

Characteristics of Repeat Infections of *Chlamydia Trachomatis* Among Mississippians, 2004 – 2008

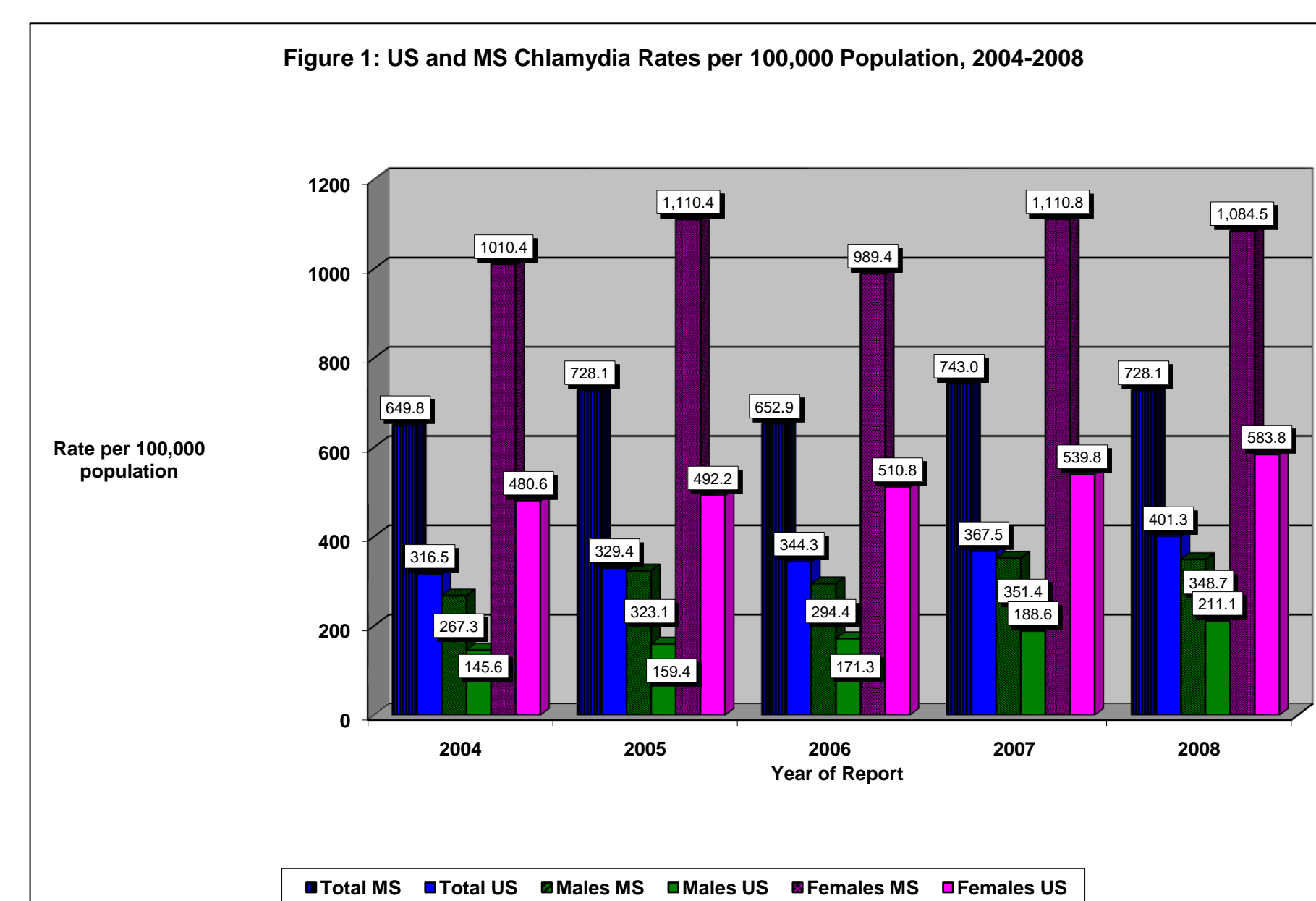
Kendra Johnson, MPH¹, Madhavi Patel, MPH¹, Imran Sunesara, MBBS, MPH², Leandro Mena, MD, MPH^{1,2}

¹ Mississippi State Department of Health, STD/HIV Office, ² University of Mississippi Medical Center, Division of Infectious Diseases

Introduction

Chlamydia is the most common reportable bacterial Sexually Transmitted Disease (STD) in the United States (U.S.) with approximately three million people infected annually (1). It's caused by the bacterium, *Chlamydia trachomatis*, and it's now recognized as the cause of substantial morbidity to the woman's reproductive organs. Even though symptoms of chlamydia are usually mild or absent, serious complications that cause irreversible damage, including infertility, can occur before a woman ever recognizes a problem. Chlamydia also can cause discharge from the penis of an infected man (2). Previous studies revealed that persons aged 14 – 24 years have the highest rates of infection (3). About 5% to 15% of routinely screened young women (aged <25 years) are infected with chlamydia (3).

One previous episode of chlamydia increases the risk for a recurrent or new infection, often within a year, and for both genders (4). Repeat infections with *Chlamydia trachomatis* are associated with increased risk for long-term sequelae. Therefore, the CDC advises clinicians to consider re-screening all women with chlamydia infection approximately three months after treatment (4,5). In 2008, Mississippi had the highest rate per 100,000 population of chlamydia nationally. Figure 1 compares the U.S. and Mississippi rates by total population and by gender for chlamydia infections from 2004-2008.



Objectives

To describe the recent epidemiology of chlamydia infections and to identify the risk factors associated with repeat infections among Mississippians.

Methods

Demographic data was abstracted, including age, gender, race, zip code of residence, and date of infection from all cases of chlamydia infection reported to the Mississippi State Department of Health STD surveillance available in the STD Management Information System (STD*MIS) from January 1, 2004, through December 31, 2008. Characteristics of individuals with one chlamydia infection were compared to individuals with repeat infections.

Methods (continued)

Individuals with diagnosed infection within 21 days of initial report were counted as a single infection. Descriptive statistics were performed for those with single and repeated chlamydia infection. For those with repeated infections, the number of days between initial infection and each subsequent infection were calculated. Further characterizations were done that compared individuals who had < 3 infections with those who had ≥ 3 infections. Univariate analysis using chi-square tests were performed to identify risk factors associated with repeat chlamydia infection.

Results

From 2004 – 2008, there were 102,117 reports of chlamydia infection in Mississippi from 80,736 individuals. Table 1 presents the demographic characteristics of individuals with single and repeat infections in Mississippi, 2004-2008. The mean age of individuals with reported chlamydia infection was 22 ± 5.9 years, with 78% of reported cases on individuals under 25 years old. There were more cases reported in females (78%) and African Americans accounted for 83.5% (70,435/84,378) of all reports for which race was known. Individuals who lived in urban areas at the time of diagnosis represented 93% of cases.

Table 1: Overall Demographic Characteristics of Mississippians with Chlamydia Infection (Single and Repeat), 2004-2008

Age Group	N (%)
Mean Age (years) ± SD	22 ± 5.9
<25 years	79,138 (77.5%)
25 years or older	22,850 (22.4%)
Unknown	129 (0.1%)
Gender	
Male	22,447 (22.0%)
Female	79,670 (78.0%)
Race	
African American	70,435 (69.0%)
Non-African American	13,943 (14.0%)
Unknown	17,739 (17.0%)
Geographic Location	
Urban	95,145 (93.0%)
Rural	6,972 (7.0%)
Repeater Infection Status	
Single Infections	80,236 (81.0%)
Repeated Infections	15,655 (19.0%)

Repeat infections were reported in 15,655 individuals. The number of repeat infection reports ranged from 2-11 per individual (mean = 2.4 ± 0.7 cases). Of those reported cases, 81% had a single infection, 14% had two infections, 4% had three infections, 1% had four infections, and <1% had 5 or more infections (Table 2).

Table 2: Distribution of Reported Repeat Chlamydia Infection in Mississippi, 2004-2008

Number Times of Reported Infection	Number of Individuals (%)	Total Infections (%)
1	65,081 (80.6%)	65,081 (63.7%)
2	11,554 (14.3%)	23,108 (22.6%)
3	2,937 (3.6%)	8,811 (8.6%)
4	836 (1.0%)	3,344 (3.1%)
5	232 (0.3%)	1,160 (1.1%)
6	69 (0.1%)	414 (0.4%)
7	22 (0.0%)	154 (0.2%)
8	2 (0.0%)	16 (0.0%)
9	2 (0.0%)	18 (0.0%)
11	1 (0.0%)	11 (0.0%)
Grand Total	80,736	102,117

Results (continued)

Overall, the average time between the initial and first repeat infection was 14.8 ± 12 months. There was no statistical significance when the time between initial and first repeat infection was compared among men and women (15.2 months compared to 14.7 months).

Table 3 shows the mean time in months between reports among individuals with repeated chlamydia infection. The time between repeated infection reports decreased as the numbers of repeated infections increased.

Table 3: Average Time (Months) between Reports among Individuals with Repeated Chlamydia Infection (2004-2008)

# Infections	Chlamydia Reports									
	1st - 2nd	2nd - 3rd	3rd - 4th	4th - 5th	5th - 6th	6th - 7th	7th - 8th	8th - 9th	9th - 10th	10th - 11th
2	15.9									
3	12.3	13.1								
4	10.4	10.0	10.5							
5	9.3	8.5	8.0	9.0						
6	8.9	6.8	6.7	7.8	9.7					
7	6.7	7.8	6.6	6.0	6.1	7.1				
8	4.7	7.2	5.6	8.9	10.0	2.4	4.1			
9	7.3	5.3	3.4	1.4	1.7	7.0	4.0	5.3		
11	6.8	6.0	2.7	3.0	3.9	2.7	0.9	4.0	8.4	2.7

The mean age of those with single infection was 23 ± 6.7 years and for those with repeated infection was 20 ± 4.4 years (P=<.0001). The mean age of males with single infections was 24 ± 7.3 years, compared to 22 ± 5.5 years for those with repeat infections (P=<.0001). The mean age of females with single infection was 22 ± 6.3 years, compared to 20 ± 4.1 years for those with repeat infections (P=<.0001). Individuals < 25 years old, females, and African Americans were significantly more likely to be reported with repeated chlamydia infection. Area of residence was not associated with repeated chlamydia infection report. (Table 4)

Table 4: Characteristics of Men and Women in Mississippi with Single and Repeat Chlamydia Infection, 2004-2008

Age	Single Infections (%)	Repeat Infections (%)	P Value
Mean Age ± SD	23 ± 6.7	20 ± 4.4	<.0001
<25	47,263 (72.8%)	13,882 (88.7%)	<.0001
25+	17,696 (27.2%)	1,767 (11.3%)	
Gender			
Male	17,698 (27.2%)	2,091 (13.4%)	<.0001
Female	47,383 (72.8%)	13,564 (86.6%)	
Race			
African American	40,987 (79.5%)	12,287 (89.2%)	<.0001
Non-African American	10,572 (20.5%)	1,480 (10.8%)	
Geographic Location			
Urban	60,610 (93.1%)	14,564 (93.0%)	0.66
Rural	4,471 (6.9%)	1,091 (7.0%)	

Table 5 shows the comparison of individuals with < 3 reported chlamydia infections with individuals with ≥ 3 reports. Those with ≥ 3 reports were significantly younger, female, African American and more likely to reside in urban areas.

Results (continued)

Table 5: Characteristics of Men and Women in Mississippi with Repeat Chlamydia Infections, 2004-2008

	<3 Reported Infections	≥3 Reported Infections	P Value
Age			
Mean Age ± SD	20 ± 4.7	19 ± 3.5	<.0001
<25	10,071 (87.2%)	3,811 (93.0%)	<.0001
25+	1,478 (12.8%)	289 (7.0%)	
Gender			
Male	1,702 (14.7%)	389 (9.5%)	<.0001
Female	9,852 (85.3%)	3,712 (90.5%)	
Race			
African American	8,843 (88.3%)	3,444 (91.8%)	<.0001
Non-African American	1,171 (11.7%)	309 (8.2%)	
Geographic Location			
Urban	10,718 (92.8%)	3,846 (93.8%)	
Rural	836 (7.2%)	255 (6.2%)	.03

Conclusions

In Mississippi, chlamydia constitutes a significant public health problem with great consequences to the reproductive health of the state's population. Repeat infections are common, and probably underrepresented in this sample that includes only cases reported to MSDH STD surveillance and not actual infections, which largely remain asymptomatic and undiagnosed.

The data identified individuals younger than 25 years old, females, and African Americans with a highest risk for a repeated infection following an initial chlamydia infection diagnosis. Youth, females, African Americans, and residents of urban areas are at a higher risk for multiple (≥3) repeated chlamydia infections.

Implications

Mississippi's chlamydia screening programs and STD/HIV prevention programs should consider risk reduction strategies and disease screening intensification that target populations at high risk for repeated infection.

Further research should be conducted to assess the behavioral factors and composition of social and sexual networks of those with multiple repeated chlamydia infections.

References

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