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Early Syphilis Cases Among Women by Sex of Sex Partners — United States, 2014–2023

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Abstract

National surveillance data show that early syphilis cases among women increased during 2014–2023, regardless of the sex of their sex partners. Certain characteristics that could affect syphilis transmission—including incarceration history, sexual behaviors, and substance use—were most common among women who have sex with both women and men.

Short Summary:

Surveillance data show increasing early syphilis cases among women; women who have sex with women and men had the highest proportions of incarceration, sexual behaviors, and substance use.

Keywords

syphilis; women who have sex with women; women who have sex with women and men; incarceration; substance use

Introduction

Early syphilis (ES), or syphilitic infections acquired within the past 12 months, increased among women in the United States during 2014–2023, with approximately 27,000 cases reported in 2023.[1] These early infections pose significant concerns due to increased transmissibility compared with late-stage syphilis.[2]

National syphilis surveillance and control efforts among women have historically focused on heterosexual populations.[3] Although syphilis transmission can occur between 2 female sex partners,[4] syphilis trends among women who have sex with women remain largely unknown.[5] In this study, we expand on published surveillance data[1] to examine trends in ES cases among women by sex of sex partners (SOSP) during 2014–2023.[1] Additionally, we

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summarize the characteristics of ES cases among women, stratified by SOSP, to help guide intervention strategies.

Materials and Methods

We reviewed ES (primary; secondary; and early nonprimary, nonsecondary syphilis) case notifications among women aged ≥15 years sent to the Centers for Disease Control and Prevention (CDC) from all 50 states and the District of Columbia through the National Notifiable Diseases Surveillance System for the years 2014–2023. Using 2 variables that indicated sex with men and sex with women during the past 12 months, we categorized women into four groups: women who have sex with men only (WSMO), women who have sex with women only (WSWO), women who have sex with women and men (WSWM), and women with unknown sex of sex partners (WSU) (Table S1, Supplemental Digital Content). WSU were defined as women with missing/unknown data for both variables, or those denying sex with both men and women within the past 12 months.

We compared the following characteristics of SOSP groups: syphilis surveillance stage (primary; secondary; or early nonprimary, nonsecondary), sociodemographic characteristics (age, race/Hispanic ethnicity, US Census region, and reporting year), clinical characteristics (diagnosing facility type, HIV status, lifetime history of sexually transmitted infections [STIs], and pregnancy status), and reported history of incarceration and behaviors (methamphetamine use, injection drug use, sex with persons who inject drugs, sex with men who have sex with men, exchanging sex for drugs or money, and number of sex partners) within the past 12 months.

We completed 2 sensitivity analyses: (1) an analysis that was limited to 41 jurisdictions with data completeness of 70% or higher for the 2 SOSP variables, and (2) an analysis that defined WSU as women with missing/unknown data for 1 or both SOSP variables. Because these data comprise all available nationally notified cases, we did not conduct statistical tests; however, numerators and denominators are provided for each percentage. Denominators for clinical, incarceration, and behavioral variables excluded cases with missing/unknown data to approximate the prevalence of these factors. All analyses were performed using R software version 4.4.0.[6] Our study used routine public health surveillance data and was exempt from CDC Institutional Review Board review.

Results

During 2014–2023, a total of 142,142 ES cases were reported among women (Table). Among those cases, 16.3% were primary syphilis; 33.4% were secondary syphilis; and 50.3% were early nonprimary, nonsecondary syphilis. Most cases occurred among women aged 15–24 (27.6%), 25–34 (38.7%), and 35–44 (21.7%) years. Overall, 111,142 (78.2%) of cases included SOSP data; of those, 93.5% occurred among WSMO, 0.7% among WSWO, and 5.8% among WSWM. The racial/ethnic composition of ES cases varied by SOSP. ES case counts increased across all SOSP groups during 2014–2022 before decreasing in 2023. The proportion of WSU increased from 14.4% in 2016 to 26.2% in 2021 before decreasing in 2023 to 23.4%.

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When comparing selected reported characteristics and behaviors between WSMO and WSWM, WSMO had higher proportions of pregnancy while diagnosed with syphilis (17.2% vs. 10.6%), but WSWM had higher proportions of previous STIs (53.1% vs. 61.5%), history of incarceration (15.4% vs. 28.5%), history of methamphetamine use (15.5% vs. 28.9%), history of injection drug use (9.4% vs. 19.6%), history of sex with persons who inject drugs (10.3% vs. 25.3%), history of sex with men who have sex with men (4.4% vs. 13.5%), history of exchange sex (6.9% vs. 21.8%), or having 5 or more sex partners (7.2% vs. 28.9%) within the past 12 months.

Results were similar when comparing the primary analysis to either sensitivity analysis, and when comparing both sensitivity analyses to one another, with WSWM having higher proportions of selected reported characteristics and behaviors than WSMO or WSWO (Tables S2, S3; Supplemental Digital Content). Restricting by data completeness at the jurisdiction level resulted in fewer geographic areas, leading to some differences in geographic distribution as compared to the primary analysis. Using alternative WSU coding increased the proportions of cases among WSU, primarily influencing case distribution by history of substance use and sexual behaviors.

Discussion

Our review of ES surveillance data among women demonstrated increasing case counts across SOSP groups during 2014–2022 and decreasing counts during 2022–2023. Further, the majority of national ES cases occurred among WSMO and women aged 15–44 years. Syphilis prevention and control activities have historically prioritized primary and secondary syphilis cases due to their transmissibility and syphilis cases among women of reproductive age (WRA) to reduce congenital syphilis outcomes. Because the majority of ES cases among women occurred in those aged 15–44 years, and pregnancy was reported in all SOSP groups, health departments should continue to prioritize follow-up for WRA, regardless of reported SOSP.

Although accounting for only 5.8% of ES cases among women, WSWM had higher proportions of incarceration history and sexual and substance use behaviors that might have contributed to higher syphilis transmission or acquisition than among WSMO or WSWO. This trend persisted in both sensitivity analyses. When compared to the primary analysis, the distribution of ES cases in the first sensitivity analysis varied by region, suggesting that some regions had lower levels of data completeness among variables used to determine SOSP. In the second sensitivity analysis, history of substance use and sexual behaviors varied, given that some women who reported these behaviors and were categorized as WSMO or WSWO in the primary analysis were later recoded as WSU. Nevertheless, the persistence of high incarceration history and sexual and substance use proportions among WSWM with ES in all three analyses indicates this finding was relevant across jurisdictions with varying levels of SOSP data completeness and methods of coding SOSP groups.

Several potential reasons might explain why WSWM with ES had higher proportions of these variables compared with other SOSP groups. WSWM might experience stigma from both heterosexual and gay/lesbian communities, as well as the potential erasure of their

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sexual orientations,[7] which could lead to stress-related coping mechanisms like substance use and sexual behaviors potentially associated with STI transmission and acquisition.[8] The WSWM in our study had more sexual partners and potentially wider sexual networks than WSMO or WSWO,[9] positioning them in networks that might bridge disparate populations and possibly increase their exposure to some sexual and substance use behaviors. Women who report sex with both women and men might be more willing to disclose other sexual and substance use behaviors than other SOSP groups. Correlations between housing instability, substance use, and exchanging sex[10] suggest some women seeking housing, drugs, or other goods might exchange sex for those goods, regardless of SOSP. Recently incarcerated women are more likely to experience factors that influence STI transmission and acquisition such as substance use and exchanging sex for goods[11] than those never experiencing incarceration. Additionally, women might be more likely to have female sex partners in correctional settings regardless of their SOSP in non-correctional settings.[12] These findings highlight possible benefits to syndemic care models for WSWM and similar populations to ensure prompt syphilis diagnosis and treatment while facilitating linkage to relevant substance use services. CDC currently recommends universal opt-out syphilis screening for women in correctional settings based on local area and institutional prevalence.[13] Future analyses should investigate the impact of incarceration and sexual and substance use behaviors on syphilis transmission among WSWM, as well as identify optimal syndemic care models that address syphilis transmission and substance use.

The proportion of WSU cases relative to other SOSP groups increased during the study period. With rising case counts, disease intervention specialists might have experienced heavier caseloads, limiting the time allocated to collect socio-behavioral characteristics for each case. Health departments facing competing priorities and scarce resources could consider innovative approaches to improve case investigation efficiency, such as implementing automated syphilis record search and review algorithms.[14] Newly available resources could then be used to collect data on SOSP and socio-behavioral characteristics, or perform other public health functions, to address underlying factors and behaviors affecting syphilis transmission.

This study has several limitations. First, information on SOSP, clinical characteristics, incarceration history, and sexual and substance use behaviors among ES cases was frequently missing. We excluded cases with incomplete data from clinical, incarceration, and behavioral proportion calculations; therefore, these proportions might be artificially elevated if most excluded cases did not experience incarceration, or the behaviors evaluated in our study. Second, all WSWM had at least 2 sex partners in the past 12 months, potentially biasing this group to have more sex partners and broader exposures to sexual and substance use behaviors than other SOSP groups. Third, the women reporting sex with women and men in our study might be more forthcoming in reporting their behaviors than other SOSP groups, falsely elevating these variables in comparison to other populations. Fourth, we were unable to assess when women were incarcerated relative to their sexual behaviors and cannot determine if behavior changes in correctional settings might have influenced their SOSP. Fifth, we are unable to calculate ES rates by SOSP because national denominator estimates for women by SOSP are unavailable. Future studies should explore

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these denominator estimates as well as better evaluate why WSWM with ES report high proportions of incarceration and certain behaviors.

Despite these limitations, our study shows that WSWM and other populations affected by syphilis might benefit from syndemic care models that address the interplay between incarceration, substance use, and syphilis transmission. Future studies could evaluate why WSWM with ES had higher proportions of reported sexual and substance use behaviors than WSMO and WSWO, as well as how best to implement syndemic care models among WSWM and other relevant populations.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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TABLE.

Characteristics of Early Syphilis Cases Among Women, by Sex of Sex Partners — United States, 2014–2023

	Sex of Sex Partners, n (%)				
Characteristic	**WSMO**	**WSWO**	**WSWM**	**WSU**	**Total**
Total	103,916 (73.1)	785 (0.6)	6,441 (4.5)	31,000 (21.8)	142,142 (100.0)
Syphilis surveillance stage					
Primary	16,335 (15.7)	158 (20.1)	1,137 (17.7)	5,555 (17.9)	23,185 (16.3)
Secondary	35,534 (34.2)	290 (36.9)	2,408 (37.4)	9,297 (30.0)	47,529 (33.4)
Early nonprimary, nonsecondary	52,047 (50.1)	337 (42.9)	2,896 (45.0)	16,148 (52.1)	71,428 (50.3)
Age group, y					
15–24	29,864 (28.7)	240 (30.6)	2,116 (32.9)	7,028 (22.7)	39,248 (27.6)
25–34	40,388 (38.9)	317 (40.4)	2,745 (42.6)	11,571 (37.3)	55,021 (38.7)
35–44	21,853 (21.0)	159 (20.3)	1,195 (18.6)	7,643 (24.7)	30,850 (21.7)
45–54	8,594 (8.3)	51 (6.5)	322 (5.0)	3,223 (10.4)	12,190 (8.6)
55–64	2,772 (2.7)	15 (1.9)	60 (0.9)	1,165 (3.8)	4,012 (2.8)
≥65	445 (0.4)	3 (0.4)	3 (0.0)	370 (1.2)	821 (0.6)
Race/Hispanic ethnicity *					
Black/African American, non-Hispanic	36,762 (35.4)	334 (42.5)	2,266 (35.2)	10,140 (32.7)	49,502 (34.8)
Hispanic/Latina	21,013 (20.2)	143 (18.2)	841 (13.1)	5,199 (16.8)	27,196 (19.1)
White, non-Hispanic	33,522 (32.3)	189 (24.1)	2,675 (41.5)	10,336 (33.3)	46,722 (32.9)
Other, non-Hispanic **	9,342 (9.0)	80 (10.2)	501 (7.8)	2,993 (9.7)	12,916 (9.1)
Missing/ Unknown	3,277 (3.2)	39 (5.0)	158 (2.5)	2,332 (7.5)	5,806 (4.1)
US Census region					
Northeast	10,321 (9.9)	81 (10.3)	574 (8.9)	2,557 (8.2)	13,533 (9.5)
Midwest	14,732 (14.2)	99 (12.6)	964 (15.0)	5,588 (18.0)	21,383 (15.0)
South	49,925 (48.0)	379 (48.3)	3,267 (50.7)	14,340 (46.3)	67,911 (47.8)
West	28,938 (27.8)	226 (28.8)	1,636 (25.4)	8,515 (27.5)	39,315 (27.7)
Reporting year ***					
2014	3,530 (78.4)	27 (0.6)	181 (4.0)	763 (17.0)	4,501 (100.0)
2015	4,299 (78.3)	30 (0.5)	247 (4.5)	914 (16.6)	5,490 (100.0)
2016	5,548 (79.9)	37 (0.5)	360 (5.2)	999 (14.4)	6,944 (100.0)
2017	6,695 (80.0)	35 (0.4)	416 (5.0)	1,223 (14.6)	8,369 (100.0)
2018	8,581 (79.0)	46 (0.4)	515 (4.7)	1,718 (15.8)	10,860 (100.0)
2019	10,120 (74.7)	75 (0.6)	669 (4.9)	2,677 (19.8)	13,541 (100.0)
2020	11,077 (70.8)	89 (0.6)	651 (4.2)	3,818 (24.4)	15,635 (100.0)
2021	15,807 (69.3)	106 (0.5)	916 (4.0)	5,981 (26.2)	22,810 (100.0)
2022	19,160 (70.3)	175 (0.6)	1,263 (4.6)	6,656 (24.4)	27,254 (100.0)
2023	19,099 (71.4)	165 (0.6)	1,223 (4.6)	6,251 (23.4)	26,738 (100.0)
Diagnosing facility type					
STI clinic	13,624 (13.1)	102 (13.0)	1,102 (17.1)	2,560 (8.3)	17,388 (12.2)
Non-STI clinic	88,808 (85.5)	671 (85.5)	5,258 (81.6)	27,783 (89.6)	122,520 (86.2)

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	Sex of Sex Partners, n (%)				
Characteristic	**WSMO**	**WSWO**	**WSWM**	**WSU**	**Total**
Missing/ Unknown	1,484 (1.4)	12 (1.5)	81 (1.3)	657 (2.1)	2,234 (1.6)
HIV status					
HIV-positive	3,861 (4.8)	24 (4.2)	168 (3.3)	1,403 (10.5)	5,456 (5.5)
HIV-negative	77,092 (95.2)	553 (95.8)	4,966 (96.7)	11,984 (89.5)	94,595 (94.5)
Missing/ Unknown	22,963	208	1,307	17,613	42,091
Lifetime history of STIs					
Yes	41,542 (53.1)	227 (40.1)	3,115 (61.5)	5,932 (65.8)	50,816 (54.7)
No	36,665 (46.9)	339 (59.9)	1,947 (38.5)	3,083 (34.2)	42,034 (45.3)
Missing/ Unknown	25,709	219	1,379	21,985	49,292
Pregnancy status					
Pregnant	16,720 (17.2)	36 (5.2)	641 (10.6)	3,154 (12.6)	20,551 (16.0)
Not pregnant	80,239 (82.8)	658 (94.8)	5,400 (89.4)	21,927 (87.4)	108,224 (84.0)
Missing/ Unknown	6,957	91	400	5,919	13,367
History of incarceration[†]					
Yes	13,024 (15.4)	123 (19.9)	1,599 (28.5)	882 (31.9)	15,628 (16.7)
No	71,710 (84.6)	494 (80.1)	4,016 (71.5)	1,882 (68.1)	78,102 (83.3)
Missing/ Unknown	19,182	168	826	28,236	48,412
History of methamphetamine use[†]					
Yes	12,536 (15.5)	75 (13.4)	1,535 (28.9)	667 (6.7)	14,813 (15.3)
No	68,493 (84.5)	486 (86.6)	3,775 (71.1)	9,298 (93.3)	82,052 (84.7)
Missing/ Unknown	22,887	224	1,131	21,035	45,277
History of injection drug use[†]					
Yes	7,861 (9.4)	50 (8.3)	1,116 (19.6)	315 (13.5)	9,342 (10.1)
No	76,106 (90.6)	554 (91.7)	4,572 (80.4)	2,016 (86.5)	83,248 (89.9)
Missing/ Unknown	19,949	181	753	28,669	49,552
History of sex with persons who inject drugs[†]					
Yes	8,286 (10.3)	50 (8.7)	1,351 (25.3)	36 (2.2)	9,723 (11.0)
No	72,241 (89.7)	526 (91.3)	3,987 (74.7)	1,624 (97.8)	78,378 (89.0)
Missing/ Unknown	23,389	209	1,103	29,340	54,041
History of sex with men who have sex with men[†]					
Yes	3,304 (4.4)	5 (1.1)	677 (13.5)	33 (2.3)	4,019 (4.9)
No	71,760 (95.6)	446 (98.9)	4,348 (86.5)	1,404 (97.7)	77,958 (95.1)
Missing/ Unknown	28,852	334	1,416	29,563	60,165
History of exchanging sex for drugs or money[†]					
Yes	6,039 (6.9)	21 (3.4)	1,273 (21.8)	105 (5.4)	7,438 (7.8)
No	81,074 (93.1)	601 (96.6)	4,554 (78.2)	1,825 (94.6)	88,054 (92.2)
Missing/ Unknown	16,803	163	614	29,070	46,650
Number of sex partners[†]					

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	Sex of Sex Partners, n (%)				
Characteristic	**WSMO**	**WSWO**	**WSWM**	**WSU**	**Total**
0–4	80,369 (92.8)	594 (96.6)	3,922 (71.1)	7,188 (98.7)	92,073 (92.0)
≥5	6,244 (7.2)	21 (3.4)	1,594 (28.9)	93 (1.3)	7,952 (8.0)
Missing/ Unknown	17,303	170	925	23,719	42,117

This table includes data from all 50 states and the District of Columbia.

*Race/Hispanic ethnicity are categorized in a stepwise process. Cases with Hispanic/Latina ethnicity are classified as such, while cases with non-Hispanic or unknown Hispanic/Latina ethnicity are classified as non-Hispanic and are categorized by race.

**Other non-Hispanic race/ethnicity includes all cases with known race not captured in the labeled race and Hispanic ethnicity categories, including American Indian or Alaska Native, Asian, Native Hawaiian and Other Pacific Islander, multiracial, and races reported as “other” in national surveillance data. This category is intended to show the balance of early syphilis cases among women and should not be interpreted independently.

***Row percentages are used to evaluate this variable.

†Within the past 12 months.

STI = sexually transmitted infection; WSMO = women who have sex with men only = WSWM, women who have sex with women and men; WSWO = women who have sex with women only; y = years.