Published in final edited form as:

J Am Coll Health. 2016 ; 64(6): 496–501. doi:10.1080/07448481.2015.1117470.

Exploring chlamydia positivity among females on college campuses, 2008–2010

Melissa A. Habel, MPH, Jami S. Leichter, PhD, Elizabeth Torrone, PhD

Centers for Disease Control and Prevention, Atlanta, Georgia, USA

Abstract

Objective: Describe chlamydia positivity among young women tested at college health centers by student characteristics: age, race/ethnicity, and institution type.

Participants: During 2008–2010, colleges participating in a national infertility prevention program provided chlamydia testing data from females aged 18–24.

Methods: Chlamydia positivity (number of positive tests divided by the number tested) among females stratified by college type (4-year versus 2-year and minority serving institutes [MSIs]) was determined.

Results: Chlamydia testing data were provided by 148 colleges: 37 (26%) MSIs and 21 (15%) 2-year colleges. Of the 118,946 chlamydia tests, 6.5% were positive. Chlamydia positivity in females at 4-year colleges was 6.6% versus 5.3% at 2-year colleges ($p = .0001$). Positivity at MSIs was almost double of that at non-MSIs, 10.0% versus 5.4% ($p = .0001$).

Conclusions: Chlamydia positivity may be higher among college females than previously thought. Higher positivity at MSIs suggests that targeted sexually transmitted infection prevention efforts may be useful for high-risk college populations.

Keywords

Chlamydia; college; student; minority serving institute; STD

There are an estimated 20 million new sexually transmitted infections (STIs) each year, half of which occur among 15–24-year-olds.¹ *Chlamydia trachomatis* is one of several STIs that disproportionately affects youth and young adults¹ and can cause serious health consequences, including chronic pelvic pain and pelvic inflammatory disease that can lead to infertility, and also facilitate the acquisition and transmission of the human immunodeficiency virus (HIV).^{2,3} Because chlamydial infections are usually asymptomatic,

CONTACT Melissa A. Habel, MPH mabel@cdc.gov Health Scientist, Division of STD Prevention, Centers for Disease Control and Prevention, 1600 Clifton Road, Mailstop E-44 Atlanta, GA 30333, USA.

Conflict of interest disclosure

The authors have no conflicts of interest to report. The authors confirm that the research presented in this article met the ethical guidelines, including adherence to the legal requirements, of the United States and data were collected as part of routine public health surveillance and were thus exempt from CDC Institutional Review Board review.

Publisher's Disclaimer: Disclaimer

Publisher's Disclaimer: The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

the US Public Services Task Force (USPSTF) recommends that all sexually active young women aged 24 or under be screened annually for chlamydia to prevent negative reproductive health outcomes.⁴ Of the over 30 million young adults aged 18–24 years in the United States, approximately 42% are currently enrolled in undergraduate or graduate school.⁵ College students represent a subgroup of young adults potentially at high risk for STI acquisition. Similar to other young adults, they report engaging in a number of high-risk behaviors, putting them at risk for STIs, including having multiple sex partners, engaging in sex without a condom, and using drugs or binge drinking during sex.⁶

Nationally representative data on STIs among the college population are limited. The American College Health Association's (ACHA) annual Pap Test and STI Survey collects self-reports of chlamydia positivity (ie, the proportion of students tested for chlamydia who are positive) from approximately 160 college health centers, annually.⁷ However, because positivity data are submitted in total for the school year, numerators (the number of students testing positive) and denominators (number of students tested) cannot be determined.⁸ As no individual level characteristics are available, positivity cannot be stratified by age and race/ethnicity. Moreover, participating health centers are primarily from 4-year colleges and few are from minority serving institutes (MSIs) (eg, historically black colleges or universities [HBCUs] or Hispanic serving institutes [HSIs]). In the latest Pap and STI Survey, only 6% and 2% of schools surveyed were MSIs and 2-year colleges, respectively.⁹ As of 2008, MSIs enroll over 20% of all college students and 40% of undergraduates attend a 2-year college.
10–13

Students at MSIs and 2-year schools may have increased risks for STIs. Two-year colleges tend to have larger percentages of nontraditional, lower-income, and minority students than 4-year colleges.¹³ Minority groups suffer a disproportionate burden of STIs, sometimes even with normative sexual behaviors.^{14,15} Some MSIs constitute a relatively homogeneous community, with students often drawn from areas with high community prevalence due to unfavorable social determinants, such as poverty, in addition to high prevalence within their sexual networks.¹⁵ To the extent this effectively concentrates at-risk group individuals in one location, it also concentrates transmission and maintains high prevalence. Lower socioeconomic status can result in decreased access to preventive health services where the cycle of asymptomatic carriage and transmission could otherwise be disrupted. Likewise, the bridging that may occur between students in these nontraditional college settings and members of their surrounding communities may lead to increased disease transmission.¹⁵ Given the lack of STI data on MSIs and 2-year colleges and the increased STI risks that their students may face, it is important to explore STIs on these often overlooked, nontraditional campuses, especially as compared with more traditional campuses.

To increase understanding of STIs among college students, this study describes chlamydia positivity among young women tested at college health centers participating in a national infertility prevention program during 2008–2010 by student characteristics (ie, race/ethnicity) and institutional characteristics (ie, college type: non-MSIs vs MSIs, 2-year vs 4-year).

Methods

We reviewed chlamydia testing data from college health centers participating in a national infertility prevention program during 2008–2010. Line-listed data on tests were collected using a standardized set of key demographic and diagnostic variables at the clinic level, collated by Department of Health and Human Services (DHHS) region,¹⁶ and provided to the Centers for Disease Control and Prevention (CDC) quarterly. Data were collected as part of CDC Division of STD Prevention's routine public health surveillance and were thus exempt from institutional review board review.

Limited institutional variables were collected with the testing data. To further characterize institutions in our sample as MSI or non-MSI, we used the college name to link testing data to data from the US Department of Education's 2012 list of postsecondary institutions enrolling populations with significant percentages of undergraduate minority students. The following are institutions eligible under that classification: HBCU, HSI, Tribal College or University (TCU), Alaska Native serving institution or Native Hawaiian serving institution, Predominantly Black Institution, Asian American and Native American Pacific Islander serving institutions, or Native American serving nontribal institution.¹⁰ To determine 2-year versus 4-year status of participating health centers, we conducted a Google search of each institution and coded each as 4-year or 2-year based on online information. We were able to classify MSIs by type (eg, HBCU vs HSI, TCU, etc), but the sample size was too small to examine the data at this level. We could not determine MSIs and 4-year versus 2-year status for a small number of colleges in the sample ($n = 5$).

Testing data were summed across the 3 years for each health center. Data analyses were limited to participating health centers that reported at least 100 chlamydia tests among women aged 18–24 years during the 3 years. We determined chlamydia positivity (the number of positive tests divided by the number tested) by participant characteristics (age and race/ethnicity) and college type (4-year vs 2-year, and MSIs vs non-MSIs). Given that there are likely regional differences in chlamydia morbidity,^{17,18} all analyses were stratified by DHHS region.¹⁶ However, DHHS Region I did not submit data to the program and was therefore excluded from the analysis. Differences in positivity were evaluated using chi-square tests. SAS 9.3 (SAS Institute, Cary, NC) was used for all analyses.

Results

During 2008–2010, 247 college health centers submitted data through the national infertility prevention program, of which 148 met the inclusion criteria of having reported at least 100 chlamydia tests among women aged 18–24 during the 3 years. Fifteen percent of the health centers included were 2-year colleges, and over a quarter (26%) were classified as a MSI. Most of the participating MSIs were located in the southeast ($n = 55$) and southwest ($n = 28$); the majority of 2-year colleges were located in the west ($n = 19$). Several regions reported no data from either MSIs or 2-year colleges (Region X [northwest], Region VII [central United States], Region II [northeast]).

Participating health centers reported a total of 118,946 chlamydia tests among females aged 18–24 years, of which 7,733 (6.5%) were positive (Table 1). Positivity varied by age, with the highest positivity among women aged 18 years (10%) and women aged 19 years (8%). By ages 23 and 24, chlamydia positivity had dropped below 4%. Differences by race/ethnicity were also observed, with positivity highest among non-Hispanic black women (13%), followed by Hispanic women (5.3%) and non-Hispanic white women (4.5%). Chlamydia positivity in females at 4-year colleges was 6.6% as compared with 5.3% at 2-year colleges ($p = .0001$). Among females attending MSIs, chlamydia positivity was almost double that of females at non-MSIs (10.0% vs 5.4%; $p = .0001$).

Overall, chlamydia positivity varied by DHHS region ($p = .0001$). Positivity was highest in the southeast (11.0%) and southwest (13.5%). Among women 18 years old, positivity was highest in Regions VI (21.7%) and IV (15.6%). Significant differences in positivity existed between 2- and 4-year colleges in Regions III and VIII ($p = .0001$); Regions II, IV through VII, and X had no participating 2-year colleges for comparative analyses. In regard to MSIs versus non-MSIs, significant differences in chlamydia positivity existed between the two in Regions III, IV, and VI ($p < .0001$); in Regions II, VII, and X, no colleges were classified as MSIs.

Comment

To our knowledge, we provide the first estimates of chlamydia positivity among young women tested in college health centers stratified by student and institution characteristics. Among the health centers participating in a national infertility prevention program, we found an overall chlamydia positivity of 6.5%, higher than estimated prevalence of chlamydia in the general population of sexually active young women (4.7%).¹⁹ However, positivity estimates are often higher than population prevalence estimates given that persons tested for chlamydia may have a higher risk profile (eg, a patient may seek out testing if they are a contact of someone with a known STI or are themselves symptomatic) than those who were screened according to guidelines. Our findings are comparable to women tested in family planning clinics participating in the national infertility prevention program (8.0%) and women testing in prenatal care clinics (7.2%) in 2010.¹⁷ However, positivity among health centers included in this analysis was almost twice the positivity reported by health centers participating in the latest ACHA Pap and STI Survey (3.8%).⁹

By linking routinely collected testing data to institutional data, we explored positivity by age, race/ethnicity, and institution characteristics. We found that chlamydia positivity was 10% at age 18, the age of many college freshmen, suggesting that colleges could target incoming students with STI prevention activities as well as messages encouraging STI testing. Our data also suggests that chlamydia positivity is highest in black college women, followed by Hispanic women. This may be because of overrepresentation in the data from HBCUs and HSIs; nevertheless, this is important data for college health administrators serving MSIs. Our data also suggest that MSIs may bear a disproportionate burden of chlamydia compared with non-MSIs. We found that chlamydia positivity was higher on 4-year campuses compared with 2-year; however, both estimates were greater than general

population prevalence estimates. This finding differs from previous research;^{20–22} however, it is possible that screening versus testing rates differed at 4- and 2-year campuses.

We found significant differences in positivity by DHHS region. The Pap & STI Survey⁷ has not reported positivity estimates by region, but the differences in our study mirror national trends in reported cases of chlamydia, with more infections detected in the southern regions of the United States.¹⁷ Given the overall high positivity in Regions VI and IV, college health administrators in those regions may also want to consider their current STI testing and prevention activities.

Limitations

This study has several limitations. We opportunistically used data from a national infertility prevention program, and our analyses are limited to the 148 college health centers reporting data to the program that met our inclusion criteria. As there are approximately 4,500 colleges across the country, these data may not be representative of all colleges; however, our sample of MSIs mirrored the percentage of MSIs nationally enrolling college students.¹⁰ It is possible that colleges with high prevalence of STIs or in geographic areas with high prevalence of STIs were targeted for program inclusion and as such positivity may be overestimated. There may also have been a bias toward inclusion of colleges with better data collection systems. Although the program collected demographic data, risk behavior data were not available, nor were screening coverage estimates (ie, the proportion of the student population tested); therefore, we were not able to tell if some centers were testing symptomatic women only (as compared with screening all sexually active women aged 24 and under), inflating positivity. Several regions did not provide data from either MSIs or 2-year colleges, so findings relating to MSIs and 2-year colleges cannot be generalized to these regions. Finally, human error may have occurred in the categorizing of MSIs and 2- and 4-year colleges.

Implications

Students are members of general society, so it is inevitable that some of their issues and problems will mirror those of the general population.²³ Health departments and federally qualified health centers may want to explore ways to screen and provide linkage to care to colleges in high morbidity areas. Given that 2-year colleges often do not have health centers on campus, linkage to STI care may be especially important for this group. Our sample revealed high chlamydia positivity among younger students. STI testing events such as the *GYT: Get Yourself Tested* campaign^{24,25} (www.cdc.gov/gyt) may be a beneficial prevention activity during student orientation or at other events targeting first- or second-year students. Evidence suggests that a variety of colleges have had success implementing the GYT campaign on campus and hosting testing events.²⁶ Even though USPSTF recommends routine chlamydia screening for women under the age of 24, some data suggest that screening of asymptomatic women in college health centers is low.²⁷ Strategies for improving chlamydia screening and treatment in the college setting could include implementing express testing in the health center for asymptomatic students using self-collected vaginal swabs or urine samples (no examination required). Also, where legal, health centers could use an expedited partner therapy (EPT) model for students to provide

treatment to their nonstudent partners. Implementation of EPT could help improve compliance with treatment and decrease reinfection of the college students when their sexual network includes partners typically not seen in the student health center.

Conclusions

Chlamydia positivity may be higher among college females than previously thought. More exploration is needed in regard to the STI service needs of MSIs and 2-year colleges. Prevention efforts may be most beneficial by targeting incoming students or students early on in their college experiences. Public health professionals may need to reframe their idea of the “traditional” college campus to include nontraditional college settings, such as community colleges. Further consideration is needed on how STI screening fits into this new landscape of college campuses.

Acknowledgments

We would like to thank LaZetta Grier for her assistance with management of the national infertility prevention program data. We thank the facilities and regional coordinating centers that participated in the national infertility prevention program for collection of data and submission to CDC.

Funding

No funding was used to support this research and/or the preparation of the manuscript.

References

1. Satterwhite CL, Torrone E, Meites E, et al. Sexually transmitted infections among US women and men: prevalence and incidence estimates, 2008. *Sex Transm Dis.* 2013;40:187–193. [PubMed: 23403598]
2. Holmes K, Sparling P, Stamm W, et al. Sexually transmitted diseases. 4th ed New York, NY: The McGraw-Hill Companies; 2007.
3. Fleming DT, Wasserheit JN. From epidemiological synergy to public health policy and practice: the contribution of other sexually transmitted diseases to sexual transmission of HIV infection. *Sex Transm Infect.* 1999;75:3–17. [PubMed: 10448335]
4. US Preventive Services Task Force. Recommendation Summary. September 2014. Available at: <http://www.uspreventiveservicestaskforce.org/Page/Topic/recommendation-summary/chlamydia-and-gonorrhea-screening>. Accessed May 4, 2015.
5. School Enrollment. American Community Survey 1-Year Estimates. US Census Bureau Web site. Available at: http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_11_1YR_S1401&prodType=table. Accessed April 8, 2015, 2013.
6. American College Health Association. American College Health Association–National College Health Assessment II: Reference Group Executive Summary Spring 2012. Hanover, MD: American College Health Association; 2012.
7. Pap Test and STI Survey. American College Health Association Web site. Available at: http://www.acha.org/topics/pap_sti_survey.cfm. Accessed April 8, 2015.
8. Smith PD, Roberts CM. American College Health Association annual Pap Test and Sexually Transmitted Infection Survey: 2006. *J Am Coll Health.* 2008;57:389–394.
9. American College Health Association. ACHA. Pap and STI Survey for Calendar Year 2013 Data: Survey Data Report. Available at: http://www.acha.org/topics/docs/ACHA_CY2013_PapTest_and_STI_Survey_FullDataReport.pdf. Published January 2015. Accessed April 8, 2015, 2014.
10. US Department of Education, National Center for Education Statistics. Higher Education General Information Survey (HEGIS). “Fall Enrollment in Colleges and Universities” surveys, 1976 and

- 1980, and 1990 through 2008 Integrated Postsecondary Education Data System (IPEDS), “Fall Enrollment” survey, 1990, and selected years, Spring 2001 through Spring 2009. Available at: <http://www2.ed.gov/about/offices/list/ocr/edlite-minorityinst.html>. Accessed May 4, 2015.
11. Gasman M, Conrad C. Minority Serving Institutions: Education All Students. Available at: http://www.gse.upenn.edu/pdf/cmsi/msis_educating_all_students.pdf. Published April 2014. Accessed April 9, 2015.
 12. Harmon N The Role of Minority-Serving Institutions In National College Completion Goals. Washington, DC: Institute for Higher Education Policy; 2012.
 13. Provasnik S, Planty M. National Center for Education Statistics. Community Colleges Special Supplement to The Condition of Education 2008. Statistical Analysis Report. Washington, DC: US Department of Education, Institute of Education Sciences, National Center for Education Statistics; 2008 Available at: <http://purl.fdlp.gov/GPO/gpo1203>. Accessed May 4, 2015.
 14. Hallfors DD, Iritani B, Miller WC, et al. Sexual and drug behavior patterns and HIV and STD racial disparities: the need for new directions. *Am J Public Health*. 2007;97:125–131. [PubMed: 17138921]
 15. Hogben M, Leichter J. Social determinants and sexually transmitted disease disparities. *Sex Transm Dis*. 2008;35 (12 Suppl):S13–S18. [PubMed: 18936725]
 16. US Department of Health and Human Services Regional Offices. US Department of Health and Human Services Web site. Available at: <http://www.hhs.gov/iea/regional/>. Last updated April 15, 2014. Accessed April 9, 2015.
 17. Centers for Disease Control and Prevention. Sexually Transmitted Disease Surveillance, 2010. Atlanta, GA: US Department of Health and Human Services; 2011.
 18. Miller WC. Epidemiology of chlamydial infection: are we losing ground?. *Sex Transm Infect*. 2008;84:82–86. [PubMed: 18372493]
 19. Torrone E, Papp J, Weinstock H. Prevalence of Chlamydia trachomatis genital infection among persons aged 14–39 years—United States, 2007–2012. *MMWR Morb Mort Wkly Rep*. 2014;63:834–838.
 20. Eisenberg, Lust K, Garcia C. Differences in sexual behaviors among unmarried sexually active students at 2- and 4-year colleges. *Res Nurs Health*. 2014;37:128–134. [PubMed: 24481785]
 21. Rosenbaum J. “Clap” for college: educational roots of STI disparities between students at community colleges versus 4 year colleges. Presentation at National STD Prevention Conference Minneapolis, MN; 3 2012.
 22. Farley T, Cohen D, Elkins W. Asymptomatic sexually transmitted diseases: the case for screening. *Prev Med*. 2003;36:502–509. [PubMed: 12649059]
 23. Martinez TP, Martinez AP. Campaigning proactively for sexual health on campus. *Hispanic Outlook*. 6 2005;15 (18):23–26. Available at: <http://sks.sirs.swb.orc.scoolaid.net>. Accessed April 9, 2015.
 24. Friedman A, Brookmeyer K, Kachur R, et al. Normalizing talking and testing among youth through the GYT: Get Yourself Tested Campaign: an integrated approach to STD prevention communication. *Sex Transm Dis*. 2014;41:151–157. [PubMed: 24521718]
 25. McFarlane M, Brookmeyer K, Friedman A, Habel M, Kachur R, Hogben M. GYT: Get Yourself Tested Campaign awareness: associations with sexually transmitted disease/HIV testing and communication behaviors among youth. *Sex Transm Dis*. 2015;42:619–624. [PubMed: 26457487]
 26. Bringing GYT to Your Campus. American College Health Association Online Continuing Education Program Web site. Available at: http://www.acha.org/Continuing_Education/online_ce_bringing_gyt_to_your_campus.cfm. Published April 16, 2014. Accessed May 4, 2015.
 27. Habel M, Becasen J, Dittus P. The state of sexual health services at U.S. colleges & universities. Poster presentation at Society for Adolescent Health & Medicine Conference Los Angeles, CA; 3 2015.

Table 1.

Individual characteristics and chlamydia positivity of college health center clients by DHHS region, women aged 18–24, 2008–2010

Characteristic	Overall total		Centers		Region										IX		X					
	n	% positive	n	%	II	% positive	III	% positive	IV	% positive	V	% positive	VI	% positive	VII	% positive	VIII	% positive	n	% positive		
Overall CT	118,946	6.5			3,935	5.1	45,380	5.0	19,861	10.9	13,742	7.0	3,292	13.5	5,721	8.0	5,159	5.2	12,577	4.9	9,279	3.4
Age																						
18	16,163	10.0			454	7.7	5,400	6.8	3,685	15.6	1,839	11.4	544	21.7	807	12.3	512	6.6	2,005	7.1	917	3.8
19	23,380	8.1			756	6.2	8,658	6.0	4,636	13.4	2,559	8.9	739	14.0	1,215	9.6	913	5.3	2,276	6.3	1,628	4.0
20	24,243	6.3			814	5.0	9,829	5.1	4,128	10.3	2,641	6.5	637	13.5	1,086	6.7	1,004	5.5	2,302	5.1	1,802	3.9
21	25,205	5.5			939	4.3	10,655	5.0	3,577	8.3	3,047	5.5	556	12.1	1,108	6.7	1,048	5.2	2,074	4.0	2,201	3.2
22	15,593	5.1			467	4.3	5,861	4.0	2,015	7.2	2,044	6.5	422	11.9	824	6.8	826	4.6	1,653	4.0	1,481	3.4
23	8,487	3.8			281	3.9	2,912	3.2	1,111	6.5	967	3.5	246	4.1	414	6.5	496	4.0	1,310	3.3	750	1.7
24	5,875	3.3			224	2.5	2,065	2.1	709	5.2	645	3.6	148	6.8	267	4.5	360	5.3	957	3.0	500	2.8
Race																						
Hispanic	7,283	5.3			505	5.5	487	4.5	1,095	9.0	421	7.4	42	9.5	83	6.0	150	6.0	4,023	4.2	477	3.1
Non-Hispanic black	27,391	12.7			792	10.5	6,599	11.4	13,206	12.6	2,012	12.1	2,002	17.8	1,200	16.7	77	14.3	1,281	11.0	222	9.0
Non-Hispanic white	45,307	4.5			1,441	2.7	15,583	4.0	4,450	6.2	4,106	5.9	1,089	5.8	4,197	5.8	2,482	5.5	4,234	3.8	7,635	3.1
Non-Hispanic other	13,502	4.5			303	4.3	8,858	3.8	356	11.5	258	6.6	102	16.7	156	3.9	115	7.0	2,679	5.3	775	4.5
Non-Hispanic unknown	25,363	4.9			894	4.0	13,853	4.0	664	12.1	6,945	6.3	57	8.8	85	4.7	2,335	4.5	360	3.9	170	5.3
Type of Institution																						
2-year	8,690	5.3	21	14.8	0		272	11.4	0		0		0		0		401	11.0	8,017	4.8	0	
4-year	101,020	6.6	121	85.2	3,935	5.1	45,108	5.0	18,229	11.2	6,241	7.3	3,292	13.5	5,721	8.0	4,758	4.7	4,457	5.3	9,279	3.4
Minority serving enrollment																						
Yes	24,733	10.0	37	25.9	0		4,608	11.7	11,385	12.2	255	9.4	505	21.8	0		525	5.1	7,455	5.0	0	
No	90,062	5.4	106	74.1	3,935	5.1	40,772	4.3	5,817	9.8	12,098	6.3	2,787	12.0	5,721	8.0	4,634	5.2	5,019	5.0	9,279	3.4

^aCenters that submitted chlamydia testing data through a national infertility prevention program during 2008–2010.

^bThe following US states and territories comprise each DHHS region: Region II: NJ, NY, PR, VI; Region III: DE, DC, MD, PA, VA, WV; Region IV: KY, MS, NC, TN, AL, FL, GA, SC; Region V: IL, IN, MI, MN, OH, WI; Region VI: AR, LA, NM, OK, TX; Region VII: IA, KS, MO, NE; Region VIII: CO, MT, ND, SD, UT, WY; Region IX: AZ, CA, HI, NV, and the 6 US Associated Pacific Jurisdictions; Region X: AK, ID, OR, WA.