



HHS Public Access

Author manuscript

Sex Transm Dis. Author manuscript; available in PMC 2019 October 09.

Published in final edited form as:

Sex Transm Dis. 2011 July ; 38(7): 598–602. doi:10.1097/OLQ.0b013e318210027d.

Epidemiology of Syphilis Among Hispanic Women and Associations With Congenital Syphilis, Maricopa County, Arizona

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Abstract

Objective: We investigated factors associated with high rates of congenital syphilis among Hispanic infants in Maricopa County, AZ.

Methods: Using 2004–2008 syphilis case report data from the state and county health departments, we examined characteristics of pregnant and nonpregnant women with syphilis and their male partners.

Results: During 2004–2008, 970 women were reported to have syphilis: 49% were Hispanic (of whom 49% were non-US citizens), 27% were white, 13% were black, and 8% were American Indian/Alaskan Native. Although 16% of Hispanic noncitizens reported drug use or high-risk sexual behaviors, 64% of these women had a male sex partner who reported drug use or anonymous sex. Hispanic women with syphilis were more likely to be pregnant (37%) than white (15%) or black women (13%) ($P < 0.05$), and were overrepresented among pregnant women with syphilis. Pregnant Hispanic noncitizens were treated later than pregnant Hispanic citizens (median 28 weeks gestation vs. 21 weeks, $P = 0.01$).

Conclusions: Innovative congenital syphilis prevention strategies that are relevant to Hispanic women are warranted. Strategies should address the reproductive health and prenatal care needs of Hispanic women, and may include interventions for their male partners.

Congenital syphilis (CS), transmission of *Treponema pallidum* from an infected pregnant woman to her infant during pregnancy, is one of the most severe sequelae of inadequately treated syphilis. Despite declines in primary and secondary syphilis rates among women in

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Arizona during 2000–2008, from 3.1 cases per 100,000 in 2000 to 1.8 in 2008,^{1,2} CS rates in Arizona remained consistently high. As defined by the Centers for Disease Control and Prevention (CDC) surveillance case definition,² CS rates were 31.7 cases per 100,000 live births in 2000 and 30.3 in 2008. Only Louisiana, Texas, and Maryland had higher rates than Arizona in 2008.² Most CS cases in Louisiana and Maryland are among infants born to black mothers, and most CS cases in Texas are among infants born to black or Hispanic mothers (Centers for Disease Control and Prevention, unpublished).

Although 26% of the female population of Arizona in 2008 was Hispanic,³ 15 of 31 infants with CS (48%) were born to Hispanic mothers. Furthermore, the CS rate in Arizona in 2008 among Hispanic infants was higher than expected, given the underlying primary and secondary syphilis rate among Hispanic women. Disparities in prenatal syphilis screening and treatment might contribute.

To address the high CS rates and the disproportionate CS rate among Hispanic infants, the Arizona Department of Health Services and the Maricopa County Department of Public Health implemented a social marketing campaign in 2007 to increase awareness of CS among clinicians and Hispanic women. However, a high CS rate and the ethnic disparity persisted in 2008. As a result, the Arizona Department of Health Services and the Maricopa County Department of Public Health requested CDC assistance. The subsequent investigation had the following objectives: (1) to describe characteristics of Hispanic women with syphilis and their reported male sex partners with syphilis in Maricopa County, AZ; (2) to describe the characteristics of prenatal care received by pregnant women with syphilis; and (3) to investigate factors contributing to the ethnic disparity in CS.

MATERIALS AND METHODS

We reviewed Arizona Department of Health Services and Maricopa County Department of Public Health records for syphilis cases among women and CS cases diagnosed in Maricopa County during 2004–2008. To understand disease transmission patterns, we abstracted case records for women with early syphilis; to understand prenatal care practices among women with syphilis, we abstracted case records for pregnant women with any stage of syphilis. We chose Maricopa County as the investigation site because most CS cases in Arizona were reported in Maricopa County.⁴

As part of routine syphilis case investigation in Maricopa County, Communicable Disease Investigators attempted to interview all women diagnosed with syphilis, and men with early (primary, secondary, and early latent) syphilis soon after the diagnosis of syphilis. From in-person or telephone interviews, the Communicable Disease Investigators collected data on demographic characteristics, including self-identified race/ethnicity, self-reported US citizenship status and duration of time in the US, self-reported risk behaviors occurring during the interview period (see below), and information about sexual partners exposed during the interview period. The interview periods were the previous 4 months for primary syphilis, previous 8 months for secondary syphilis, and previous 12 months for early latent syphilis.⁵ Testing and treatment were obtained from clinician interviews and medical records. The data obtained and analyzed were collected through routine public health

activities, including disease surveillance and partner notification, and thus were not subject to review by institutional review boards.

We defined women with syphilis as women with any stage of syphilis reported to the Maricopa County Health Department during 2004–2008. Syphilis stages were defined according to CDC surveillance case definitions.² Women with early syphilis included women with primary, secondary, or early latent syphilis, and women with late syphilis included women with late latent syphilis, syphilis of unknown duration, or neurosyphilis (with no stage information listed). We defined CS cases according to CDC surveillance case definitions for confirmed and probable CS.² We designated men who have sex with men as men who self-identified as homosexual or bisexual, or who reported sex with a man during the interview period.

We searched the Maricopa County syphilis database by name and/or record identification number for syphilis case records of male sex partners reported by each woman with early syphilis, and confirmed that the reported male partner named the index female case as a sex partner. We linked available case records of reported male sex partners to the corresponding case records of the index female cases. This linkage was done for women with early syphilis (reflecting recent syphilis transmission), pregnant women with syphilis, and for men with syphilis, to allow access to demographic and behavioral data contained in the men's case records.

Data Analysis

We conducted all analyses using SAS v. 9.1 (SAS Institute, Inc, Cary, NC). We compared demographic characteristics and risk behaviors occurring during the interview period of women with syphilis by race/ethnicity. The observed patterns did not change when the data were stratified by the stage of syphilis and differing interview periods, so women with all stages of syphilis were aggregated. Among Hispanic women with early syphilis who we linked to at least one male partner, we compared demographic characteristics and risk behaviors, including behaviors of their male partners, by citizenship status. Among pregnant women with syphilis, we compared reported prenatal care, timing of syphilis screening and treatment, and the proportion of women who delivered an infant with CS, by race/ethnicity. We further compared mothers of infants with CS to pregnant women with syphilis who delivered infants who were not reported as CS cases. Differences in dichotomous data were assessed by the chi-square test or Fisher exact test, and continuous data by the *t* test and the Wilcoxon-Mann-Whitney test; differences were considered statistically significant at the $P < 0.05$ level.

RESULTS

A total of 970 women were reported to have syphilis in Maricopa County, AZ during 2004–2008: 476 (49%) were Hispanic, 265 (27%) were non-Hispanic white, 130 (13%) were non-Hispanic black, 79 (8%) were American Indian/Alaskan Native (AI/AN), and 20 (2%) were Asian (Table 1). Overall, the mean age of the women was 28.7 years; Hispanic women were significantly younger than white, black, and AI/AN women. Hispanic women were more likely to be pregnant than white and black women. Hispanic women were significantly less

likely to report drug use, incarceration, or anonymous sex than women of all other racial/ethnic groups, were less likely than white and black women to report receiving money or drugs for sex, and were less likely than white women to report 2 or more sex partners during the interview period. Among Hispanic women with syphilis, pregnancy was reported by 48% (n = 101) of noncitizens and 25% (n = 52) of citizens ($P < 0.001$). Among women who reported drug use, the type of drug varied by race/ethnicity: methamphetamine use was reported by 41% (n = 49) of whites, 13% (n = 6) of blacks, 46% (n = 17) of AI/AN women, and 34% (n = 32) of Hispanics; cocaine or crack cocaine use was reported by 36% (n = 42) of whites, 59% (n = 23) of blacks, 22% (n = 8) of AI/AN women, and 39% (n = 37) of Hispanics.

We identified 341 women with early syphilis; these women reported a total of 1869 sex partners. Adequate information to initiate a contact investigation was provided for 378 male sex partners. Among 378 male sex partners, 178 (47%) were infected with syphilis recently or at the time of the contact investigation; 72 (19%) were given preventive treatment for presumptive recent syphilis infection; 45 (12%) were not infected; 10 (3%) refused examination or treatment; 55 (15%) could not be located; 7 (2%) were out of jurisdiction; 2 (0.5%) had insufficient information to begin investigations; and 9 (2%) had a disposition of “other.” The 178 infected male sex partners were linked to 172 of 341 (50%) women with early syphilis, including 77 of 148 (52%) Hispanic women with early syphilis. Table 2 displays the characteristics of the 77 Hispanic women with early syphilis who were linked to at least one male sex partner, stratified by US citizenship status of the women. Non-citizens were significantly less likely than citizens to report drug use or incarceration. Most citizens and noncitizens reported only one sex partner during the interview period, yet many citizens and noncitizens had a male sex partner who reported drug use and anonymous sex.

Table 3 displays the characteristics of the 242 women with all stages of syphilis who were pregnant at the time of syphilis diagnosis, stratified by race/ethnicity. Of these women, 162 (67%) were Hispanic. Prenatal care was reported by 83% of all pregnant women; there were no significant differences between Hispanic women and women of other racial/ethnic groups. Among Hispanic women, prenatal care was reported by 67% of citizens and 79% of noncitizens ($P = 0.09$). Among all pregnant women, 38% were not tested for syphilis until their third trimester or at delivery (Table 3). The median gestational age at the time of maternal syphilis treatment was 24 weeks (range: 5–42 weeks). We did not detect significant differences in timing of treatment between Hispanic women and women of other racial/ethnic groups. Among Hispanic women, noncitizens were treated for syphilis at a median of 28 weeks gestation (range: 6–42) and citizens were treated at a median of 21 weeks (range, 5–39; $P = 0.011$). The noncitizens were not necessarily recent immigrants: among those treated for syphilis at 28 weeks of gestation or later, the median reported time in the United States was 30 months (range: 1 month–22 years) and 81% reported residency in the United States for 12 months or more. Among all pregnant women with syphilis, 32% delivered infants with CS (Table 3). We neither detected significant differences in the proportion of women who delivered infants with CS between Hispanic women and other women (Table 3), nor among Hispanics by citizenship status (30% among citizens and 33% among noncitizens, $P = 0.712$).

Mothers of infants with CS were compared with pregnant women with syphilis whose infants were not reported as CS cases (Table 4). Early syphilis (infected within the past 12 months), late maternal testing, and late treatment were significantly associated with delivering an infant with CS.

Among the 21 mothers of infants with CS who were screened for syphilis during their first or second trimesters, 11 (52%) initially tested negative and subsequently tested positive at delivery. Of these 11 women, 6 (55%) were Hispanic (of whom 5 were noncitizens), 3 (27%) were AI/AN, 1 (9%) was white, and 1 (9%) was black. A total of 8 of the 11 (73%) women who initially tested negative were not rescreened during the third trimester.

DISCUSSION

This study advances our understanding of syphilis in women in Maricopa County, AZ. Despite being infected with syphilis, few Hispanic women, particularly non-US citizens, reported sexual risk behaviors traditionally associated with syphilis infection. However, many of these women had male sex partners who reported drug use and anonymous sex. A high proportion of Hispanic women with syphilis were pregnant, probably contributing to high CS case counts among Hispanic infants. Although we did not find clear disparities in prenatal care access or utilization by race/ethnicity, we found that pregnant Hispanic noncitizen women were treated significantly later than pregnant Hispanic women who were US citizens.

Commercial sex work and drug use, particularly crack cocaine use, have been associated with syphilis in women.^{6,7} In Maricopa County, many white, black, and AI/AN women with syphilis also reported commercial sex work, drug use, incarceration, and anonymous sex. Smaller proportions of Hispanic women who were US citizens reported these risk behaviors, and far fewer Hispanic noncitizens with syphilis reported these risk behaviors. These findings are consistent with findings of 2 recent investigations of Hispanic women with syphilis in Maricopa County.^{8,9} The discordance between the behaviors of Hispanic women, particularly noncitizens, and their male sex partners suggests that men are engaging in high-risk activities outside of their primary partnerships and are subsequently infecting their lower-risk primary female partners. Low rates of condom use among Hispanic men and women^{10,11} and traditional gender roles within relationships¹² might contribute to this transmission pattern. In addition, Hispanic women who are recent immigrants may have little knowledge of syphilis and might not be aware of their partners' sexual activities.⁹

We found higher levels of pregnancy among Hispanic women with syphilis than among white and black women with syphilis, consistent with high fertility rates among Hispanic women observed in Arizona³ and nationally,¹³ and the increased likelihoods of unintended pregnancies among Hispanic women.^{10,14} The large number of pregnancies in Hispanic women with syphilis is likely to contribute to high CS case counts among Hispanic infants.

Pregnant Hispanic women with syphilis who were not US citizens were treated for syphilis significantly later than Hispanic women who were US citizens. Delayed maternal syphilis treatment places the fetus at heightened risk of CS.¹⁵ Possible explanations for late treatment

of maternal syphilis among noncitizens include: the lack of or late initiation of prenatal care, possibly due to Arizona Medicaid requirements to prove citizenship at the time of application and the restriction of covered services for illegal immigrants to emergency care only¹⁶; difficulty contacting noncitizen women for follow-up care; or a lower likelihood of third trimester screening.⁸ Yet, the degree to which the disparity in timing of treatment contributes to disproportionate CS rates among Hispanic infants is unclear. We did not find significant differences in timing of treatment among pregnant women by race/ethnicity, and we did not detect significant differences in the likelihood of delivering infants with CS by race/ethnicity or citizenship of the mother.

We did not find a clear explanation for the disproportionately high CS rates among Hispanic infants in Arizona. A possible explanation may be underdetection of syphilis among Hispanic women: CS rates among Hispanic infants may reflect the true (and underreported) burden of syphilis among Hispanic women. Pregnant Hispanic women could also be entering the United States to deliver their children; however, most pregnant Hispanic noncitizens with syphilis reported that they had been in the United States for the entirety of their pregnancy.

Although AI/AN women were not the focus of our investigation, it is important to note that this vulnerable population has disproportionately high sexually transmitted disease rates and may face barriers to care.¹⁷ Infants born to AI/AN women are at elevated risk of CS, with CS rates of 79.7 per 100,000 live births in Arizona in 2008 (CDC, unpublished data). We found that 28% of AI/AN women with syphilis were pregnant and tended to be treated late in pregnancy.

Although these data provide important insights into the epidemic of CS in Arizona, there are several limitations. Reliance upon passively reported cases of adult syphilis and CS may result in underreporting of cases. Legal and social disincentives to disclose citizenship status, time in the United States, drug use, and sexual behaviors may contribute to inaccurate responses. Data on the partners of Hispanic women might not be representative of all male partners of Hispanic women with syphilis. Although we defined the trimester when women were first screened and treated for syphilis, our measures could not assess the quality of prenatal care and the number of prenatal care visits. Given the geographic focus of the investigation, these findings may not be generalizable to other localities. However, we suspect that the findings are relevant for other states that border Mexico or communities that have high levels of syphilis morbidity and growing Hispanic immigrant populations.

CS prevention efforts should include innovative strategies that are appropriate for this population of Hispanic women, perhaps including interventions for Hispanic men. Clinicians caring for Hispanic populations in areas of high syphilis morbidity should be aware that women's behavioral profile may not accurately predict their risk of syphilis. In areas of high syphilis morbidity, all pregnant women should be screened for syphilis routinely according to local and CDC guidelines, which include a third trimester test in addition to screening during the first trimester and at delivery. Interventions to reduce unintended pregnancies and increase the ability of women to negotiate condom use are warranted. Lastly, community-based organizations, healthcare providers, and government agencies are encouraged to form

partnerships to increase access to and awareness of the importance of early prenatal care and timely prenatal syphilis testing for all women, including noncitizens. CS is preventable, yet it is only through sustained effort and effective partnerships that CS prevention and reductions in health disparities will be achieved.

Acknowledgments

Supported by the Centers for Disease Control and Prevention.

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Characteristics of Women With Syphilis by Race/Ethnicity: Maricopa County, Arizona, 2004 to 2008

TABLE 1.

Characteristics	White (n = 265)	Black (n = 130)	AI/AN (n = 79)	Hispanic (n = 476)	Total* (n = 970)
Age, mean ± SD	30.4 ± 9.0 [‡]	31.8 ± 8.9 [‡]	30 ± 7.7 [‡]	27.2 ± 7.6	28.7 ± 8.3
US citizen, n (%)	255 (97) [‡]	105 (82) [‡]	76 (96.2) [‡]	213 (49)	649 (72)
Pregnant, n (%)	34 (15) [‡]	16 (13) [‡]	25 (33)	162 (37)	242 (28)
Stage, n (%)					
Early	118 (45) [‡]	35 (27)	38 (48) [‡]	148 (31)	341 (35)
Late	147 (55)	95 (73)	41 (52)	328 (69)	629 (65)
Risk behaviors, n (%) [‡]					
Drug use	118 (57) [‡]	45 (42) [‡]	37 (54) [‡]	93 (22)	294 (36)
Incarceration	104 (45) [‡]	52 (44) [‡]	28 (39) [‡]	83 (19)	268 (31)
Anonymous sex	104 (49) [‡]	34 (32) [‡]	19 (28)	88 (21)	246 (30)
Received money/drugs for sex	54 (26) [‡]	27 (26) [‡]	7 (10)	37 (9)	125 (15)
2 or more sex partners	116 (44) [‡]	45 (35)	33 (42)	156 (33)	355 (37)

Missing data account for discrepancies between number values and percentages.

* Total includes Asian (n = 20) and observations with missing race/ethnicity.

[‡] Significantly different from Hispanic women at the P < 0.05 level.

[‡] Occurred during interview period.

AI/AN indicates American Indian/Alaskan Native; SD, standard deviation.

TABLE 2.

Risk Behaviors of Hispanic Women With Early Syphilis Who Were Linked to a Male Sex Partner, by Citizenship Status of the Women: Maricopa County, Arizona, 2004 to 2008

Characteristics	US Citizen (n = 45)	Non-US Citizen (n = 32)	P
Risk behaviors of women with early syphilis, n (%) [*]			
Drug use	15 (33)	4 (13)	0.037
Incarceration	9 (22)	0 (0)	0.007
Anonymous sex	9 (20)	5 (16)	NS
Received money or drugs for sex	2 (5)	1 (4)	NS
2 or more sex partners	9 (20)	3 (9)	NS
Risk behaviors of male partners, n (%)			
Drug use	22 (61)	19 (56)	NS
Incarceration	16 (39)	2 (7)	0.002
Anonymous sex	24 (55)	18 (64)	NS
Gave money or drugs for sex	4 (10)	5 (17)	NS
MSM	2 (5)	4 (13)	NS

Missing data account for discrepancies between number values and percentages.

^{*} Women with syphilis for whom data on male partners were available.

MSM indicates men who have sex with men; NS, not significant; SD, standard deviation.

Characteristics of Pregnant Women With Syphilis by Race/Ethnicity: Maricopa County, Arizona, 2004 to 2008

TABLE 3.

Characteristics	White (n = 34)	Black (n = 16)	AI/AN (n = 25)	Hispanic (n = 162)	Total* (n = 242)
Age (mean ± SD)	26.3 ± 5.8	26.9 ± 5.6	28.7 ± 6.9 [‡]	25.1 ± 5.7	25.7 ± 5.9
Any prenatal care, n (%)	22 (76)	10 (83)	16 (94)	110 (83)	162 (83)
Trimester first tested, n (%)					
First or second	13 (50)	10 (83)	13 (62)	93 (63)	131 (62)
Third or at delivery	13 (50)	2 (17)	8 (38)	55 (37)	80 (38)
Stage, n (%)					
Early	17 (50)	7 (44)	14 (56)	58 (36)	98 (41)
Late	17 (50)	9 (56)	11 (44)	104 (64)	144 (59)
Median no. gestational weeks at maternal treatment (range)	24 (6–40)	22 (7–40)	29 (5–40)	25 (5–42)	24 (5–42)
Delivered infant with CS, n (%)	11 (32)	5 (31)	9 (36)	51 (32)	78 (32)
Risk behaviors, n (%)					
Drug use	20 (63) [‡]	4 (27)	11 (48) [‡]	21 (13)	56 (24)
Anonymous sex	19 (59) [‡]	7 (44) [‡]	4 (17)	25 (16)	56 (24)
Received money or drugs for sex	9 (28) [‡]	6 (37) [‡]	0 (0)	8 (5)	23 (10)
2 or more sex partners	14 (41)	9 (56) [‡]	15 (60) [‡]	49 (30)	89 (37)
Risk behavior of male partners, n (%) [‡]					
Drug use	4 (50)	0 (0)	3 (60)	26 (52)	33 (52)
Incarceration	3 (37)	0 (0)	4 (80) [‡]	11 (22)	18 (28)
Anonymous sex	4 (50)	0 (0)	4 (80)	30 (59)	38 (59)
Gave money or drugs for sex	1 (13)	0 (0)	1 (20)	5 (10)	7 (11)
2 or more sex partners	3 (33)	0 (0)	2 (33)	11 (21)	16 (23)
MSM	0 (0)	0 (0)	0 (0)	5 (10)	5 (7)

Missing data account for discrepancies between number values and percentages.

* Total includes Asian (n = 5) and observations with missing race/ethnicity.

[‡] Significantly different than pregnant Hispanic women at the *P* < 0.05 level.

[‡]For pregnant women who were matched to at least one male sex partner with syphilis, n = 65 (white, n = 8; black, n = 1; AI/AN, n = 5; Hispanic, n = 51).

AI indicates American Indian/Alaskan Native; SD, standard deviation; MSM, men who have sex with men.

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TABLE 4.

Characteristics of Pregnant Women With Syphilis Who Delivered Infants With CS Compared to Pregnant Women With Syphilis Whose Infants Were Not CS Cases: Maricopa County, Arizona, 2004 to 2008

Characteristics	Pregnant Women With Syphilis		P
	Not CS (n = 164)	CS (n = 78)	
Age (mean ± SD)	25.4 ± 5.9	26.5 ± 5.8	NS
Race/ethnicity, n (%)			NS
White	23 (14)	11 (14)	NS
Black	11 (7)	5 (7)	NS
AI/AN	16 (10)	9 (12)	NS
Hispanic	110 (67)	51 (66)	NS
Asian	4 (2)	1 (1)	NS
US citizen, n (%)	86 (53)	42 (55)	NS
Stage of syphilis, n (%)			
Early	55 (34)	43 (56)	0.001
Late	109 (66)	34 (44)	—
Prenatal care, n (%)	110 (92)	52 (68)	<0.001
Trimester first tested, n (%)			
First or second	110 (73)	21 (35)	<0.001
Third or at delivery	41 (27)	39 (65)	—
Week of maternal syphilis treatment, median (range)	18 (5–37)	36 (6–42)	<0.001
Risk behaviors			
Drug use, n (%)	37 (23)	19 (25)	NS
Anonymous sex, n (%)	41 (26)	15 (21)	NS
Received money or drugs for sex, n (%)	15 (10)	8 (11)	NS
Incarceration, n (%)	19 (12)	8 (11)	NS
Median no. partners (range)	1 (0–500)	1 (0–40)	NS

SD indicates standard deviation; CS, congenital syphilis.