Gender and Age Disparities in the Prevalence of *Chlamydia* Infection Among Sexually Active Adults in the United States

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Abstract

Background: *Chlamydia trachomatis* (CT) causes a costly and potentially recurrent bacterial infection that accounts for a considerable proportion of sexually transmitted infections (STIs) in the United States. Disparities by gender and age group in CT prevalence have been reported previously. The current study evaluates demographic, socioeconomic, and behavioral risk and protective factors that may account for gender/age disparities in CT infections among sexually active young adults in the United States.

Methods: Secondary analyses were performing using the 1999–2006 National Health and Nutrition Examination Survey (NHANES) data.

Results: A total sample of 5611 adults, 20–39 years of age, who participated in the 1999–2006 NHANES, reported lifetime sexual experience, and had valid laboratory-based CT status, was analyzed. CT prevalence did not differ significantly by gender and was estimated to be 1.6%. It was slightly higher for people <25 years vs. those ≥25 years of age; age disparities were reduced after controlling for demographic, socioeconomic, and behavioral characteristics. Among those <25 years, non-Hispanic blacks had a higher odds of CT infection compared with other groups. Among those ≥25 years of age, not having had unprotected sex in the past month reduced the odds for CT infection, whereas non-Hispanic black race and never married status increased the odds for CT infection.

Conclusions: Among sexually active adults, no gender disparities were observed in CT prevalence. Age group disparities were partly explained by personal characteristics associated with risk of STIs.

Introduction

CHLAMYDIA TRACHOMATIS (CT) CAUSES A COSTLY and potentially recurrent bacterial infection that accounts for a considerable proportion of sexually transmitted infections (STIs) in the United States.^{1–5} Recent technological advances have facilitated early detection and treatment of CT infections.^{2,4,6–9} If left untreated, a CT infection may have severe consequences for infected people and their sexual partners as well as adverse pregnancy outcomes.^{1,7,10} Health problems that have been attributed to CT infections include HIV/AIDS, infertility, pelvic inflammatory disease (PID), ectopic pregnancy, chronic pelvic pain, and testicular and prostate infections.¹ Vertical transmission of CT and other related STIs may also cause poor outcomes for newborn infants.¹¹

CT infection is known to disproportionately affect non-Hispanic blacks and to exceed the national average in the Southeastern region of the United States.^{12,13} Gender and age disparities have been reported whereby CT tends to occur more frequently in females, adolescents, and young adults between the ages of 15 and 24 years.^{2–4,7,13–15} Evidence for such inequalities, however, mostly originates from convenience rather than population-based samples, and the epidemiology of CT has been studied predominantly in high-risk groups, including commercial sex workers, homosexual men, and injection drug users.^{16–22}

Estimating the prevalence of and identifying risk factors for CT infection is a prerequisite to the design, implementation, and evaluation of screening programs aimed at reducing its burden at the national level. The inclusion of an STI

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surveillance laboratory component in recent waves of the National Health and Nutrition Examination Survey (NHANES) provides the opportunity to assess the burden of CT in a nonselected population of adolescents and young adults. In a recent study, Datta et al.²³ analyzed data on 6632 1999–2002 NHANES participants and estimated CT prevalence to be 2.2% among people 14–39 years of age. Although no gender differences in CT prevalence were observed, age disparities were found to be gender specific, and the only other risk factors identified were race/ethnicity and self-reported STI history.

A thorough examination of CT risk and protective factors according to gender and age group is paramount for tailoring of interventions to the specific needs of sexually active adults in each subgroup. Whereas lifetime sexual experience is a necessary condition for acquiring STIs, other demographic, socioeconomic, and behavioral factors may enhance our understanding of gender/age disparities in CT prevalence among sexually active adults. The current study employs the 1999–2006 NHANES data to evaluate personal characteristics that may account for such disparities in CT infection among sexually active U.S. adults, 20–39 years of age. We hypothesized that CT prevalence will be highest among women and people <25 years of age and that the association of CT prevalence with selected demographic, socioeconomic, and behavioral indicators will differ according to gender and age group.

Materials and Methods

Data source

Secondary analyses of NHANES public-use datasets were performed. Conducted by the National Center for Health Statistics (NCHS) at the Centers for Disease Control and Prevention (CDC), NHANES is a series of cross-sectional surveys originally designed for evaluation of health and nutritional characteristics of the United States civilian population. Sources of data include interviews, physical examinations, and laboratory tests. All NHANES surveys use a stratified, multistage probability cluster sampling design. Sociodemographic and health data were collected by trained staff using household interviews. In addition, a mobile examination center (MEC) run by health professionals was used to collect anthropometric, blood pressure, and laboratory measurements on either all or a subgroup of study participants. Detailed descriptions of the NHANES study design and data collection procedures have been published elsewhere.^{24,25} Since 1999, NHANES has become a continuous surveillance system. We, therefore, combined the 1999–2000, 2001–2002, 2003–2004, and 2005–2006 NHANES datasets for our analyses. Informed consent was obtained from subjects in the original NHANES protocol. The current analyses were approved by the institutional review board of Eastern Virginia Medical School.

Measures

Chlamydia trachomatis. The 1999–2006 NHANES surveys include laboratory data for several STIs, including CT and *Neisseria gonorrhoeae* (NG). Urine samples were collected at the MEC from a select group of NHANES respondents 14–39 years of age and were simultaneously evaluated for CT and NG using standard laboratory techniques. Briefly, amplified DNA assays for CT and NG were applied, and amplification

and detection of target DNA were performed using primers and labeled detector probes. CT and NG infections were determined by relating observed measurements to predetermined cutoff values.²⁶ In the 1999–2002 NHANES waves, a ligase chain reaction amplification technology was used for detecting the presence of CT DNA. In the 2003–2006 NHANES waves, CT and NG were simultaneously detected using BDProbeTec amplified DNA assays. Although CT and NG often coexist,²³ the current analyses were limited to the most frequently identified infectious agent, namely, CT.

Sociodemographic and risk behavioral factors. Data on demographic, socioeconomic, and tobacco use characteristics were ascertained for all survey participants through computer-assisted personal interviews (CAPI). In addition, data on sexual behaviors and alcohol and recreational drug use were obtained from various age subgroups and by applying different methodologies. For instance, alcohol use was evaluated for people ≥20 years through CAPI. Recreational drug use and sexual behaviors were assessed using audio computer assisted personal self-interview (ACASI) questionnaire for those in the age ranges of 12–59 years and 14–59 years. Because tobacco, alcohol, and recreational drug use are proxy measures of a lifestyle that is conducive to risky sexual behaviors, we expect the CT prevalence to be higher among subjects who report having consumed these substances in the recent past. The current analyses were restricted to adult men and women, 20–39 years of age, who reported having had vaginal, oral, or anal sex at least once during their lifetime. Individuals <20 years of age were excluded from the analyses, as many of the risk factors of interest were assessed only among adults.

Statistical analysis

Descriptive, bivariate, and multivariate analyses were conducted using Stata version 8 (Stata Corps., College Station, TX). Prevalence rates, crude and adjusted odds ratios (COR and AOR), and their 95% confidence intervals (CI) were computed, taking sampling weights into consideration. MEC examination weights were used for all analyses; these weights were defined to represent the U.S. civilian, noninstitutionalized population while accounting for oversampling of certain age and ethnic groups and interview nonresponse.²⁷ Bivariate associations were analyzed using Pearson's chi-square test for independence. Initially, we evaluated disparities in CT prevalence by gender (male, female), age group (<25 years, ≥25 years), and gender/age group categories (males <25 years, males ≥25 years, females <25 years, females ≥25 years). Next, we evaluated variations in CT prevalence by selected demographic, socioeconomic, and behavioral characteristics before and after stratifying according to gender, age group, or both. Because multiple waves of NHANES data were combined, only demographic, socioeconomic, and behavioral characteristics that were similarly defined across waves and previously found to influence STI acquisition were included in the analysis. These include race/ethnicity (Mexican American/other Hispanic, non-Hispanic white, non-Hispanic black, other), education (less than high school, high school, greater than high school), marital status (ever married, never married, cohabiting), annual household income (<\$20,000, ≥\$20,000), cigarette smoking (past 30 days: yes, no), binge or heavy

drinking (past 12 months: yes, no), recreational drug use (past 12 months: yes, no), age at first sexual experience (≤ 15 years, > 15 years), unprotected sex in the past month (yes, no). Finally, stratified logistic regression analyses were conducted, with strata defined according to gender or age group, depending on findings from a logistic model whereby CT status is the dependent variable and gender, age group, and an interaction (gender*age group) term are the independent variables. In each stratum, we assessed unadjusted and adjusted effects of the selected demographic, socioeconomic, and behavioral factors on CT status. Two-sided statistical tests were performed at an alpha level of 0.05.

Results

A total of 5611 participants (males, $n = 2447$, and females, $n = 3164$; age < 25 years, $n = 1486$, age ≥ 25 years, $n = 4125$) from the 1999–2006 NHANES reported lifetime sexual activity and had known CT status based on laboratory testing. Of those, 120 individuals were classified as having had a recent CT infection, resulting in an estimated CT prevalence of 1.6% (95% CI 1.3%–1.9%). Overall, the percentage of females did not differ according to age group (< 25 years: 50.0% vs. ≥ 25 years: 50.0%, $p = 0.99$). A higher prevalence of CT was observed among individuals < 25 years of age compared with those ≥ 25 years of age (2.8% vs. 1.3%, OR 2.1, 95% CI 1.4–3.4, $p = 0.002$). In contrast, the observed difference in CT prevalence between females and males in the study sample was not statistically significant (1.6% vs. 1.7%, OR 1.0, 95% CI 0.7–1.6, $p = 0.8$). Males ≥ 25 years (1.3%), females < 25 years (2.8%), and females ≥ 25 years (1.3%) did not exhibit a significantly different CT prevalence ($p > 0.05$) compared with males < 25 years of age (2.7%). Logistic modeling of CT prevalence against gender, age group, and gender*age group implied a significant main effect for age group but no significant effect for gender or the interaction between gender and age group.

Table 1 presents the prevalence of CT infection among sexually active adults by sex, age group, and selected socio-demographic indicators. Overall, CT prevalence was highest among non-Hispanic blacks, those who were never married, and those who reported less than high school education or an annual household income of $< \$20,000$. A test-for-linear trend suggested a significant inverse dose-response relationship between level of education and CT prevalence (less than high school: 4.2%, $n = 1317$; high school: 3.9%, $n = 1364$; greater than high school: 1.7%, $n = 2926$; $p_{\text{trend}} = 0.0001$). These observations could not be generalized to all gender and age groups. For instance, level of education was not significantly associated with CT prevalence among males ≥ 25 years and females < 25 years of age.

Table 2 presents the prevalence of CT infection among sexually active adults by sex, age group, and behavioral indicators. In general, although previously correlated with risky sexual behaviors and STI acquisition, the use of such substances as cigarettes, alcohol, and recreational drugs was found to be unrelated to CT infection. In contrast, early age at first sexual experience and unprotected sexual activity in the past month appeared to be important risk markers for CT acquisition. As with sociodemographic factors, CT prevalence was influenced by behavioral characteristics to various degrees in different gender/age groups. Of note, age at first sexual experience appears to be inversely related to CT in-

fection among males but not among females. Contrary to expectations, a negative association was observed between unprotected sexual activity in the past month and CT infection among males but not among females.

Table 3 presents logistic models for demographic, socioeconomic, and behavioral characteristics as predictors of CT infection among sexually active adults according to age group. After adjustment for the selected demographic, socioeconomic, and behavioral factors, the odds ratio (OR) corresponding to age ≥ 25 years was increased from 0.46 to 0.61, while remaining of borderline statistical significance. Overall, non-Hispanic black people were at increased risk and those not reporting unprotected sexual activity in the past month were at reduced risk of CT infection. Among individuals < 25 years of age, non-Hispanic blacks had a higher odds of CT infection compared with other racial and ethnic groups. Among those ≥ 25 years of age, not having had unprotected sex in the past month reduced the odds for CT infection, whereas non-Hispanic black race and never married status increased the odds for CT infection. Recreational drug use was not included in the crude or adjusted logistic models because none of the CT-infected people reported using recreational drugs in the past 12 months. Irrespective of age group, cigarette use and binge or heavy alcohol drinking were not associated with CT disparities. Furthermore, adjusting for demographic, socioeconomic, and behavioral factors appeared to have little effect on age disparities.

Discussion

To date, a limited number of studies have been conducted in an effort to assess the burden of CT in entire communities. A Baltimore study estimated the prevalence of CT infection to be 3% in a sample of 728 untreated adults between the ages of 18 and 35 years.²⁸ Another study of approximately 14,322 young adults 18–26 years of age recruited from the Wave III of the National Longitudinal Study of Adolescent Health estimated CT prevalence to be approximately 4.2%; female gender, black race, and Southern residence were identified as risk factors for CT infection.²⁹ To our knowledge, this study is among few that have explored CT prevalence and risk/protective factors using NHANES data²³ and the first to explore gender and age disparities among sexually active adults.

Our study was consistent with the idea that young adults who are < 25 years of age are disproportionately affected by CT infection. Besides race/ethnicity, marital status, and unprotected sex in the past month, other demographic, socioeconomic, and behavioral characteristics known to influence STI acquisition appear to be less important in explaining CT prevalence or inequalities according to age group. In the current study, self-reported use of cigarettes, binge alcohol drinking, and use of recreational drugs in the recent past were not significantly associated with CT infection among sexually active adults. An unexpected finding was the negative relationship between unprotected sex in the past month and CT infection among males in the stratified analysis. The limited sample size and, consequently, the wide CIs around the CT prevalence estimates may explain such a finding, which is contrary to expectation.

Past research has correlated the use of alcohol, especially binge drinking, and recreational drugs (methamphetamines, cocaine, and marijuana) with risky sexual behaviors leading

TABLE 1. PREVALENCE OF *CHLAMYDIA* INFECTION AMONG SEXUALLY ACTIVE ADULTS BY SEX, AGE GROUP, AND SOCIODEMOGRAPHIC INDICATORS

Sex	Total			Males			Females		
	<25 years (n = 1486) Weighted % (SE)	≥25 years (n = 4125) Weighted % (SE)	Total (n = 5611) Weighted % (SE)	<25 years (n = 633) Weighted % (SE)	≥25 years (n = 1814) Weighted % (SE)	Total (n = 2447) Weighted % (SE)	<25 years (n = 853) Weighted % (SE)	≥25 years (n = 2311) Weighted % (SE)	Total (n = 3164) Weighted % (SE)
Age group									
Total	2.7 (0.5) $p = 0.001$	1.3 (0.2) $p = 0.0001$	1.6 (0.2) $p = <0.0001$	2.7 (0.6) $p = 0.03$	1.3 (0.2) $p = 0.001$	1.6 (0.2) $p = <0.0001$	2.8 (0.7) $p = 0.0008$	1.3 (0.3) $p = 0.01$	1.7 (0.3) $p = 0.0004$
Race/ethnicity									
Mexican American/other Hispanic	1.8 2.1	1.6 0.8	1.6 1.1	1.1 2.6	1.6 0.7	1.5 1.1	2.6 1.7	1.5 0.8	1.8 1.0
Non-Hispanic white	7.9	3.9	4.9	6.1	4.8	5.2	9.5	3.1	4.7
Non-Hispanic black	1.1	1.7	1.5	1.9	0.0	0.4	4.8	3.6	2.7
Other									
Education	$p = 0.04$	$p = 0.003$	$p = 0.0001$	$p = 0.004$	$p = 0.4$	$p = 0.01$	$p = 0.7$	$p = 0.003$	$p = 0.006$
Less than high school	4.2	2.4	2.8	4.8	1.9	2.7	3.4	3.0	3.1
High school	3.9	1.8	2.3	4.4	1.4	2.2	3.3	2.1	2.5
Greater than high school	1.7	0.3	1.1	0.8	0.9	0.9	2.4	0.7	1.0
Marital status	$p = 0.38$	$p = 0.02$	$p = 0.005$	$p = 0.29$	$p = 0.24$	$p = 0.022$	$p = 0.62$	$p = 0.009$	$p = 0.009$
Ever married	1.7	1.0	1.1	0.9	0.9	0.2	2.1	1.1	1.2
Never married	3.0	2.2	2.6	2.8	1.7	2.2	3.4	3.0	3.2
Cohabiting	3.4	1.1	1.8	4.2	1.5	2.2	2.7	0.7	1.4
Annual household income (\$)	$p = 0.04$	$p = 0.1$	$p = 0.001$	$p = 0.04$	$p = 0.3$	$p = 0.02$	$p = 0.3$	$p = 0.2$	$p = 0.02$
<20,000	5.1	2.1	3.3	6.3	2.0	3.7	4.2	2.1	2.8
≥20,000	2.1	1.2	1.4	1.8	1.2	1.3	2.5	1.2	1.5

p represents the statistical significance of a chi-square test, taking 1999–2006 National Health and Nutrition Examination Survey (NHANES) design into consideration; $p < 0.05$ is considered statistically significant.
SE, standard error.

TABLE 2. PREVALENCE OF *CHLAMYDIA* INFECTION AMONG SEXUALLY ACTIVE ADULTS BY SEX, AGE GROUP, AND BEHAVIORAL INDICATORS

Sex	Age group	Total			Males			Females		
		<25 years (n = 1486) Weighted % (SE)	≥25 years (n = 4125) Weighted % (SE)	Total (n = 5611) Weighted % (SE)	<25 years (n = 633) Weighted % (SE)	≥25 years (n = 1814) Weighted % (SE)	Total (n = 2447) Weighted % (SE)	<25 years (n = 853) Weighted % (SE)	≥25 years (n = 2311) Weighted % (SE)	Total (n = 3164) Weighted % (SE)
Cigarette smoking (past 30 days)	Total	2.7 (0.5)	1.3 (0.2)	1.6 (0.2)	2.7 (0.6)	1.3 (0.2)	1.6 (0.2)	2.8 (0.7)	1.3 (0.3)	1.7 (0.3)
	Yes	p = 0.6	p = 0.6	p = 0.4	p = 0.9	p = 0.9	p = 0.9	p = 0.4	p = 0.5	p = 0.2
Binge or heavy drinking (past 12 months)	No	3.2	1.4	1.9	2.7	1.2	1.6	3.8	1.7	2.2
	Yes	2.5	1.3	1.5	2.7	1.2	1.6	2.4	1.2	1.5
Recreational drug use (past 12 months)	No	p = 0.39	p = 0.5	p = 0.8	p = 0.9	p = 0.8	p = 0.8	p = 0.4	p = 0.5	p = 0.9
	Yes	2.4	1.4	1.7	2.7	1.4	1.7	2.0	1.6	1.7
Age at first sexual experience	No	3.2	1.2	1.7	2.9	1.2	1.6	3.4	1.2	1.7
	Yes	p = 0.7	p = 0.5	p = 0.4	p = 0.7	p = 0.5	p = 0.44	p = 0.9	p = 0.7	p = 0.7
Unprotected sex (past month)	No	0	0	0	0	0	0	0	0	0
	Yes	2.9	1.4	1.8	2.8	1.4	1.7	3.1	1.5	1.9
	≤15 years	p = 0.05	p = 0.2	p = 0.01	p = 0.0001	p = 0.01	p < 0.0001	p = 0.3	p = 0.8	p = 0.6
	>15 years	3.9	1.8	2.3	5.8	2.2	3.1	1.9	1.3	1.4
	No	2.1	1.1	1.3	0.9	0.8	0.8	3.2	1.4	1.7
	Yes	p = 0.4	p = 0.01	p = 0.002	p = 0.2	p = 0.05	p = 0.002	p = 0.9	p = 0.2	p = 0.3
	No	3.2	1.9	2.3	3.7	2.0	2.5	2.7	1.9	2.1
	Yes	2.5	1.0	1.3	2.0	0.9	1.1	2.9	1.1	1.5

p represents the statistical significance of a chi-square test, taking 1999–2006 NHANES survey design into consideration; *p* < 0.05 is considered statistically significant.

TABLE 3. LOGISTIC MODELS FOR DEMOGRAPHIC, SOCIOECONOMIC, AND BEHAVIORAL CHARACTERISTICS AS PREDICTORS OF *CHLAMYDIA* INFECTION AMONG SEXUALLY ACTIVE ADULTS BY AGE GROUP

	Overall (n = 5611)				Age < 25 years (n = 1486)				Age ≥ 25 years (n = 4125)			
	Crude		Adjusted ^a		Crude		Adjusted ^b		Crude		Adjusted ^c	
	n	OR (95% CI)	OR (95% CI)	n	OR (95% CI)	OR (95% CI)	OR (95% CI)	n	OR (95% CI)	OR (95% CI)	n	OR (95% CI)
Age												
<25 years	1486	1.00	1.00	–	–	–	–	–	–	–	–	–
≥25 years	4125	0.46 (0.29-0.74)	0.61 (0.37-1.00)	–	–	–	–	–	–	–	–	–
Socioeconomic factors												
Race/ethnicity												
Mexican American/other Hispanic	1619	1.00	1.00	489	1.00	1.00	1.00	1130	1.00	1.00	1.00	1.00
Non-Hispanic white	2622	0.65 (0.36-1.19)	0.84 (0.42-1.72)	619	1.17 (0.39-3.45)	1.38 (0.32-5.95)	1.38 (0.32-5.95)	2003	0.49 (0.22-1.12)	0.69 (0.27-1.43)	2003	0.49 (0.22-1.12)
Non-Hispanic black	1134	3.10 (1.78-5.42)	2.95 (1.57-5.52)	319	4.63 (1.79-11.99)	4.24 (1.16-15.54)	4.24 (1.16-15.54)	815	2.51 (1.37-4.60)	2.39 (1.29-4.43)	815	2.51 (1.37-4.60)
Other	236	0.93 (0.26-3.34)	2.95 (1.57-5.52)	59	0.62 (0.09-3.84)	–	–	177	1.05 (0.23-4.79)	1.63 (0.36-7.48)	177	1.05 (0.23-4.79)
Education												
Less than high school	1317	1.00	1.00	429	1.00	1.00	1.00	893	1.00	1.00	1.00	1.00
High school	1364	0.80 (0.52-1.23)	1.27 (0.71-2.26)	410	0.93 (0.46-1.86)	1.40 (0.52-3.79)	1.40 (0.52-3.79)	954	0.74 (0.41-1.34)	1.22 (0.59-2.49)	954	0.74 (0.41-1.34)
More than high school	2926	0.34 (0.19-0.60)	0.54 (0.27-1.08)	651	0.39 (0.15-0.99)	0.63 (0.18-2.19)	0.63 (0.18-2.19)	2275	0.34 (0.17-0.68)	0.48 (0.22-1.05)	2275	0.34 (0.17-0.68)
Marital status												
Ever married	3156	1.00	1.00	425	1.00	1.00	1.00	2731	1.00	1.00	1.00	1.00
Never married	1661	2.50 (1.52-4.11)	1.69 (1.05-2.76)	820	1.85 (0.99-3.45)	2.02 (0.94-4.35)	2.02 (0.94-4.35)	841	2.29 (1.28-4.05)	1.88 (1.10-3.21)	841	2.29 (1.28-4.05)
Cohabiting	640	1.69 (0.68-4.18)	1.30 (0.53-3.22)	210	2.07 (0.58-7.38)	2.39 (0.58-9.94)	2.39 (0.58-9.94)	430	1.13 (0.43-3.01)	0.88 (0.33-2.35)	430	1.13 (0.43-3.01)
Annual household income (\$)												
<20,000	959	1.00	1.00	369	1.00	1.00	1.00	590	1.00	1.00	1.00	1.00
≥20,000	4268	0.41 (0.24-0.70)	0.63 (0.34-1.14)	971	0.39 (0.16-0.97)	0.44 (0.16-1.22)	0.44 (0.16-1.22)	3297	0.57 (0.28-1.13)	0.88 (0.45-1.71)	3297	0.57 (0.28-1.13)
Behavioral factors												
Cigarette smoking (past 30 days)												
Yes	1508	1.00	1.00	428	1.00	1.00	1.00	1080	1.00	1.00	1.00	1.00
No	4099	0.79 (0.48-1.30)	1.13 (0.57-2.26)	1056	0.77 (0.31-1.89)	0.74 (0.21-2.56)	0.74 (0.21-2.56)	3043	0.88 (0.52-1.48)	1.47 (0.78-2.78)	3043	0.88 (0.52-1.48)
Alcohol heavy or binge drinking (past 12 months)												
Yes	2047	1.00	1.00	599	1.00	1.00	1.00	1448	1.00	1.00	1.00	1.00
No	3233	0.96 (0.65-1.42)	0.86 (0.55-1.36)	833	1.33 (0.69-2.53)	1.11 (0.51-2.40)	1.11 (0.51-2.40)	2400	0.84 (0.49-1.44)	0.74 (0.42-1.32)	2400	0.84 (0.49-1.44)
Recreational drug use (past 12 months)												
Yes	53	1.00	1.00	6	1.00	1.00	1.00	47	1.00	1.00	1.00	1.00
No	4703	–	–	1234	–	–	–	3469	–	–	–	–
Age at first sexual experience												
≤15 years	1777	1.00	1.00	558	1.00	1.00	1.00	1219	1.00	1.00	1.00	1.00
>15 years	3816	0.56 (0.35-0.89)	0.88 (0.51-1.52)	921	0.52 (0.27-1.00)	0.74 (0.35-1.56)	0.74 (0.35-1.56)	2892	0.63 (0.33-1.22)	0.98 (0.48-2.02)	2892	0.63 (0.33-1.22)
Unprotected sex (past month)												
Yes	1875	1.00	1.00	546	1.00	1.00	1.00	1329	1.00	1.00	1.00	1.00
No	3736	0.57 (0.39-0.81)	0.59 (0.38-0.95)	940	0.76 (0.37-1.55)	0.83 (0.37-1.87)	0.83 (0.37-1.87)	2796	0.50 (0.29-0.85)	0.47 (0.25-0.90)	2796	0.50 (0.29-0.85)

^aFully adjusted logistic model based on a total sample of 4417 1999–2006 NHANES subjects, 20–39 years of age, with valid data on all covariates.

^bFully adjusted logistic model based on a total sample of 1042 1999–2006 NHANES subjects, 20–24 years of age, with valid data on all covariates.

^cFully adjusted logistic model based on a total sample of 3338 1999–2006 NHANES subjects, 25–39 years of age, with valid data on all covariates.

CI, confidence interval; OR, odds ratio.

to the acquisition of HIV and other STIs.³⁰ This relationship has been documented in homosexual men, adolescents, heterosexual men and women, and psychiatric patients.³⁰ In our analyses, such lifestyle factors were not associated with CT prevalence. This counterintuitive finding might be explained by cross-sectional design and exposure definition. Clearly, a temporal relationship cannot be established between use of substances and prevalent CT. Moreover, recent experiences with cigarettes, alcohol, and recreational drugs may not be entirely relevant to CT acquisition. Patterns of substance use preceding the event that led to CT infection are likely more salient but are difficult to ascertain in a cross-sectional design. Consistent with our findings, O'Leary et al.³⁰ report that alcohol and drug use disorders may not account for the excess risk of STIs in the Southern region of the United States.

Unprotected sex is a modifiable risk factor for CT, and the increased prevalence of CT among non-Hispanic blacks is of public health concern. For instance, CT infection can ultimately lead to infertility, necessitating specialized and relatively expensive treatments, such as *in vitro* fertilization.³¹ These treatments may not be accessible to socioeconomically disadvantaged populations, of which large proportions are ethnic minorities. In sum, although the burden of CT infection and its associated health sequelae may be elevated among ethnic minorities, these same populations often have less access to healthcare services that can potentially alleviate the health consequences of a CT infection.

Our findings should be interpreted cautiously and in light of several limitations. First, the cross-sectional design precludes our ability to establish a temporal association between behavioral risk factors and CT infection. The available data identify prevalent rather than incident cases of CT. Therefore, risk characteristics may be correlates of CT incidence, duration, or both. Second, measurement error is an issue, especially for self-reported exposure data. Third, secondary analyses were performed and refined exposure measures. Finally, sample size did not permit stratification for the exploration of interactions among exposure, gender, and age groups.

Conclusions

In this study, no gender disparities in CT prevalence were observed, and age group disparities were partly explained by personal characteristics suspected to influence the risk of STIs. Sexually active young adults 20–24 years of age and those who are non-Hispanic blacks appear to be at an elevated risk for CT infection. Further studies are needed to ascertain the incidence of CT and the sequence of events leading to CT acquisition in high-risk populations.

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Disclosure Statement

The authors do not have a commercial or other association that might pose a conflict of interest (e.g., pharmaceutical

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