# Prevalence of Genital Chlamydial Infection in Young Women Entering a National Job Training Program, 1990–1997

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*Objectives.* This analysis describes trends in the prevalence of genital chlamydial infection in economically disadvantaged young women entering a national job training program.

*Methods.* We examined chlamydia test data for May 1990 through June 1997 for women aged 16 to 24 years who enrolled in the program. The significance of trends was evaluated with the $\chi^2$ test for trend.

*Results.* Prevalence of chlamydial infection declined 32.9%, from 14.9% in 1990 to 10.0% in 1997 ($P < .001$). Prevalence decreased significantly in all age groups, racial/ethnic groups, and geographic regions.

*Conclusions.* The decrease in prevalence of chlamydial infection suggests that prevention activities have reached disadvantaged women across the United States; however, prevalence of chlamydial infection remains high, and enhanced prevention efforts in disadvantaged communities are urgently needed. (*Am J Public Health.* 2001;91:1287–1290)

Genital tract infection with *Chlamydia trachomatis* can cause pelvic inflammatory disease, ectopic pregnancy, infertility, and chronic pelvic pain in women and is associated with increased risk for HIV infection.[1–3] Screening and treatment programs for chlamydial infection expanded during the 1990s.[4] The number of reported cases of chlamydial infection in women increased from 226 557 in 1990 to 436 350 in 1997, primarily because of an increase in testing and reporting.[5,6] In contrast, the prevalence of infection in women attending family planning clinics in 4 northwestern states that have widespread screening programs decreased during that time.[6] Trends in the prevalence of infection in most areas of the country and in women who do not attend family planning clinics are unknown. To understand national trends in the prevalence of *C trachomatis* infection in economically disadvantaged women, we analyzed data on chlamydia tests for women entering a national job training program.

The job-training program for economically disadvantaged youths administered by the US Department of Labor enrolls more than 60 000 young men and women aged 16 to 24 years each year at approximately 100 centers across the country.[7] In 1997, approximately 40% of the enrollees were women, 72% were minorities, 33% came from families on public assistance, 78% were high school dropouts, and 63% had never held a full-time job.[7] Because prevalence of chlamydial infection is usually high in adolescents, minorities, and persons of low socioeconomic status,[8] women entering the program are routinely screened for chlamydia.[9] We assessed trends in the prevalence of chlamydial infection in this population from May 1990 through June 1997.

## METHODS

Women entering each program center receive a pelvic examination within 14 days of enrollment. During the observation period, most centers sent cervical specimens to a commercial laboratory that used the Pathfinder enzyme immunoassay (Sanofi Diagnostics Pasteur, Inc, Redmond, Wash) to detect *C trachomatis*; this test has an estimated sensitivity and specificity of 77.4% and 99.6%, respectively.[10] Laboratory results, reason for test (e.g., symptomatic entrance examination, asymptomatic entrance examination), and demographic information for each woman tested, including date of birth, race/ethnicity, and zip code of residence before enrollment, were computerized at the laboratory. Data were sent from the laboratory to the Centers for Disease Control and Prevention (CDC) without identifying information.

We included women aged 16 to 24 years (>99% of women tested) in the analysis. We restricted our analysis to specimens labeled as "entrance examination" tests that had a new patient code number. Using the US Postal Service's computerized zip code files, we derived state of home residence before enrollment from the zip code of residence. States of residence were grouped into 4 US Census Bureau regions (South, Northeast, Midwest, and West).

The percentage of women enrolled in the program who were tested for chlamydial infection at entrance was calculated by dividing the number of entrance examination test results by the number of women enrolled in the program. Enrollment numbers and the age and state of residence of enrollees were obtained from the program's Data Center.

Prevalence of infection was calculated by individual age, age group (16–19 years, 20–24 years), race/ethnicity (White, Black, Hispanic, American Indian/Alaskan native, Asian/Pacific Islander), geographic region of residence, presence or absence of symptoms, and time period (1990–1993, 1994–1997). Adjusted odds ratios were calculated by logistic regression analysis to determine independent predictors of chlamydial infection.

The relative change in prevalence from 1990 to 1997 was calculated for all women tested and for each age group, race/ethnicity, and geographic region in which at least 200 women per year were tested. Confidence intervals for the relative decrease in prevalence in each group were obtained by Taylor series approximation.[11] We evaluated the significance of trends with the $\chi^2$ test for trend by using calendar-year periods.[12]

We adjusted annual prevalence for age (16–17, 18–19, 20–21, 22–24 years) and race/ethnicity (White, Black, Hispanic, other),

using the 1990 female program population as the "standard" population. Because the demographic characteristics of the female program population were stable over time, age- and race/ethnicity-adjusted prevalence was similar to unadjusted prevalence; therefore, we chose to present only unadjusted prevalence.

## RESULTS

Of 174 749 women enrolled in the program from May 1990 through June 1997, 141 913 (81%) were tested at entrance for chlamydial infection by the national contract laboratory. The percentage of women tested ranged from 75% to 84% per year. Women tested were no different from the total population of women enrolled in the program with respect to age and geographic region of residence.

Of the specimens submitted, 577 (0.4%) were unsatisfactory and were excluded from the analysis. Of the remaining 141 336 tests, 17 597 (12.5%) were positive. Prevalence was significantly higher for adolescents; minorities; those living in the South, Midwest, and Northeast compared with those in the West; and those with symptoms of infection (Table 1). As age increased, prevalence of chlamydial infection decreased (Table 2). Prevalence was significantly higher for adolescents aged 16 through 19 than for women aged 20 through 24 years in all regions and for all racial/ethnic groups (data not shown). Prevalence was significantly higher for Blacks than for Whites in all 4 regions (data not shown). Similarly, prevalence for Hispanic women was significantly higher than that for Whites in all regions except the South, where prevalence for Hispanic women (10.0%) was the same as that for White women.

The demographic characteristics associated with chlamydial infection in the univariate analysis (young age, non-White race, residence in the South, Midwest, or Northeast) were also associated with infection in the logistic regression analysis, except for residence in the Northeast (Table 1). The early time period (1990–1993) was independently associated with increased risk for chlamydial infection.

The prevalence of chlamydial infection decreased 32.9% (95% confidence interval [CI]=27.4%, 37.5%) during the study period, from 14.9% in 1990 to 10.0% in 1997 ($P<.001$) (Figure 1). After age and race/ethnicity were adjusted for, the relative change in prevalence was not significantly different from the unadjusted decrease (data not shown). The decrease in the prevalence of chlamydial infection from 1990 to 1997 was statistically significant for all age, racial/ethnic, and geographic groups ($P<.05$). The relative decrease in prevalence was 28.8% (95% CI=22.9%, 34.6%) for women aged 16 to 19 years and 39.7% (95% CI=28.7%, 50.6%) for women aged 20 through 24 years. By region, the relative decrease was 40.4% (95% CI=29.7%, 51.2%) for the Midwest, 37.0% (95% CI=25.1%, 49.0%) for the West, 36.6% (95% CI=25.3%, 47.9%) for the Northeast, and 24.1% (95% CI=15.9%, 32.3%) for the South. The relative decrease was larger for Whites (41.5%; 95% CI=30.0%, 52.9%) and Blacks (33.6%; 95% CI=27.5%, 39.6%) than for Hispanics (6.3%; 95% CI=−14.0%, 26.5%).

**TABLE 1—Characteristics Associated With Chlamydial Infection in Women Aged 16 to 24 Years Entering a National Job Training Program May 1990–June 1997**

| Characteristic | No. Tested (N = 141 336)[a] | No. Testing Positive (%) | Crude OR (95% CI) | Adjusted OR (95% CI)[b] |
|---|---|---|---|---|
| Age, y | | | | |
| 16–19 | 101 183 | 14 098 (13.9) | 1.7 (1.6, 1.8) | 1.7 (1.6, 1.8) |
| 20–24 | 40 153 | 3 499 (8.7) | (Reference) | (Reference) |
| Race/ethnicity[c] | | | | |
| Black, non-Hispanic | 78 739 | 11 698 (14.9) | 1.9 (1.8, 2.0) | 1.8 (1.7, 1.9) |
| American Indian/Alaskan native | 4 695 | 602 (12.8) | 1.6 (1.5, 1.8) | 1.8 (1.6, 2.0) |
| Hispanic | 20 974 | 2 188 (10.4) | 1.3 (1.2, 1.4) | 1.4 (1.3, 1.5) |
| Asian/Pacific Islander | 1 992 | 179 (9.0) | 1.1 (0.9, 1.3) | 1.2 (1.0, 1.4) |
| White, non-Hispanic | 34 558 | 2 906 (8.4) | (Reference) | (Reference) |
| Region[d] | | | | |
| South | 61 074 | 8 508 (13.9) | 1.5 (1.4, 1.6) | 1.3 (1.2, 1.3) |
| Midwest | 25 801 | 3 311 (12.8) | 1.3 (1.3, 1.4) | 1.2 (1.1, 1.3) |
| Northeast | 23 752 | 2 793 (11.8) | 1.2 (1.2, 1.3) | 1.0 (1.0, 1.1) |
| West | 27 659 | 2 732 (9.9) | (Reference) | (Reference) |
| Examination category | | | | |
| Symptoms at entrance | 6 576 | 1 082 (16.5) | 1.4 (1.3, 1.5) | 1.4 (1.3, 1.5) |
| No symptoms at entrance | 134 760 | 16 515 (12.3) | (Reference) | (Reference) |
| Year of test | | | | |
| 1990–1993 | 69 875 | 9 168 (13.1) | 1.1 (1.1, 1.2) | 1.1 (1.1, 1.1) |
| 1994–1997 | 71 461 | 8 429 (11.8) | (Reference) | (Reference) |

*Note.* OR = odds ratio; CI = confidence interval.
[a]Unsatisfactory tests are excluded.
[b]Results of logistic regression model including main effects variables.
[c]Data not shown for women categorized as "other" race (n = 296); data missing for 82 records.
[d]Data not shown for 2949 women who were not from the 50 states or the District of Columbia or for 101 women with missing zip code information.

## DISCUSSION

The prevalence of chlamydial infection in women entering a national job training program declined from 1990 to 1997 for all age groups, racial/ethnic groups, and geographic areas of residence. We believe that this represents a true decline in the prevalence of chlamydial infection in disadvantaged youths in the United States. Declines in the prevalence of genital chlamydial infection already have been documented in specific geographic areas with widespread screening of clinic populations,[6,13,14] which suggests that screening programs decrease prevalence in target populations. Our finding that prevalence decreased

**TABLE 2—Prevalence of Chlamydial Infection in Women Entering a National Job Training Program May 1990–June 1997, by Age**

| Age, y | No. Tested (N = 141 336)[a] | % Testing Positive (95% CI) |
|---|---|---|
| 16 | 26 759 | 15.8 (15.4, 16.3) |
| 17 | 26 449 | 14.9 (14.4, 15.3) |
| 18 | 25 655 | 13.1 (12.7, 13.6) |
| 19 | 22 320 | 11.5 (11.1, 11.9) |
| 20 | 16 619 | 10.2 (9.8, 10.7) |
| 21 | 10 931 | 8.9 (8.3, 9.4) |
| 22 | 5 817 | 7.4 (6.7, 8.1) |
| 23 | 4 009 | 6.6 (5.8, 7.4) |
| 24 | 2 777 | 4.9 (4.1, 5.7) |

*Note.* CI = confidence interval.
[a]Unsatisfactory tests are excluded.

in female enrollees, who are recruited from disadvantaged communities across the country, suggests that prevention activities may have reached not only clinic patients in specific geographic areas but also disadvantaged women entering the program throughout the United States. The trends in prevalence that we report are consistent with recent estimates of the incidence of genital chlamydial infection in the US population, which suggest a decline in incidence between 1985 and 1996.[15]

Although screening programs for chlamydia were instituted in the 1980s in some sexually transmitted disease (STD) clinics, family planning clinics, and private physicians' offices,[13,16,17] many medical care providers did not implement chlamydia screening until the mid-1990s, if at all.[14,18] Federal funding for infertility prevention that supported screening and treatment services was limited until the mid-1990s.[4] It was not until 1993 that the CDC issued a recommendation for health care providers to screen all sexually active adolescent women for chlamydia.[8] Given the lack of screening in the early 1990s in many communities, screening programs are probably only 1 of several factors contributing to the decrease in the prevalence of chlamydia in this population. Other factors, such as increased condom use and decreased sexual experience in adolescents, may have contributed to the nationwide decline in the prevalence of *C trachomatis* in female enrollees.[19,20] AIDS prevention activities, introduced in the 1980s, may have contributed to the increase in safe sex or delayed sex and thus to the decline in the incidence of STDs. Concurrent with the decrease in the prevalence of chlamydial infection in program enrollees, the prevalence of HIV infection in program enrollees declined 50% from 1990 to 1996.[21]

Possible reasons for a smaller decline in the prevalence of chlamydial infection in Hispanics than in other racial/ethnic groups include less access to medical care in the 1990s and less access to safe sex messages. Data from the National Survey of Family Growth in 1995 indicated that Hispanic women were less likely than non-Hispanic White or Black women to have health insurance, to have received a pelvic examination during the preceding 12 months, or to have received any formal sex education before the age of 18 years.[20]

There are several limitations or potential biases in these prevalence estimates. First, chlamydia test results are available for only 81% of all female entrants. Some women may have dropped out of the program before getting tested, some may not have been tested because they denied being sexually active,[22] and some were tested by a noncontract laboratory. If most of those not tested were not sexually active, our prevalence estimates are too high for the entire population. On the other hand, the prevalence data shown here may underestimate prevalence in female entrants, because the sensitivity of the enzyme immunoassay used throughout the study period is estimated to be 77%.[10] Trends should not be affected by either of these potential biases.

Despite the marked decline in the prevalence of chlamydial infection in female program entrants documented here, prevalence

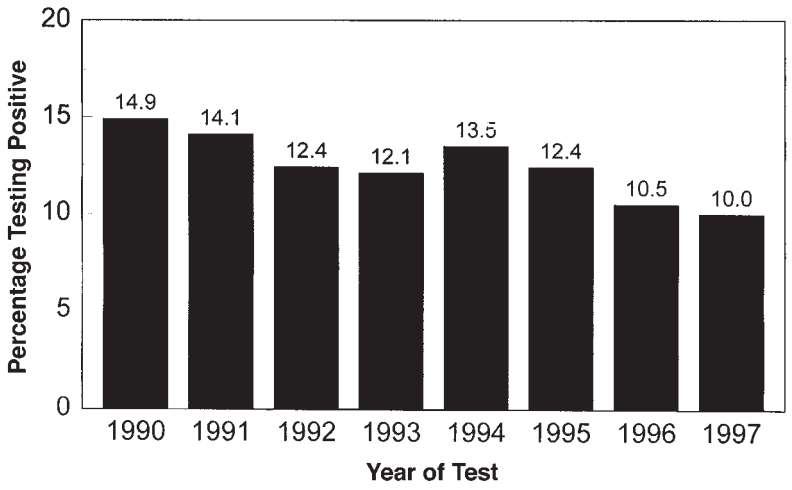


**FIGURE 1—Prevalence of chlamydial infection in women aged 16 through 24 years entering a National Job Training Program May 1990–June 1997, by year of test.**

was still very high in 1997, especially in adolescent women. The program is providing a much-needed service by testing and treating this population for chlamydial infection, thus preventing medical complications of *C trachomatis* infection and transmission to sex partners. In the communities where these out-of-school, unemployed, economically disadvantaged young women live before entering the program, it is necessary to strengthen prevention and control efforts. Health care providers should be encouraged to implement routine chlamydia screening and treatment for young women, encourage treatment for sex partners of women testing positive, and provide education and counseling about safe sex practices. Screening and education in nontraditional settings, such as schools, juvenile detention facilities, and drug treatment centers, may help to further reduce chlamydial infection in sexually active adolescents.[23] ■

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## Contributors

K.J. Mertz analyzed and interpreted the data and wrote the paper. R.L. Ransom managed, analyzed, and interpreted the data. M.E. St. Louis and S.L. Groseclose planned the study and edited the manuscript. A. Hadgu provided expertise in analysis and interpretation of data and use of statistical methods and edited the manuscript. W.C. Levine suggested analyses and contributed to the writing and editing of the paper. C. Hayman oversaw testing at Job Corps, provided access to laboratory data, and edited the manuscript.

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