LMIC may contribute to ongoing HIV/STI transmission among MSM and TW.[19] Moreover, the potential impact of syndromic STI management on HIV/STI transmission may be exacerbated in the context of undetected NG infections of the pharynx, which is a common source of urethral NG[20] and a reservoir for antimicrobial resistant NG.[21]

Mexico's HIV epidemic is concentrated within key populations. In contrast to the low HIV prevalence among reproductive-aged adults in Mexico (0.2%),[22] HIV prevalence is high among MSM and TW (~17%),[23] including those in Tijuana along Mexico's northern border with the United States (~20%).[24,25] Although STI prevalence has not been well documented within this population, among MSM and TW who participated in a 2012 pilot study in Tijuana, 89% of those living with HIV were previously undiagnosed and those living with HIV had a higher prevalence of syphilis infection (18.2% vs. 5.1%).[24] To examine the potential for targeted STI screening to curb HIV/STI transmission among MSM and TW in LMIC, we estimated the prevalence of symptomatic and asymptomatic syphilis and urethral, rectal, and pharyngeal CT/NG infections among HIV-negative and newly diagnosed HIV-positive MSM and TW in Tijuana.

Methods

Study population

As previously described,[26] MSM and TW were recruited between 2015 and 2018 for HIV testing through respondent-driven sampling (RDS) and venue-based sampling (VBS) in Tijuana, Mexico. Eligibility criteria for HIV testing included at least 18 years of age, cisgender man or transgender woman, no prior HIV diagnosis, and anal sex with a cisgender man or transgender woman in the past 4 months (VBS) or 12 months (RDS). Venue-based sampling was performed across 36 venues in Tijuana that had been identified as locations frequented by MSM and TW, such as nightclubs, bars, public spaces, and motels. Respondent-driven sampling began with 33 seeds who had been identified through VBS or referrals from Tijuana's municipal HIV clinic (*Centros Ambulatorios de Prevencion y Atención en SIDA e Infecciones de Transmision Sexual* or Outpatient Centers for Prevention and Care of HIV and Sexually Transmitted Infections (CAPASITS)) and were selected to be diverse with respect to HIV status, age, socioeconomic status, sexual orientation, gender identity, and recruitment source. Eligibility criteria for seeds included at least 18 years of age, cisgender man or transgender woman, anal sex with a cisgender man or transgender woman in the past 4 months, Tijuana residence, and social networks inclusive of at least 15 MSM or TW who also reside in Tijuana (this was changed to five MSM or TW in April 2017 to boost recruitment). Seeds and their peer recruits were given coupons to refer three to six MSM or TW from their social networks to the study and compensated US$100 Mexican pesos (approximately US$5 [US dollar]) for every eligible peer they referred. Venue-based sampling and RDS (only those who reported anal sex in the past 4 months for comparability to VBS) participants who tested negative for HIV infection were offered enrollment in a cross-sectional study (*Proyecto Redes* or Networks Project), while those who were newly diagnosed with HIV infection were offered enrollment in a 12 -month follow-up study (*Proyecto Enlaces* or Links Project). Because individuals could be identified multiple times via the same or a different recruitment method, those identified more than once who remained eligible for HIV testing were retested if it had been at least 3 months since their last test but were not enrolled in *Proyecto Redes* more than once.

Study procedures and data collection

From February 2017 to November 2018, *Proyecto Redes* and *Proyecto Enlace*s participants also underwent STI testing (syphilis, CT, and NG) at enrollment as part of a substudy with the aim of testing approximately 200 (~50% HIV-positive) MSM and TW for STIs. HIV-negative individuals identified via RDS or VBS after *Proyecto Redes*

was complete (September 2017) or after previously participating in *Proyecto Redes* were directly enrolled in the sub-study and offered STI testing. *Proyecto Enlaces* participants who had been enrolled prior to the launch of the sub-study were also directly enrolled in the sub-study and offered STI testing when they returned for their follow-up visits. A total of 124 and 98 individuals who tested HIV negative and HIV positive, respectively, underwent STI testing and completed interviewer-administered computer-assisted surveys. HIV-positive participants gave permission for their HIV care data to be extracted from their medical records at the CAPASITS clinic. We found that 10 of the 98 HIV-positive participants had accessed HIV care prior to enrollment in *Proyecto Enlaces* indicating that they had been previously diagnosed with HIV infection. We therefore excluded those 10 participants from the present analysis as they were not newly diagnosed. HIV-negative individuals who underwent STI testing at the time of enrollment in *Proyecto Redes* ($N = 67$) or the sub-study ($N = 57$) provided information on sociodemographics (age, gender identity, sexual orientation, years of residence in Tijuana, highest level of education completed, and average monthly income which was dichotomized at US$3000 Mexican pesos [~US$150] based on approximate federal poverty thresholds for urban areas during our study period),[27] sexual and substance use behaviors, and current symptoms consistent with syphilis (genital ulcer and rash) and urethral, rectal, and pharyngeal CT/NG infections (urethral discharge or pain with urination, anorectal pain, discharge or bleeding, and sore throat). HIV-positive individuals who underwent STI testing at the time of enrollment in *Proyecto Enlaces* ($N = 63$) also provided information on sociodemographics and sexual and substance use behaviors but provided information on current symptoms via a different survey completed approximately 2 weeks later. Some of those HIV-positive participants (25.4% [16/63]) did not return for that visit. HIV-positive individuals who underwent STI testing at a follow-up visit ($N = 25$) also provided information on sociodemographics and current symptoms, but that survey did not collect data on sexual and substance use behaviors.

HIV and sexually transmitted infection testing

Participants' HIV status was established via rapid testing (Advanced Quality HIV 1/2 Test Kits, InTec Products, Inc., Xiamen, China) on site followed by confirmatory testing (Bio-Rad Geenius HIV 1/2 Confirmatory Assay and an HIV chemiluminescence assay [CIA]) at the San Diego County Public Health Laboratory (SDCPHL). Participants were screened for syphilis using treponemal rapid tests on site. Those with a positive treponemal rapid test result provided a blood sample for confirmatory testing at the SDCPHL following the reverse syphilis testing algorithm in which a treponemal CIA was performed followed by a confirmatory rapid plasma reagin (RPR) test. If the RPR test was nonreactive, then a *Treponema pallidum* particle agglutination assay was performed to confirm the CIA result. Participants provided urine specimens to detect urethral CT/NG infections (Xpert CT/NG; Cepheid, Sunnyvale, CA) and extragenital (rectal and pharyngeal) swab specimens to detect rectal and pharyngeal CT/NG infections (Aptima Combo 2® Assay; Hologic) via nucleic amplification testing at the University of California, San Diego (UCSD) AntiViral Research Center and SDCPHL, respectively. Participants received the results of their confirmatory HIV/syphilis and CT/NG tests within 2 weeks. If test results were indeterminate, then participants were asked to return to provide a new specimen for testing. Those testing positive for an STI were provided free antibiotic treatment according to Mexican STI treatment guidelines and counseled to refer their partners for testing. Those confirmed HIV positive were referred to Tijuana's municipal HIV clinic (CAPASITS) for free care and treatment.

Data analysis

We calculated the prevalence of syphilis infection and CT/NG infections by anatomic site within our sample. In addition, we calculated the percentage of syphilis cases with an RPR titer of >1:4. We used descriptive statistics to characterize our sample and STI prevalence by HIV status, sociodemographics, sexual and substance use behaviors, and current symptoms. To examine whether targeted STI screening at the time of HIV diagnosis is warranted among MSM and TW in Tijuana, we used chi-squared tests to further examine differences in STI prevalence by HIV status. In addition, we calculated the sensitivity and positive predictive value of symptoms (syndromic management) to predict positive STI test results.

Research ethics approval

All study procedures were approved by the Human Subjects Protection Committees at the Universidad de Xochicalco in Tijuana and the UCSD (IRB Approval #140111, 150677). All participants provided written informed consent.

Results

We enrolled a sample of 124 HIV-negative and 88 newly diagnosed HIV-positive (median time in months since diagnosis = 0.0; interquartile range = 0.0–6.0) MSM and TW (Table 1), of whom 42.0% and 58.0% were recruited using RDS and VBS, respectively. Our sample had a mean age of 37.0 years (standard deviation [*SD*] = 11.1) and on average reported living in Tijuana for 13.6 years (*SD* = 13.7). Most participants reported being Mexican citizens (96.7%), cisgender men (97.2%), half reported less than a high school education (51.9%), and one-fifth reported an average monthly income below the approximated federal poverty

Table 1. Sample characteristics of MSM and TW in Tijuana by sexually transmitted disease and anatomical site of infection, *n* (%) [*n* = 212].

		Urethra		Rectum		Pharynx		
		Gonorrhea	Chlamydia	Gonorrhea	Chlamydia	Gonorrhea	Chlamydia	Syphilis
Characteristic	Total	(+)	(+)	(+)	(+)	(+)	(+)	(+)
Total	212	9	16	26	25	16	6	46
HIV status								
Positive	88 (41.5)	6 (6.8)	9 (10.2)	19 (21.6)	16 (18.2)	9 (10.3)	4 (4.6)	31 (35.2)
Negative	124 (58.5)	3 (2.4)	7 (5.7)	7 (5.7)	9 (7.3)	7 (5.7)	2 (1.6)	15 (12.1)
Age in years, mean (*SD*)	37.0 (11.1)	36.7 (10.2)	34.6 (9.5)	31.5 (9.3)	30.5 (9.5)	28.6 (8.8)	27.7 (5.9)	33.8 (11.2)
Gender identity								
Cisgender man	206 (97.2)	9 (4.4)	16 (7.8)	23 (11.2)	23 (11.2)	15 (7.3)	5 (2.4)	43 (20.9)
Transgender woman	6 (2.8)	0 (0.0)	0 (0.0)	3 (50.0)	2 (33.3)	1 (20.0)	1 (16.7)	3 (50.0)
Sexual orientation								
Gay/homosexual	86 (40.6)	4 (4.7)	6 (7.0)	13 (15.1)	17 (19.8)	7 (8.1)	2 (2.3)	26 (30.2)
Bisexual	94 (44.3)	4 (4.3)	7 (7.5)	9 (9.6)	6 (6.4)	5 (5.3)	3 (3.2)	17 (18.1)
Heterosexual	29 (13.7)	1 (3.5)	3 (10.3)	3 (10.3)	2 (6.9)	2 (7.1)	1 (3.5)	2 (6.9)
Not sure	3 (1.4)	0 (0.0)	0 (0.0)	1 (33.3)	0 (0.0)	2 (66.7)	0 (0.0)	1 (33.3)
Years of residence in Tijuana, mean (*SD*)	13.6 (13.7)	14.1 (15.4)	14.8 (14.0)	13.2 (12.7)	13.0 (10.7)	8.0 (8.2)	16.8 (8.0)	13.5 (12.4)
Number of men with whom had anal sex (past 4 months), mean (*SD*)	8.2 (20.2)	4.2 (5.3)	5.3 (6.8)	16.0 (33.0)	21.3 (48.2)	4.0 (3.0)	2.5 (2.4)	13.7 (36.1)
Alcohol use before or during sex (past 4 months)								
Yes	96 (51.3)	2 (2.1)	6 (6.3)	9 (9.4)	11 (11.5)	7 (7.3)	0 (0.0)	19 (19.8)
No	91 (48.7)	4 (4.4)	7 (7.7)	8 (8.8)	8 (8.8)	6 (6.6)	3 (3.3)	16 (17.6)
Drug use before or during sex (past 4 months)								
Yes	97 (51.9)	4 (4.1)	8 (8.3)	10 (10.3)	9 (9.3)	5 (5.2)	0 (0.0)	18 (18.6)
No	90 (48.1)	2 (2.2)	5 (5.6)	7 (7.8)	10 (11.1)	8 (8.9)	3 (3.3)	17 (18.9)
Methamphetamine use (past month)								
Yes	83 (44.4)	4 (4.8)	7 (8.4)	10 (12.1)	5 (6.0)	5 (6.0)	0 (0.0)	14 (16.9)
No	104 (55.6)	2 (1.9)	6 (5.8)	7 (6.7)	14 (13.5)	8 (7.7)	3 (2.9)	21 (20.2)
Exchanged money, drugs, or other goods for sex (past 4 months)								
Yes	65 (34.8)	4 (6.2)	5 (7.7)	6 (9.2)	4 (6.2)	5 (7.7)	0 (0.0)	12 (18.5)
No	122 (65.2)	2 (1.6)	8 (6.6)	11 (9.0)	15 (12.3)	8 (6.6)	3 (2.5)	23 (18.9)

MSM: cisgender men who have sex with cisgender men; *SD*: standard deviation; TW: transgender women.
*Column percentage provided for total column; row percentages provided for all other columns.

threshold[27] (19.1%). Participants reported anal sex with a mean of 8.2 male sexual partners (*SD* = 20.2) in the past 4 months, with whom about half reported using alcohol (51.3%) or drugs (51.9%) before or during sex, and nearly half reported using methamphetamine in the past month (44.4%).

Overall, 39.6% (84/212) of participants tested positive for an STI (syphilis, CT, or NG). The prevalence of syphilis was 21.7% (46/212), with 67.4% (31/46) of syphilis cases having an RPR titer of >1:4. Four participant test results were indeterminate for CT and/or NG at one anatomic site, and a new specimen had to be collected; one of the four participants did not provide an additional specimen for testing and their indeterminate result (for pharyngeal NG) was excluded from the analysis. The prevalence of CT infection was 19.3% (41/212): 7.5% (16/212) urethral, 11.8% (25/212) rectal, and 2.8% (6/212) pharyngeal. The prevalence of NG infection was 16.5% (35/212): 4.2% (9/212) urethral, 12.3% (26/212) rectal, and 7.6% (16/211, note one result was indeterminate) pharyngeal. Nearly two-thirds of the 60 cases with CT and/or NG infection only had an extragenital infection (63.3%; 38/60) (Figure 1), with 61.0% (25/41) of the 41 total CT infections and 74.3% (26/35) of the 35 total NG infections occurring in the absence of a urethral infection.

Sexually transmitted infection prevalence was higher among newly diagnosed HIV-positive participants than HIV-negative participants (55.7% vs. 28.2%; *p*-value < 0.0001). Among HIV-positive participants, the prevalence of syphilis was 35.2% (31/88), CT infection was 27.3%

(24/88; nine urethral; 16 rectal; four pharyngeal), and NG infection was 26.1% (23/88; six urethral; 19 rectal; nine pharyngeal). Among HIV-negative participants, the prevalence of syphilis was 12.1% (15/124), CT infection was 13.7% (17/124; seven urethral; nine rectal; two pharyngeal), and NG infection was 9.7% (12/124; three urethral; seven rectal; seven pharyngeal).

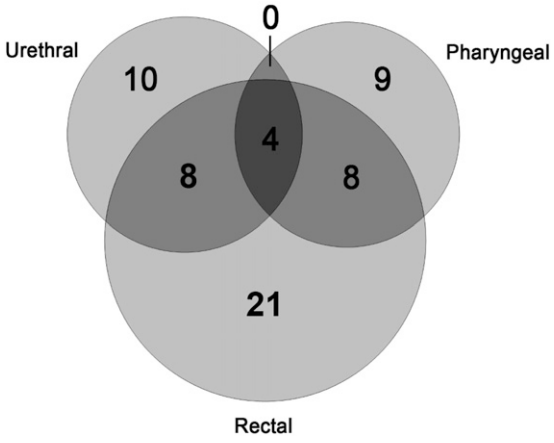

Figure 1. Venn diagram of CT/NG cases by anatomic site of infection among cisgender men who have sex with cisgender men and transgender women in Tijuana: 63.3% (38/60) of CT/NG cases among all participants would have been missed in the absence of extragenital testing.
Note: CT: *Chlamydia trachomatis*; NG: *Neisseria gonorrhoeae*.

Most CT and NG infections were asymptomatic (75.0% [15/20] of urethral CT/NG infections, 81.1% [30/37] of rectal CT/NG infections, and 88.9% [16/18] of pharyngeal CT/NG infections). In addition, of the 38 cases of syphilis that provided information on syphilis symptoms, only 14 (36.8%) were symptomatic. Of all of the 212 participants, 71 reported symptoms consistent with at least one STI; however, only 32 of those participants (45.1%) tested positive for an STI. In addition, we found a low sensitivity and positive predictive value of symptoms to predict positive CT/NG test results by anatomic site and positive syphilis test results (Table 2). The sensitivity of reporting symptoms consistent with urethral CT/NG infection was 25.0% (5/20) and the positive predictive value of those symptoms was 20.0% (5/25). The sensitivity of reporting symptoms consistent with rectal CT/NG infection was 18.9% (7/37) and the positive predictive value of those symptoms was 20.6% (7/34). The sensitivity of reporting symptoms consistent with pharyngeal CT/NG infection was 11.1% (2/18) and the positive predictive value of those symptoms was 5.9% (2/34). For syphilis, the sensitivity of syndromic management was slightly higher but still low at 36.8% (14/38) and the positive predictive value was 53.8% (14/26).

Discussion

We found a high prevalence of syphilis, CT, and NG infections among MSM and TW in Tijuana, particularly

Table 2. Prevalence of site-specific symptoms by site of infection among MSM and TW in Tijuana, *n* (%).

	(+) CT/NG infection[a]	(−) CT/NG infection
Urethral symptoms		
Urethral discharge (*n* = 7)	3 (42.9)	4 (57.1)
Pain with urination (*n* = 23)	5 (21.7)	18 (78.3)
Any urethral symptoms (*n* = 25)	**5 (20.0)**	**20 (80.0)**
Rectal symptoms		
Anorectal pain (*n* = 16)	3 (18.8)	13 (81.3)
Anorectal discharge (*n* = 9)	3 (33.3)	6 (66.7)
Anorectal bleeding (*n* = 25)	5 (20.0)	20 (80.0)
Any anorectal symptoms (*n* = 34)	**7 (20.6)**	**27 (79.4)**
Pharyngeal symptoms		
Sore throat (*n* = 34)	**2 (5.9)**	**32 (94.1)**
	(+) syphilis	(−) syphilis
Syphilis symptoms		
Genital ulcer (*n* = 13)	8 (61.5)	5 (38.5)
Rash (*n* = 15)	7 (46.7)	8 (53.3)
Any syphilis symptoms (*n* = 26)	**14 (53.9)**	**12 (46.2)**

CT: *Chlamydia trachomatis*; NG: *Neisseria gonorrhoeae*; MSM: cisgender men who have sex with cisgender men; TW: transgender women. Bold indicates an overall category within each set.
*Row percentages provided.
[a]There were 20 CT/NG urethral infections, 37 CT/NG rectal infections, and 18 CT/NG pharyngeal infections with non-missing site-specific symptoms; there were 38 syphilis infections with non-missing symptoms.

among those newly diagnosed with HIV infection. We also observed a high prevalence of asymptomatic STIs and found that the sensitivity and positive predictive value of syndromic management (i.e., treatment based upon the presence of particular STI symptoms) were very low. As such, our findings suggest that syndromic management would miss the majority of STI cases (i.e., high probability of false negatives due to low sensitivity) and result in the unnecessary treatment of symptomatic MSM and TW who do not truly have an STI (i.e., false positives due to low positive predictive value despite the high STI prevalence setting).

We also observed a high prevalence of extragenital CT/NG infections, most of which were asymptomatic and occurred in the absence of urethral CT/NG infections. Other studies have similarly found that because of the asymptomatic nature of CT and NG infections, particularly those in extragenital anatomic sites, the majority of infections would be missed in the absence of screening.[15,19] Another study in Latin America among MSM found that the most commonly symptomatic infection in their setting, urethral NG infection, was the least prevalent, while extragenital infections were more prevalent and rarely symptomatic.[15] Moreover, despite the fact that the anatomic site with the highest prevalence of both CT and NG infections in our study was the rectum, the prevalence of pharyngeal NG infection was also quite high, which is concerning given research suggesting that the pharynx is a reservoir of antimicrobial-resistant NG.[21]

Collectively, our findings suggest that STI screening, including extragenital CT/NG testing, and subsequent treatment for those who test positive, particularly at the time of HIV diagnosis, may be warranted in this population. Given that STIs may facilitate HIV acquisition and transmission,[3–7] in addition to reducing the burden of STIs among MSM and TW, targeting limited STI screening and treatment resources in Tijuana toward MSM and TW newly diagnosed with HIV infection may also lead to reductions in the transmission of STIs and HIV.[28] Prior work with MSM and TW in Tijuana encountered challenges implementing partner notification for HIV infection.[29] However, the fact that all participants in our study reported anal sex in the past 4 months (as part of inclusion criteria) underscores the need for the continued development of innovative and culturally acceptable partner notification and partner treatment strategies to enhance the success of STI screening and break the cycle of HIV/STI transmission within the sexual networks of MSM and TW in Tijuana and other similar settings in LMIC.

Our study was subject to some limitations. Participants were MSM and TW identified through RDS and VBS in Tijuana, Mexico, and therefore may not be representative of all MSM and TW in this or other settings. In addition, the moderate sample size and cross-sectional nature of the study did not allow us to evaluate the impact of STI testing on HIV acquisition and transmission directly. Despite those limitations, our study was able to identify the prevalent CT, NG, and syphilis infections that would have likely gone undetected and untreated in the absence of testing.

Conclusion

Our study documents a high prevalence of syphilis, CT, and NG infections among MSM and TW in Tijuana, Mexico. Because most of these STIs were asymptomatic and most CT/NG infections were extragenital, the absence of STI testing, including that for CT/NG at three anatomic sites, may contribute to ongoing HIV/STI transmission among MSM and TW in Tijuana. Additionally, the high prevalence of these STIs among MSM and TW newly diagnosed with HIV infection suggests that targeted STI testing at the time of HIV diagnosis may be critical to curbing HIV/STI transmission within these populations in Tijuana and other similar settings in LMIC.

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Data availability statement

De-identified primary data are available on request. Please send the request to Dr Claire Bristow at the following address cbristow@health.ucsd.edu.

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