

Trends and Characteristics of Sexually Transmitted Infections During Pregnancy: United States, 2016–2018

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Abstract

Objectives—This report presents data on recent trends for three sexually transmitted infections (STIs)—chlamydia, gonorrhea, and syphilis—reported among women giving birth in the United States from 2016 through 2018, and rates by selected characteristics for 2018.

Methods—Data are from birth certificates and are based on 100% of births registered in the United States for 2016, 2017, and 2018. Birth certificate data on infections during pregnancy are recommended to be collected from the mother’s medical records (1). Mothers are to be reported as having an infection if there is a confirmed diagnosis or documented treatment for the infection in their medical record (2).

Results—Among women giving birth in 2018, the overall rates of chlamydia, gonorrhea, and syphilis were 1,843.9, 310.2, and 116.7 per 100,000 births, respectively. The rates for these STIs increased 2% (chlamydia), 16% (gonorrhea), and 34% (syphilis) from 2016 through 2018. In 2018, rates of chlamydia and gonorrhea decreased with advancing maternal age, whereas those for syphilis decreased with maternal age through 30–34 years and then increased for women aged 35 and over. In 2018, rates of all three STIs were highest for non-Hispanic black women, women who smoked during pregnancy, women who received late or no prenatal care, and women for whom Medicaid was the principal source of payment for the delivery. Among women aged 25 and over, rates of each of the STIs decreased with increasing maternal education.

Keywords: maternal infection • STI • chlamydia • gonorrhea • syphilis

Introduction

Sexually transmitted infections (STIs) can impact a woman’s ability to conceive and increase reproductive morbidity (3). Pregnant women risk transmitting the STI to the infant during pregnancy and delivery, and untreated infections can lead to poor pregnancy outcomes such as fetal death, premature delivery, premature rupture of the membranes, low birthweight, neonatal ophthalmia, neonatal pneumonia, and mental or physical developmental disabilities (3–6). Rates of chlamydia, gonorrhea, and syphilis (both primary and secondary) have been increasing nationally in the general population from 2013 through 2018 (7–8). Limited studies are available on the prevalence of, or the characteristics of, women with STIs during pregnancy, and the research that is available typically focuses on subsets of women, such as teen mothers, one race or Hispanic-origin group, or small geographic areas (9–11).

The 2003 birth certificate revision includes the item, “Infections present and/or treated during this pregnancy.” Because of the staggered implementation of the 2003 birth certificate revision, national information on these infections became available for the first time in 2016. This report presents overall trends in chlamydia, gonorrhea, and syphilis reported among women giving birth in the United States from 2016 through 2018, and rates for these STIs by selected characteristics for 2018.

Methods

This analysis uses data from the birth certificate and is based on 100% of births registered in the United States for 2016, 2017, and 2018. Data for 2016–2018 were analyzed for trends, with a more detailed analysis for 2018 data. The item, “Infections present and/or treated during this pregnancy” was added to the birth certificate with the 2003 revision, and reported by all states as of 2016, and includes the following infections: gonorrhea, syphilis, chlamydia, hepatitis B, and hepatitis C. For



this analysis, the infections were restricted to those for which the method of transmission could reasonably be assumed to be exclusively by sexual contact (i.e., chlamydia, gonorrhea, and syphilis) (12–14). Birth certificate data on infections during pregnancy are recommended to be collected from the mother's medical records (1). Mothers are to be reported as having an infection if there is a confirmed diagnosis or documented treatment for the respective infection in their medical record (2). Of the 3,791,712 births registered in the United States for 2018, 8,460, or 0.2%, were missing information on maternal infections (15). These records, and those missing information on all other selected characteristics, were excluded from the analyses.

Rates of maternal STIs are expressed in this report as the number of live births to women with a specified infection per 100,000 live births. For the 2018 data, rates of maternal STIs are presented by age, race and Hispanic origin, education, smoking status, prenatal care, and source of payment for the delivery. Race and Hispanic origin are reported separately on the birth certificate. For this report, categories of maternal race and Hispanic origin are non-Hispanic white, non-Hispanic black, and Hispanic. All race and Hispanic-origin groups are based on single-race reporting and are consistent with the 1997 Office of Management and Budget standards (16). Analyses of maternal educational attainment were limited to women aged 25 and over to allow for completion of education.

All statements about differences in rates by subgroup in the text have been tested for statistical significance, and a statement that a given rate is higher or lower than another rate indicates that the rates are significantly different using a two-tailed z test at the alpha level of 0.05 (17).

References to decreasing or increasing trends in rates (e.g., trends in rates for 2016 through 2018) are statistically significant at the 0.05 level and were assessed using the Cochran-Armitage test for trends, a modified chi-squared test.

The reliability of percentages was evaluated based on standards developed by the National Center for Health Statistics (NCHS). For detailed information on the standards, see "National Center for Health Statistics Data Presentation Standards for Proportions" (18).

Results

Trends

- Rates for each of the three maternal STIs increased for 2016 through 2018 (Table 1).
- The chlamydia rate increased 2% in 2018 compared with 2016, from 1,815.9 per 100,000 births in 2016 to 1,832.8 in 2017 and 1,843.9 in 2018 (Figure 1). Of the three maternal STI infections, chlamydia was the most commonly reported (69,758 cases) in 2018.

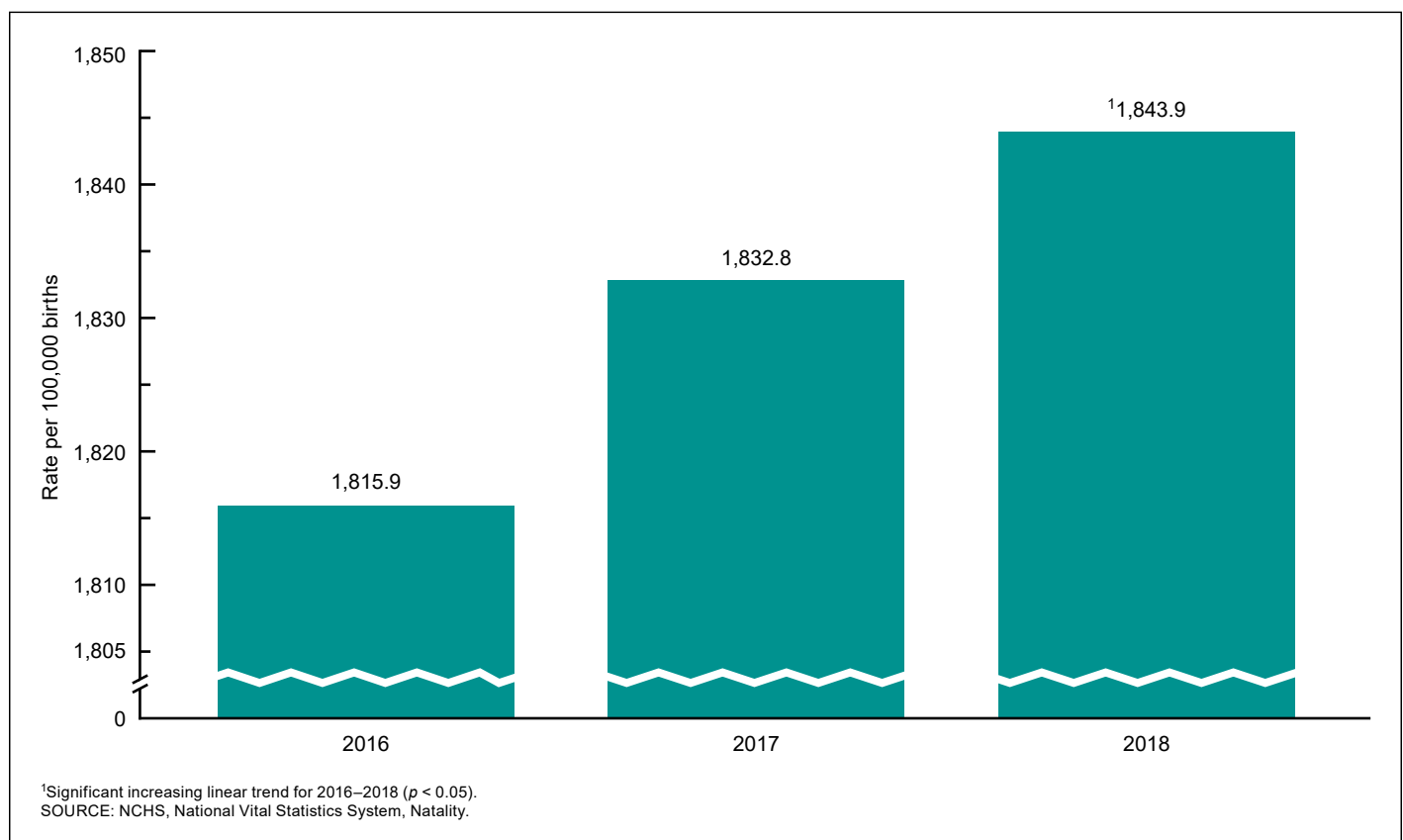


Figure 1. Rate of chlamydia: United States, 2016–2018

- The gonorrhea rate increased 16% in 2018 compared with 2016, from 268.1 in 2016 to 294.6 in 2017 and 310.2 in 2018 (Figure 2). There were 11,734 cases of gonorrhea reported among women giving birth in 2018 (Table 1).
- The syphilis rate increased 34% in 2018 compared with 2016, from 87.2 in 2016 to 101.3 in 2017 and 116.7 in 2018 (Figure 2). Syphilis was the least commonly reported of the three STIs, with 4,416 cases among women giving birth in 2018.

Maternal age

- In 2018, rates of chlamydia and gonorrhea decreased with increasing age of the mother (Table 2).
 - The rate of chlamydia declined from 7,288.4 per 100,000 births among women under age 20 to 375.2 among those aged 40 and over.
 - The rate of gonorrhea decreased from 1,151.5 among women under age 20 to 67.9 among women aged 40 and over.
- The syphilis rate was highest for women under age 20 and 20–24 (152.9 and 166.3, respectively) and lowest for women aged 30–34 (85.4). Rates then increased for women aged 35 and over (90.9 for women aged 35–39 and 113.8 for those aged 40 and over) (Table 2, Figure 3).

Maternal race and Hispanic origin

- The rates for all three of the maternal STIs were highest for non-Hispanic black women, followed by Hispanic and non-Hispanic white women (Table 2).
 - The rate of chlamydia for non-Hispanic black women (4,216.4 per 100,000 births) was almost four times as high as that for non-Hispanic white women (1,117.3) and nearly two times as high as the rate for Hispanic women (2,151.4) (Figure 4).
 - Non-Hispanic black women (998.2) had a rate of gonorrhea nearly six times as high as that for non-Hispanic white (169.9) and almost five times as high as that for Hispanic (211.9) women.
 - The rate of syphilis for non-Hispanic black women (328.7) was more than six times as high as the rate for non-Hispanic white women (52.7) and nearly two and one-half times as high as that for Hispanic women (135.4).

Maternal educational attainment

- Among mothers aged 25 and over, rates for each of the maternal STIs decreased as education level increased (Table 2).
 - The chlamydia rate ranged from a high of 1,864.0 per 100,000 births for women with less than a high school education to a low of 173.6 for women with a master's degree or higher.

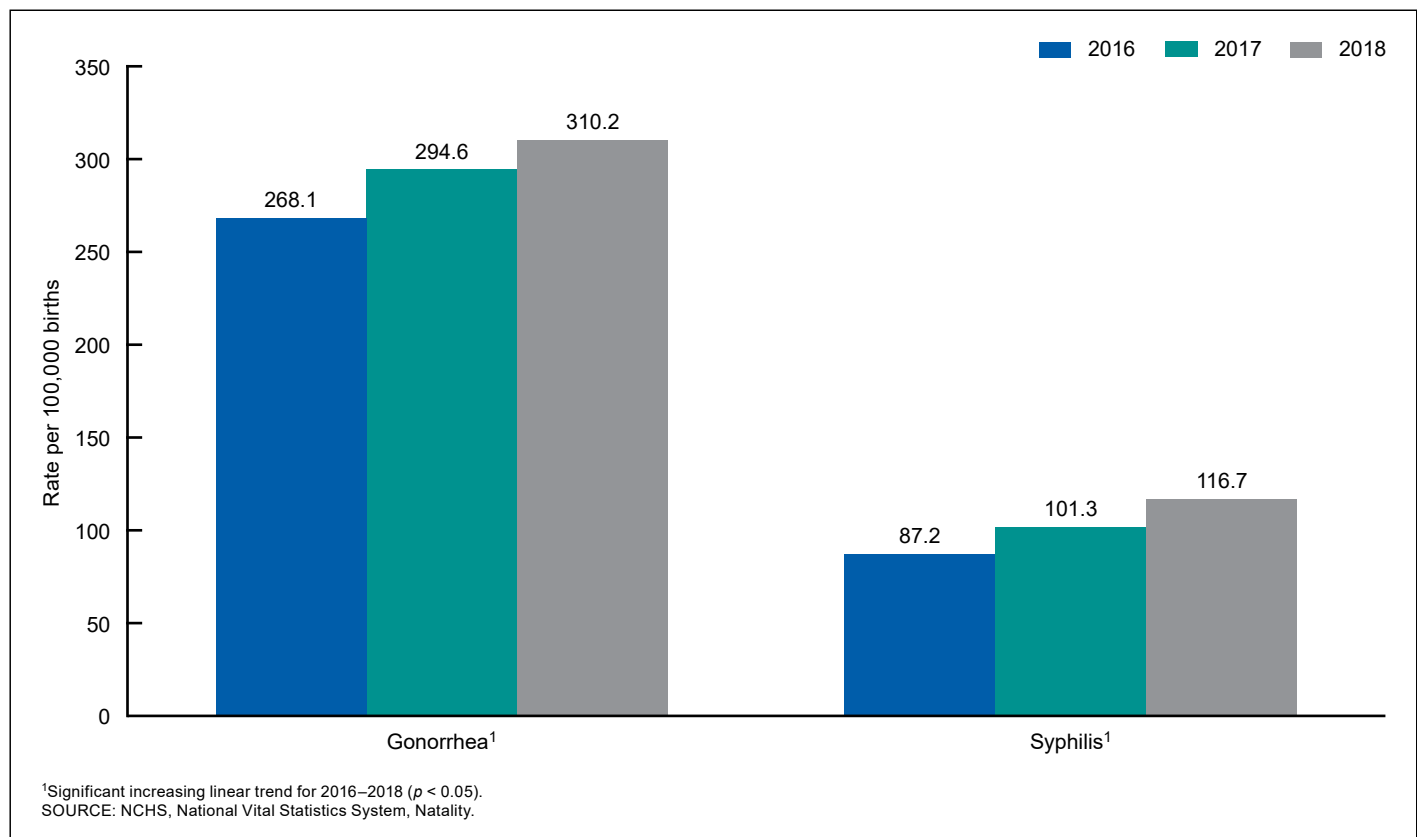


Figure 2. Rate of gonorrhea and syphilis: United States, 2016–2018

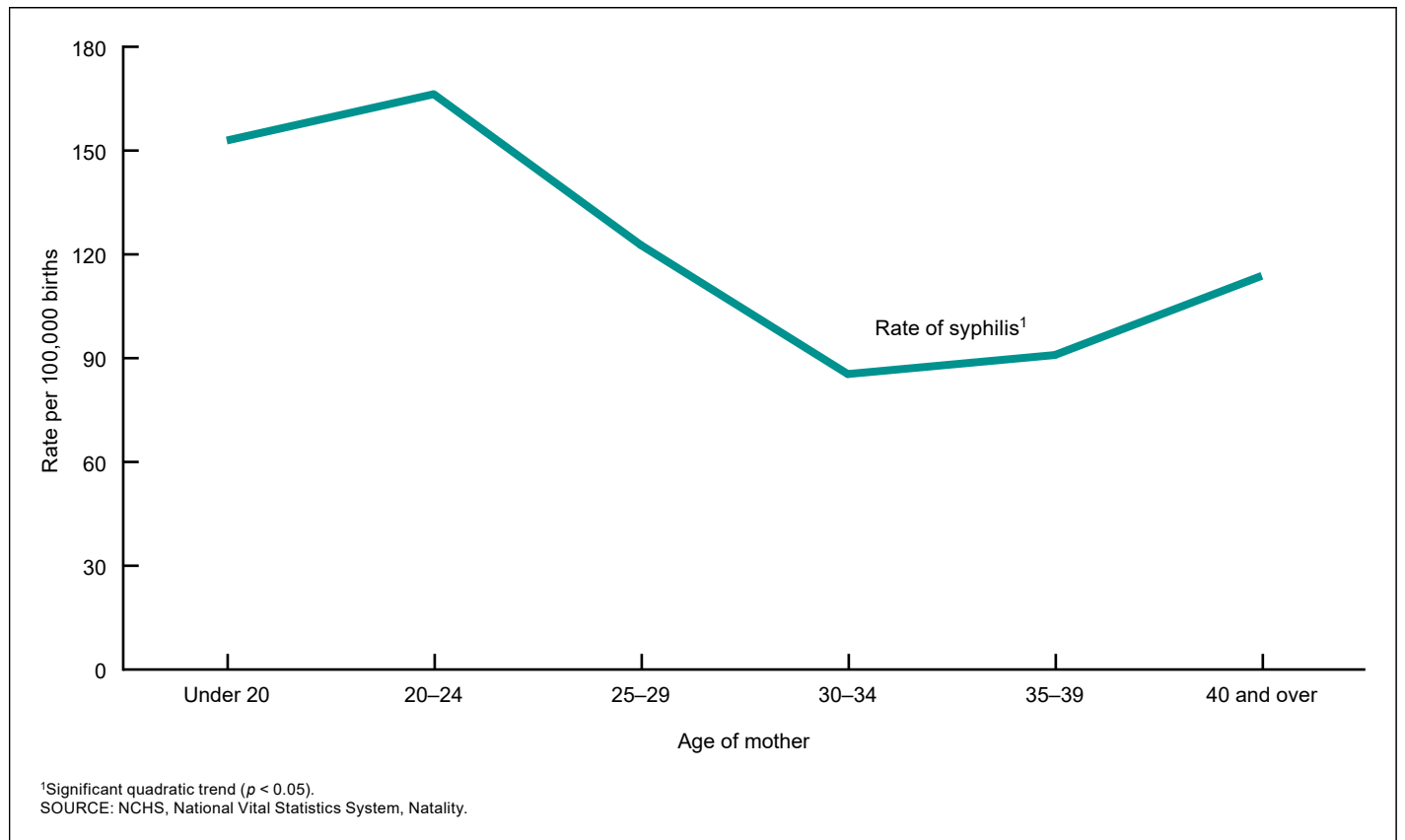


Figure 3. Rate of syphilis, by maternal age: United States, 2018

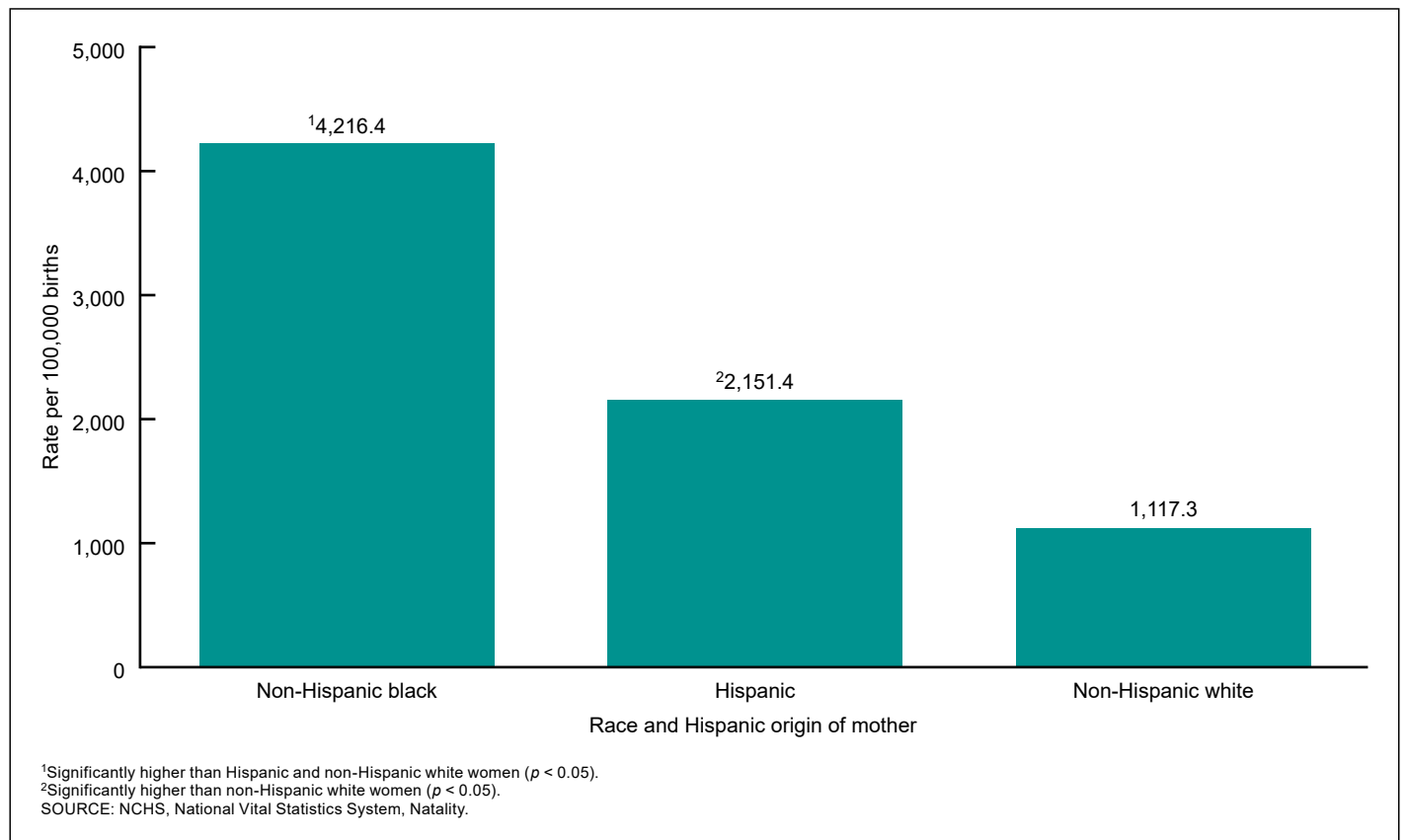


Figure 4. Rate of chlamydia, by maternal race and Hispanic origin: United States, 2018

- The rate of gonorrhea was also highest for women with less than a high school education (393.2) and lowest for women with a master's degree or higher (24.9) (Figure 5).
- The rate of syphilis followed the same pattern, with the rate highest for women with less than a high school education (297.1) and lowest for women with a master's degree or higher (20.5).

Maternal smoking during pregnancy

- Women who smoked during pregnancy had higher rates of each maternal STI than women who did not smoke during pregnancy (Table 2).
 - The chlamydia rate for women who smoked during pregnancy (3,948.7 per 100,000 births) was more than twice as high as that for women who did not smoke during pregnancy (1,691.7).
 - Among women who smoked during pregnancy, rates of gonorrhea (1,044.5) and syphilis (306.4) were three to four times as high as those for women who did not smoke during pregnancy (256.4 for gonorrhea and 101.8 for syphilis).

Timing of prenatal care

- Rates for each of the maternal STIs were lowest for women who received prenatal care during their first trimester and highest for those who received late or no care (Table 2).
 - The rate of chlamydia ranged from a low of 1,497.0 per 100,000 births for women who received prenatal care in their first trimester to a high of 3,157.6 for those who received late or no prenatal care.
 - The gonorrhea rate increased from 238.9 for women who received prenatal care in their first trimester to 629.9 for those who received late or no prenatal care.
 - The rate of syphilis for women who received late or no prenatal care (270.8) was more than three times as high as the rate for women receiving care in the first trimester (88.6).

Source of payment for delivery

- In 2018, among the four different payment sources for the delivery (Medicaid, private insurance, self-pay, and other), women for whom Medicaid was the principal source of payment had the highest rates of chlamydia, gonorrhea, and syphilis during pregnancy; women for whom private insurance was the principal source of payment had the lowest rates for all three STIs (Table 2).

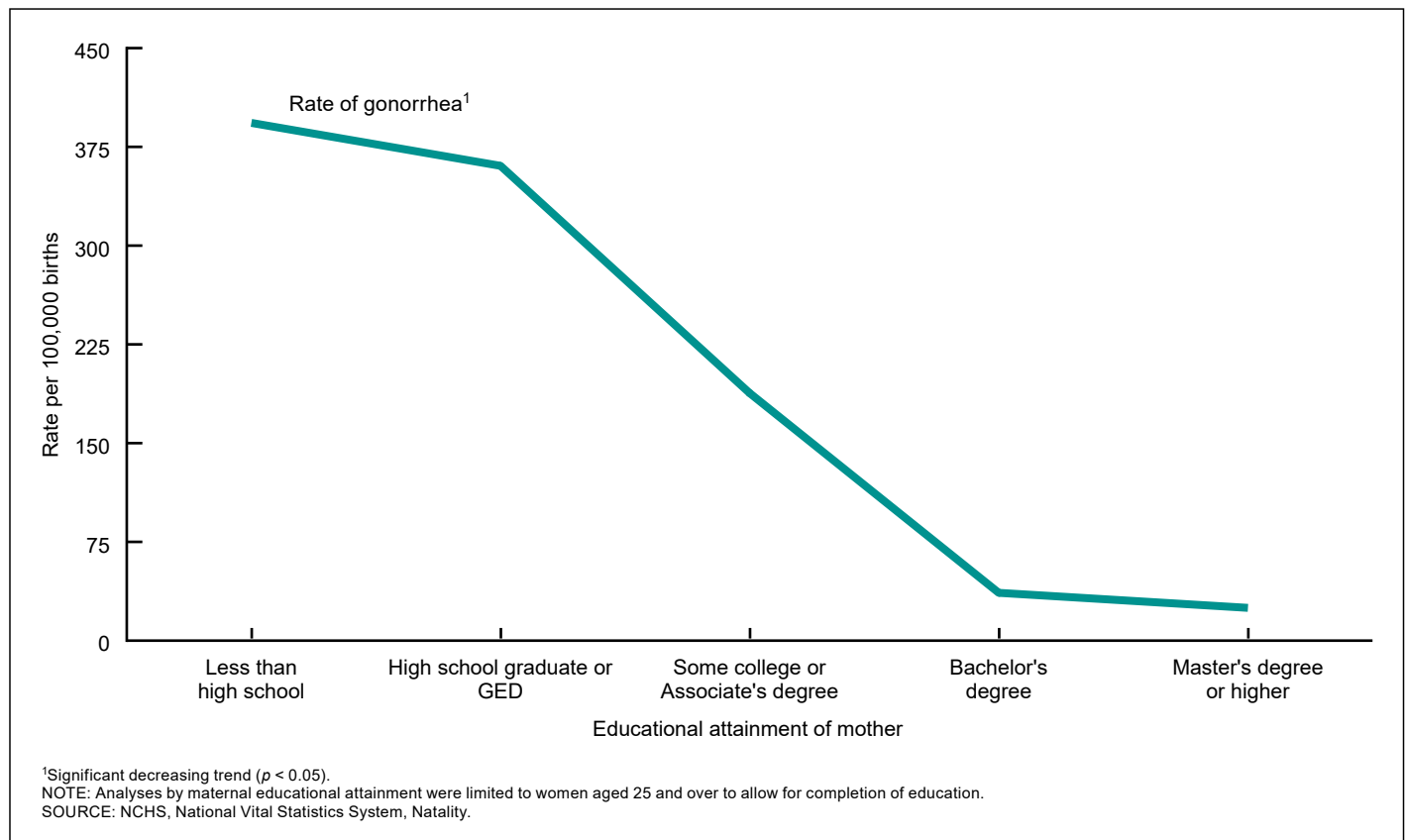


Figure 5. Rate of gonorrhea, by mother's education: United States, 2018

- The rate of chlamydia was 3,249.5 among women with Medicaid and 681.0 among women with private insurance.
- Gonorrhea and syphilis rates showed similar patterns by source of payment for delivery. The gonorrhea rate for women with Medicaid was more than seven times as high as that for women with private insurance (596.4 compared with 82.7); women with Medicaid had a rate of syphilis nearly six times as high as that for women with private insurance (211.2 compared with 35.7).

Discussion

This report describes three STIs present, treated, or present and treated during pregnancy among U.S. women giving birth in 2018 by selected characteristics, and trends in rates of these STIs for 2016 through 2018. Of the three infections, chlamydia was the most commonly reported, and syphilis was the least commonly reported. Rates for each of the STIs increased from 2016 through 2018. Rates of chlamydia and gonorrhea decreased with increasing maternal age. For all three STIs, rates were highest for non-Hispanic black women, women who smoked during pregnancy, women who received late or no prenatal care, and women for whom Medicaid was the principal source of payment for the delivery. Rates for each of the STIs decreased with increasing maternal education.

Findings from other data sources

Information for some maternal STIs during pregnancy is also available from other sources, such as the Pregnancy Risk Assessment Monitoring System, the National Health and Nutrition Examination Survey, and the National Survey of Family Growth. However, comparisons of birth certificate data with data from these sources were not feasible for one or more of the following reasons: the small number of female respondents with an STI prevented the calculation of reliable rate estimates overall and by subgroup, samples were not nationally representative, or STI data on all women of childbearing age (15–44) were not available (19–21).

Data from the Centers for Disease Control and Prevention's National Notifiable Diseases Surveillance System are used to monitor, control, and prevent approximately 120 diseases, including chlamydia, gonorrhea, and syphilis (22). Data on STI rates for women of childbearing age, regardless of pregnancy status, are available from this data source. These data have found that chlamydia and gonorrhea rates were highest for those aged 15–24 (8,23), and higher for non-Hispanic black women than for non-Hispanic white women (8); these findings are consistent with those of this report. It is important to note that birth certificate data represent a subset of all women of childbearing age whose characteristics may differ from those of all women, preventing direct comparisons across data sources.

Underreporting of maternal STI data and potential quality issues

Two studies that examined data from the 2003 revision of the birth certificate for three vital statistics reporting areas found wide variation in data quality among the medical and health checkbox items (24–25). Whereas some items, such as the method of delivery items, had moderate to high levels of sensitivity (a measure of underreporting), many of the pregnancy risk factors examined had low or extremely low sensitivity (24–25). Data items pertaining to infections during pregnancy were not assessed in these reviews because of their less frequent occurrence. Therefore, limited information is available on the quality of STI data on birth certificates.

Routine quality review of birth certificate data by NCHS suggests underreporting of maternal STIs in some jurisdictions. For example, review of STI data at the facility level revealed instances of large (i.e., more than 1,000 births per year) hospitals that would be expected to report some incidence of maternal STIs reporting fewer than expected or no cases. This is based on their report of a lower than expected number (difference of at least three standard deviations in rate compared with facilities in the region of similar size) or no infections at all over the course of a year or years, suggesting systemic underreporting of these infections by these facilities. Studies of maternal STIs using the birth certificate data should consider the possibility of underreporting and its effects on analysis.

Conclusion

Maternal STIs during pregnancy are infrequently reported, but are important health issues given the potential for negative health outcomes for both women and infants. These infections can be difficult to study due to small numbers. A strength of birth certificate data is that information is collected on all women giving birth in the United States each year, allowing for analysis of infrequently reported events such as maternal STIs and for smaller population groups over time. Despite concerns with underreporting, these data provide opportunities to examine STIs among all women giving birth in the United States.

References

1. National Center for Health Statistics. Facility worksheet for the live birth certificate. 2016. Available from: <https://www.cdc.gov/nchs/data/dvs/facility-worksheet-2016.pdf>.
2. National Center for Health Statistics. Guide to completing the facility worksheets for the certificate of live birth and report of fetal death (2003 revision). 2016. Available from: <https://www.cdc.gov/nchs/data/dvs/GuidetoCompleteFacilityWks.pdf>.
3. National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention. Sexually transmitted disease surveillance 2016. 2017. Available from: https://www.cdc.gov/std/stats16/CDC_2016_STDS_Report-for508WebSep21_2017_1644.pdf.

4. Andrews WW, Goldenberg RL, Mercer B, Iams J, Meis P, Moawad A, et al. The preterm prediction study: Association of second-trimester genitourinary chlamydia infection with subsequent spontaneous preterm birth. *Am J Obstet Gynecol* 183(3):662–8. 2000.
5. Alger LS, Lovchik JC, Hebel JR, Blackmon LR, Crenshaw MC. The association of chlamydia trachomatis, neisseria gonorrhoeae, and group B streptococci with preterm rupture of the membranes and pregnancy outcome. *Am J Obstet Gynecol* 159(2):397–404. 1988.
6. Genc M, Ledger WJ. Syphilis in pregnancy. *Sex Transm Infect* 76(2):73. 2000.
7. National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention. Sexually transmitted disease surveillance 2017. 2018. Available from: <https://www.cdc.gov/std/stats17/default.htm>.
8. National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention. Sexually transmitted disease surveillance 2018. 2019. Available from: <https://www.cdc.gov/std/stats18/natoverview.htm>.
9. Chokeyphaibulkit K, Patamasucon P, List M, Moore B, Rodriguez H. Genital chlamydia trachomatis infection in pregnant adolescents in east Tennessee: A 7-year case-control study. *J Pediatr Adolesc Gynecol* 10(2):95–100. 1997.
10. Chang SC, O'Brien KO, Nathanson MS, Mancini J, Witter FR. Characteristics and risk factors for adverse birth outcomes in pregnant black adolescents. *J Pediatr* 143(2):250–7. 2003.
11. Meade CS, Ickovics JR. Systematic review of sexual risk among pregnant and mothering teens in the USA: Pregnancy as an opportunity for integrated prevention of STD and repeat pregnancy. *Soc Sci Med* 60(4):661–678. 2005.
12. National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention. Chlamydia—CDC fact sheet (detailed). 2016. Available from: <https://www.cdc.gov/std/chlamydia/stdfact-chlamydia-detailed.htm>.
13. National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention. Gonorrhea—CDC fact sheet (detailed). 2016. Available from: <https://www.cdc.gov/std/gonorrhea/stdfact-gonorrhea-detailed.htm>.
14. National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention. Syphilis—CDC fact sheet (detailed). 2017. Available from: <https://www.cdc.gov/std/syphilis/stdfact-syphilis-detailed.htm>.
15. National Center for Health Statistics. User guide to the 2018 natality public use file. Available from: https://www.cdc.gov/nchs/data_access/Vitalstatsonline.htm.
16. Office of Management and Budget. Revisions to the standards for the classification of federal data on race and ethnicity. *Fed Regist* 62(210):58782–90. 1997.
17. National Center for Health Statistics. User guide to the 2010 natality public use file. Available from: <https://wonder.cdc.gov/wonder/help/natality/NatalityPublicUseUserGuide2010.pdf>.
18. Parker JD, Talih M, Malec DJ, Beresovsky V, Carroll M, Gonzalez Jr JF, et al. National Center for Health Statistics data presentation standards for proportions. National Center for Health Statistics. *Vital Health Stat* 2(175). 2017. Available from: https://www.cdc.gov/nchs/data/series/sr_02/sr02_175.pdf.
19. National Center for Chronic Disease Prevention and Health Promotion. About PRAMS. Available from: <https://www.cdc.gov/prams/aboutprams.htm>.
20. National Center for Health Statistics. National Survey of Family Growth, 2015–2017. Public-use data file and documentation. 2018. Available from: https://www.cdc.gov/nchs/nsfg/nsfg_2015_2017_puf.htm.
21. National Center for Health Statistics. National Health and Nutrition Examination Survey. 2015–2016 data documentation, codebook, and frequencies. 2017. Available from: https://wwwn.cdc.gov/Nchs/Nhanes/2015-2016/CHLMDA_1.htm.
22. Centers for Disease Control and Prevention. National Notifiable Diseases Surveillance System (NNDSS) : Defending America from health threats. Available from: <https://wwwn.cdc.gov/nndss/by-the-numbers.html>.
23. LeFevre ML. Screening for chlamydia and gonorrhea: U.S. Preventive Services Task Force recommendation statement. *Ann Intern Med* 161(12):902–10. 2014.
24. Martin JA, Wilson EC, Osterman MJK, et al. Assessing the quality of medical and health data from the 2003 birth certificate revision: Results from two states. National Vital Statistics Reports; vol 62 no 2. Hyattsville, MD: National Center for Health Statistics. 2013.
25. Gregory ECW, Martin JA, Argov EL, Osterman MJK. Assessing the quality of medical and health data from the 2003 birth certificate revision: Results from New York City. National Vital Statistics Reports; vol 68 no 8. Hyattsville, MD: National Center for Health Statistics. 2019.

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Table 1. Number of cases and rates of chlamydia, gonorrhea, and syphilis among births to women: United States, 2016–2018

[Rates are number of births to women with specified infection per 100,000 births]

Infection and year	Total number of births	Number of cases	Rate	Confidence interval		Not stated ¹
				Lower	Upper	
Chlamydia²						
2018.....	3,791,712	69,758	1,843.9	1,830.3	1,857.5	8,460
2017.....	3,855,500	70,479	1,832.8	1,819.4	1,846.2	9,976
2016.....	3,945,875	71,480	1,815.9	1,802.7	1,829.1	9,624
Gonorrhea²						
2018.....	3,791,712	11,734	310.2	304.6	315.8	8,460
2017.....	3,855,500	11,329	294.6	289.2	300.0	9,976
2016.....	3,945,875	10,555	268.1	263.0	273.2	9,624
Syphilis²						
2018.....	3,791,712	4,416	116.7	113.3	120.1	8,460
2017.....	3,855,500	3,895	101.3	98.1	104.5	9,976
2016.....	3,945,875	3,431	87.2	84.3	90.1	9,624

¹No response reported for the "infections treated and/or present during this pregnancy" item on the birth certificate.²Significant increasing linear trend for 2016–2018 ($p < 0.05$).

SOURCE: NCHS, National Vital Statistics System, Natality.

Table 2. Number of cases and rates of chlamydia, gonorrhea, and syphilis among births to women, by selected characteristics: United States, 2018

[Rates are number of births to women with specified infection per 100,000 births in specified group]

Infection and characteristic	Total number of births	Number of cases	Rate	Confidence interval		Not stated ¹
				Lower	Upper	
Chlamydia						
Total	3,791,712	69,758	1,843.9	1,830.3	1,857.5	8,460
Age²						
Under 20	181,607	13,203	7,288.4	7,168.7	7,408.1	456
20–24	726,175	29,427	4,062.2	4,016.7	4,107.7	1,760
25–29	1,099,491	16,995	1,549.1	1,526.0	1,572.2	2,437
30–34	1,090,697	7,176	659.3	644.1	674.5	2,194
35–39	566,786	2,482	438.9	421.7	456.1	1,241
40 and over	126,956	475	375.2	341.5	408.9	372
Race and Hispanic origin^{3,4}						
Non-Hispanic, single-race white	1,956,413	21,816	1,117.3	1,102.6	1,132.0	3,831
Non-Hispanic, single-race black	552,029	23,207	4,216.4	4,163.3	4,269.5	1,636
Hispanic ⁵	886,210	19,025	2,151.4	2,121.2	2,181.6	1,885
Educational attainment (aged 25 and over)²						
Less than high school	270,518	5,025	1,864.0	1,812.9	1,915.1	933
High school graduate or GED	567,606	9,799	1,731.2	1,697.2	1,765.2	1,573
Some college or Associate's degree ⁶	809,889	8,821	1,091.3	1,068.7	1,113.9	1,586
Bachelor's degree ⁷	737,264	2,339	317.7	304.8	330.6	1,032
Master's degree or higher ⁸	459,014	796	173.6	161.5	185.7	549
Smoking status						
Did not smoke during pregnancy	3,529,409	59,592	1,691.7	1,678.2	1,705.2	6,891
Smoked during pregnancy ⁹	245,290	9,640	3,948.7	3,871.4	4,026.0	1,160
Trimester prenatal care began¹⁰						
First trimester	2,864,344	42,817	1,497.0	1,482.9	1,511.1	4,136
Second trimester	602,384	18,028	2,997.7	2,954.6	3,040.8	989
Late or no care ¹¹	229,622	7,193	3,157.6	3,085.8	3,229.4	1,819
Payment source¹²						
Medicaid	1,595,763	51,733	3,249.5	3,222.0	3,277.0	3,755
Private insurance	1,870,659	12,722	681.0	669.2	692.8	2,543
Self-pay	157,264	2,388	1,527.2	1,466.4	1,588.0	895
Other ¹³	145,431	2,500	1,725.8	1,658.7	1,792.9	573
Gonorrhea						
Total	3,791,712	11,734	310.2	304.6	315.8	8,460
Age²						
Under 20	181,607	2,086	1,151.5	1,102.4	1,200.6	456
20–24	726,175	4,575	631.5	613.3	649.7	1,760
25–29	1,099,491	3,066	279.5	269.6	289.4	2,437
30–34	1,090,697	1,400	128.6	121.9	135.3	2,194
35–39	566,786	521	92.1	84.2	100.0	1,241
40 and over	126,956	86	67.9	53.5	82.3	372
Race and Hispanic origin^{3,4}						
Non-Hispanic, single-race white	1,956,413	3,317	169.9	164.1	175.7	3,831
Non-Hispanic, single-race black	552,029	5,494	998.2	971.9	1,024.5	1,636
Hispanic ⁵	886,210	1,874	211.9	202.3	221.5	1,885
Educational attainment (aged 25 and over)²						
Less than high school	270,518	1,060	393.2	369.6	416.8	933
High school graduate or GED	567,606	2,041	360.6	345.0	376.2	1,573
Some college or Associate's degree ⁶	809,889	1,520	188.0	178.6	197.4	1,586
Bachelor's degree ⁷	737,264	267	36.3	31.9	40.7	1,032
Master's degree or higher ⁸	459,014	114	24.9	20.3	29.5	549
Smoking status						
Did not smoke during pregnancy	3,529,409	9,033	256.4	251.1	261.7	6,891
Smoked during pregnancy ⁹	245,290	2,550	1,044.5	1,004.2	1,084.8	1,160
Trimester prenatal care began¹⁰						
First trimester	2,864,344	6,834	238.9	233.2	244.6	4,136
Second trimester	602,384	3,124	519.5	501.3	537.7	989
Late or no care ¹¹	229,622	1,435	629.9	597.4	662.4	1,819

See footnotes at end of table.

Table 2. Number of cases and rates of chlamydia, gonorrhea, and syphilis among births to women, by selected characteristics: United States, 2018—Con.

[Rates are number of births to women with specified infection per 100,000 births in specified group]

Infection and characteristic	Total number of births	Number of cases	Rate	Confidence interval		Not stated ¹
				Lower	Upper	
Gonorrhea—Con.						
Payment source ¹²						
Medicaid	1,595,763	9,494	596.4	584.4	608.4	3,755
Private insurance	1,870,659	1,544	82.7	78.6	86.8	2,543
Self-pay	157,264	290	185.5	164.2	206.8	895
Other ¹³	145,431	337	232.6	207.8	257.4	573
Syphilis						
Total	3,791,712	4,416	116.7	113.3	120.1	8,460
Age ¹⁴						
Under 20	181,607	277	152.9	134.9	170.9	456
20–24	726,175	1,205	166.3	156.9	175.7	1,760
25–29	1,099,491	1,346	122.7	116.1	129.3	2,437
30–34	1,090,697	930	85.4	79.9	90.9	2,194
35–39	566,786	514	90.9	83.0	98.8	1,241
40 and over	126,956	144	113.8	95.2	132.4	372
Race and Hispanic origin ^{3,4}						
Non-Hispanic, single-race white	1,956,413	1,029	52.7	49.5	55.9	3,831
Non-Hispanic, single-race black	552,029	1,809	328.7	313.6	343.8	1,636
Hispanic ⁵	886,210	1,197	135.4	127.7	143.1	1,885
Educational attainment (aged 25 and over) ²						
Less than high school	270,518	801	297.1	276.6	317.6	933
High school graduate or GED	567,606	1,032	182.3	171.2	193.4	1,573
Some college/Associate's degree ⁶	809,889	736	91.1	84.5	97.7	1,586
Bachelor's degree ⁷	737,264	197	26.8	23.1	30.5	1,032
Master's degree or higher ⁸	459,014	94	20.5	16.4	24.6	549
Smoking status						
Did not smoke during pregnancy	3,529,409	3,585	101.8	98.5	105.1	6,891
Smoked during pregnancy ⁹	245,290	748	306.4	284.5	328.3	1,160
Trimester prenatal care began ¹⁰						
First trimester	2,864,344	2,533	88.6	85.2	92.0	4,136
Second trimester	602,384	1,113	185.1	174.2	196.0	989
Late or no care ¹¹	229,622	617	270.8	249.5	292.1	1,819
Payment source ¹⁵						
Medicaid	1,595,763	3,362	211.2	204.1	218.3	3,755
Private insurance	1,870,659	667	35.7	33.0	38.4	2,543
Self-pay	157,264	183	117.0	100.1	133.9	895
Other ¹³	145,431	178	122.9	104.9	140.9	573

¹No response reported for the "infections treated and/or present during this pregnancy" item on the birth certificate.²Significant decreasing trend ($p < 0.05$).³Race and Hispanic origin are reported separately on birth certificates; persons of Hispanic origin may be of any race. In this table, non-Hispanic women are classified by race. Race categories are consistent with the 1997 Office of Management and Budget standards; see "Methods" in this report. Single race is defined as only one race reported on the birth certificate.⁴All race and Hispanic-origin groups are significantly different from each other ($p < 0.05$).⁵Includes all persons of Hispanic origin of any race.⁶Includes Associate of Arts and Associate of Science.⁷Includes Bachelor of Arts and Bachelor of Science.⁸Includes Master of Arts, Master of Science, Master of Engineering, Master of Education, Master of Social Work, and Master of Business Administration, Doctor of Philosophy, Doctor of Education, Doctor of Medicine, Doctor of Dental Surgery, Doctor of Veterinary Medicine, Doctor of Laws, and Juris Doctor.⁹Significantly higher than women who did not smoke during pregnancy ($p < 0.05$).¹⁰Significant increasing trend ($p < 0.05$).¹¹Late or no care includes women who began prenatal care in their third trimester or did not receive any prenatal care.¹²All source of payment groups are significantly different from each other ($p < 0.05$).¹³Other includes Indian Health Service, CHAMPUS or TRICARE, other government (federal, state, or local), or charity.¹⁴Significant quadratic trend ($p < 0.05$).¹⁵All source of payment groups significantly different from each other except for self-pay and other ($p < 0.05$).

SOURCE: NCHS, National Vital Statistics System, Natality.

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National Vital Statistics Reports, Vol. 69, No. 3, March 26, 2020

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Acknowledgments

This report was prepared in the Division of Vital Statistics (DVS) under the general direction of Steven Schwartz, Director, DVS; Isabelle Horon, Acting Associate Director for Science, DVS; and Joyce A. Martin, Team Leader, Reproductive Statistics Branch Birth Team.

Suggested citation

Gregory ECW, Ely DM. Trends and characteristics of sexually transmitted infections during pregnancy: United States, 2016–2018. National Vital Statistics Reports; vol 69 no 3. Hyattsville, MD: National Center for Health Statistics. 2020.

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DHHS Publication No. 2020-1120 • CS315066