

## Timing and Adequacy of Prenatal Care in the United States, 2016

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### Abstract

**Objectives**—This report describes prenatal care utilization in the United States for 2016, based on the trimester of pregnancy in which prenatal care began and the Adequacy of Prenatal Care Utilization (APNCU) Index, by selected maternal characteristics.

**Methods**—Data are from the 2016 national birth file and are based on 100% of births registered to residents of the 50 states and the District of Columbia. All data are based on the 2003 revision of the U.S. Standard Certificate of Live Birth. The APNCU is based on the month prenatal care began and the number of visits adjusted for gestational age; categories are inadequate, intermediate, adequate, and adequate plus.

**Results**—Overall, 77.1% of women who gave birth in 2016 initiated prenatal care in the first trimester of pregnancy; 4.6% began prenatal care in the third trimester, and 1.6% of women received no care at all. According to the APNCU, more than 75% of women received at least adequate prenatal care, and 15.0% of women received inadequate prenatal care. Younger women, women with less education, women having a fourth or higher-order birth, and non-Hispanic Native Hawaiian or Other Pacific Islander women were the least likely to begin care in the first trimester of pregnancy and to have at least adequate prenatal care. The percentages of prenatal care beginning in the first trimester and adequate prenatal care varied by state.

**Keywords:** prenatal care initiation • maternal characteristics • APNCU • natality • National Vital Statistics System

### Introduction

Prenatal care (PNC) has been viewed as a strategy to improve pregnancy outcomes for more than a century (1). Today, PNC is among the most frequently used health care services in the United States, with more than 18 million prenatal visits occurring in the United States in 2015 (2). The American College

of Obstetricians and Gynecologists (ACOG) and the American Academy of Pediatrics recommend PNC with early and ongoing risk assessment for all women, with content and timing tied to the needs and risk status of the woman and her fetus (3).

Information on PNC has been included on the U.S. Standard Certificate of Live Birth since the 1968 revision to help explore the relationship between PNC and pregnancy outcomes (4,5). The items “Month of pregnancy prenatal care began” and “Total number of prenatal visits” were included until the most recent 2003 revision. For the 2003 revision, the month PNC began item was replaced with the “Date of first prenatal care visit (month, day, year).” The change from the numerical month of pregnancy that care began to the exact date of the first prenatal visit resulted in a discontinuity in information on PNC (i.e., PNC timing based on the date of the first prenatal visit was not comparable with timing based on the month care began [6]). Further, implementation of the 2003 revision was delayed across the country, resulting in a lack of national data on PNC until all vital statistics jurisdictions implemented the new standard in 2016 (7).

This report describes PNC utilization in the United States for 2016, based on the trimester of pregnancy in which PNC began and the Adequacy of Prenatal Care Utilization (APNCU) Index, by maternal age, race and Hispanic origin, education, state of residence, birth order, and source of payment for the delivery.

### Methods

Data are based on 100% of births registered to residents of the 50 states and the District of Columbia (D.C.). All data are based on the 2003 U.S. Standard Certificate of Live Birth (8,9), which was fully implemented across the country for 2016. The data are provided to the National Center for Health Statistics (NCHS) through the Vital Statistics Cooperative Program.

The timing of PNC is determined by the month PNC began. The month PNC began is based on the date of the first prenatal

visit, the date of birth, and gestational age (based on the obstetric estimate of gestation; see “Measuring Gestational Age in Vital Statistics Data: Transitioning to the Obstetric Estimate” for details on the Obstetric Estimate) (10,11). A prenatal visit is defined as one in which the physician or other health care professional examines or counsels the pregnant woman regarding her pregnancy (10). Visits for laboratory and other testing in which the health care professional does not counsel the pregnant woman are not counted.

Trimester of pregnancy in which PNC began is a recode of the month PNC began. Results are presented for PNC that began in the first trimester and for “late or no prenatal care,” which combines PNC that began in the third trimester and no PNC. There were 3,945,875 births to U.S. residents in 2016; 2.9% of records have missing information for the month PNC began. Where month of the date of the first PNC visit is valid (1–12) and the day is missing, day is imputed from a previous record with the same month (12). This occurred for 3.1% of records in 2016.

The APNCU is based on the month PNC began and the number of visits adjusted for gestational age (13). The number of visits is assessed by comparing the number of reported visits with the number of expected visits for a particular gestational age, based on recommendations from ACOG (14). Inadequate care is defined as all PNC that began after the fourth month of pregnancy, as well as PNC that included less than 50% of the recommended number of visits. Intermediate care includes 50%–79% of the recommended visits, adequate care includes 80%–109%, and adequate plus care is 110% or more of the recommended visits. In this report, “at least adequate care” refers to “adequate” and “adequate plus” care.

Race and Hispanic origin are reported separately on the birth certificate. This report includes data for total Hispanic births and Hispanic subgroups and for the following non-Hispanic, single-race groups: white, black, American Indian or Alaska Native (AIAN), Asian and Asian subgroups, and Native Hawaiian or Other Pacific Islander (NHOPI) and NHOPI subgroups. For additional details on race and Hispanic origin, and for details on age of mother, educational attainment, and live-birth order, see the “User Guide to the 2016 Natality Public-use File” (12).

Source of payment includes Medicaid, private insurance, self-pay, and “other.” Included in the “other” category are Indian Health Service, CHAMPUS (Civilian Health and Medical Program of the Uniformed Services) or TRICARE, other government (federal, state, or local), and charity (10,12). **Supplemental Tables I-1** and **I-2** also show PNC initiation by age and race and Hispanic origin further stratified by source of payment.

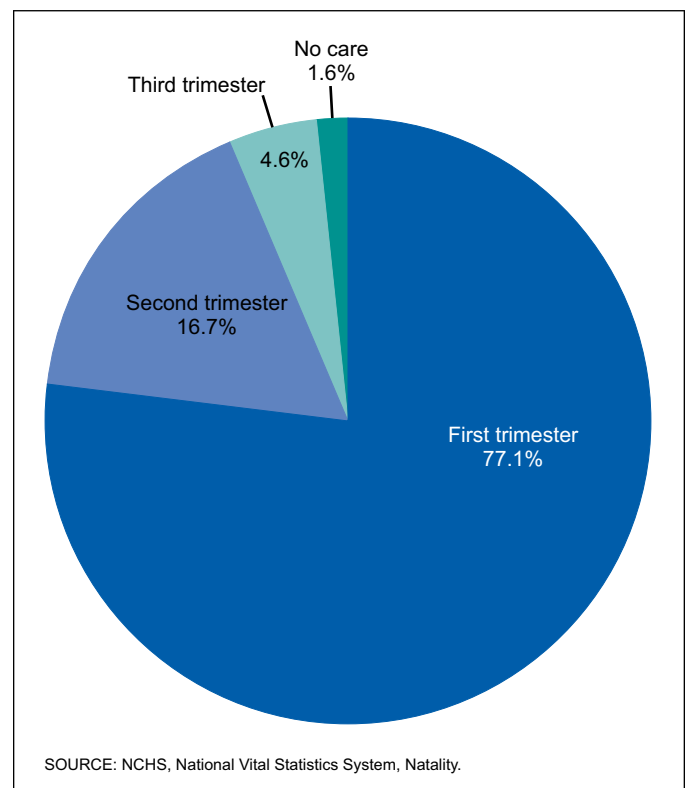
All differences noted in the text are statistically significant at the 0.05 level unless otherwise noted (10). Trends are statistically significant at the 0.05 level and were assessed using the Cochran–Armitage test for trends, a modified chi-squared test. Overall associations between independent variables and trimester PNC began or adequacy of PNC utilization were evaluated using a chi-squared test. For information and discussion on random variation and significance testing for natality data, see the “User Guide to the 2010 Natality Public-use File” (15). All estimates presented meet NCHS guidelines for presentation of proportions (16).

## Results

### Trimester of pregnancy in which PNC began

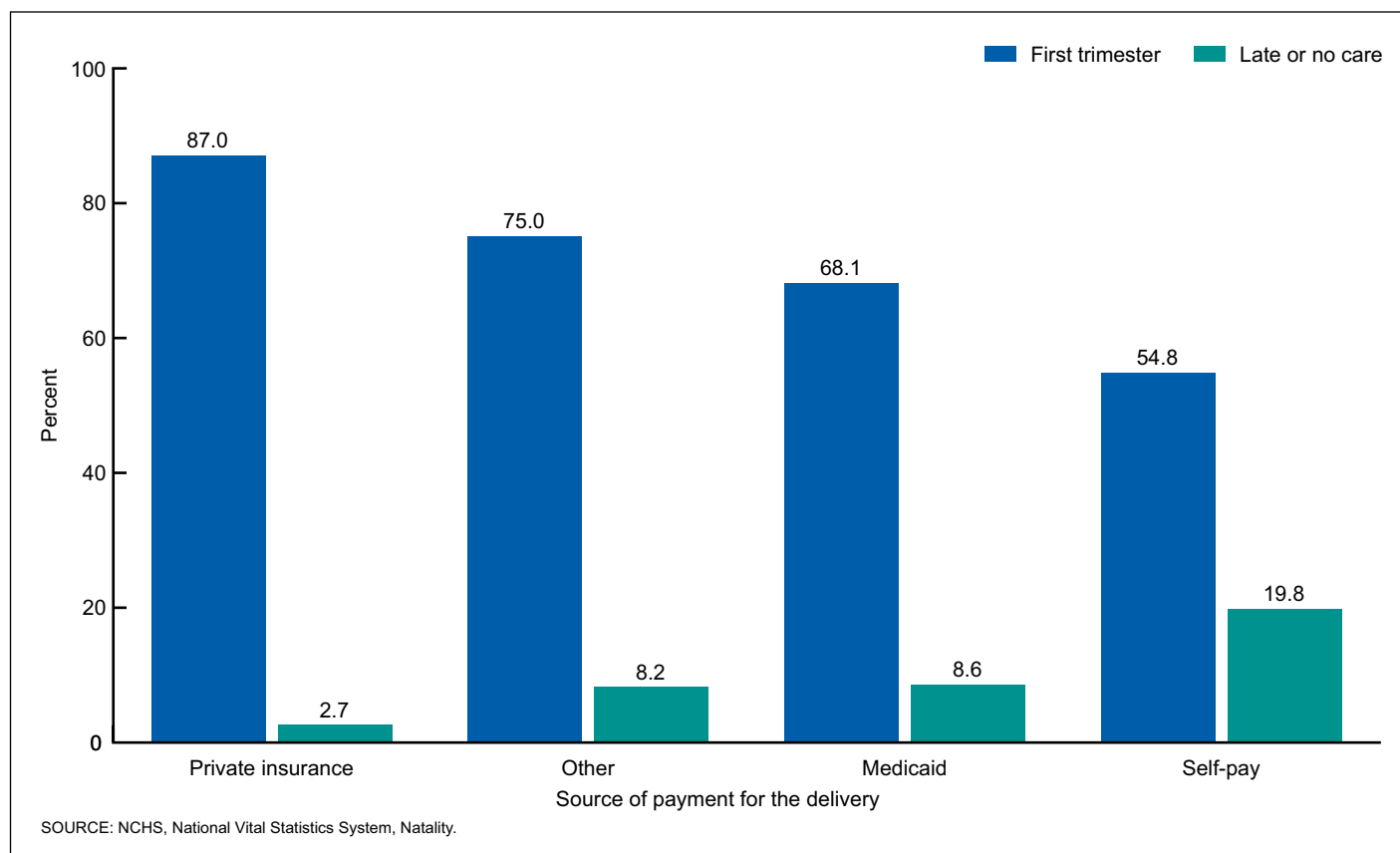
More than three out of four women (77.1%) initiated PNC in the first trimester of pregnancy in 2016 (Figure 1). Less than 5% of all women began PNC in the third trimester (late) (4.6%), and 1.6% of women received no PNC at all. **Tables 1–3** describe trimester that PNC began by selected characteristics.

- *Age of mother*—First trimester initiation and late or no PNC varied by maternal age:
  - Women in their 30s were most likely to start PNC in the first trimester of pregnancy (82.1% of women aged 30–34; 81.7% of women aged 35–39) (Table 1).
  - Mothers under age 20 were least likely to receive first trimester PNC (61.2%), particularly mothers under age 15 (36.7%).
  - The percentage receiving late or no care was highest for teen mothers (25.7% of mothers under age 15; 11.0% of mothers aged 15–19), and lowest for mothers aged 30–34 and 35–39 (4.8% each).
- *Race and Hispanic origin*—First trimester PNC initiation also varied by race and Hispanic origin:
  - Among the six largest race and Hispanic-origin groups, the percentage of mothers starting PNC in the first trimester ranged from 51.9% for non-Hispanic NHOPI women to 82.3% for non-Hispanic white women (Table 1):



**Figure 1. Trimester prenatal care began: United States, 2016**

- Among Asian subgroups, first trimester PNC ranged from 71.7% (Other Asian) to 85.5% (Japanese).
- Percentages of first trimester care for NHOPI subgroups ranged from 43.8% (Other Pacific Islander) to 72.1% (Guamanian).
- For Hispanic subgroups, first trimester care ranged from 68.1% (Central or South American) to 82.0% (Cuban).
- Late or no PNC ranged from 4.3% for non-Hispanic white women to 19.2% for non-Hispanic NHOPI women:
  - Among subgroups, the largest variation was for NHOPI, with percentages of late or no PNC ranging from 6.6% (Guamanian) to 24.8% (Other Pacific Islander).
- Among the largest race and Hispanic-origin groups, non-Hispanic white mothers were the most likely to initiate PNC in the first trimester at all ages, while non-Hispanic NHOPI women were the least likely to have first trimester PNC at all ages (Table 2).
- *Live-birth order*—First trimester PNC initiation was least common among women having a fourth or higher-order birth:
  - At least three out of four women having first (79.0%), second (80.1%), or third (75.8%) births received PNC in the first trimester compared with 66.2% of women with a fourth or higher-order birth (Table 1).
- Women having a fourth or higher-order birth were more likely to have late or no care (10.0%) compared with 5.7% and 5.1% of women having their first or second child.
- *Educational attainment*—Among women aged 25 and over (age is limited to allow for completion of education), initiation of PNC in the first trimester increased with increasing maternal education:
  - Among women with a bachelor's degree or higher, 87.6% received first trimester PNC compared with 62.7% of women with less than a high school education (Table 1).
  - Late or no PNC was most common among women with less than a high school education (11.2%) and least common among women with a bachelor's degree or higher (3.3%).
- *Source of payment for the delivery*—Receipt of first trimester PNC varied by source of payment for the delivery (payment for the delivery is not necessarily the same source of payment as for PNC):
  - Among women who self-paid for the delivery, 54.8% received PNC in the first trimester compared with 68.1% of women for whom Medicaid was the source of payment, and 87.0% of women with private insurance (Table 1 and Figure 2).



**Figure 2. Trimester prenatal care began, by source of payment for the delivery: United States, 2016**

- Levels of late or no PNC ranged from 2.7% for women with private insurance to 19.8% for women who self-paid.
- *State of residence*—First trimester initiation and late or no PNC varied by state of residence:
  - Less than 70% of women in Texas (67.0%), Arkansas (68.4%), D.C. (69.5%), and New Mexico (69.6%) received first trimester care, compared with 85%–90% in California (85.0%), New Hampshire (85.3%), Maine (85.6%), and Vermont (89.5%) (Table 3 and Figure 3).
  - Late or no care ranged from 1.6% in Vermont to 10.9% in Arkansas.

### Adequacy of PNC utilization

Patterns of PNC receipt based on the APNCU were generally similar to those of the timing of PNC initiation for all characteristics studied, including race and Hispanic origin, age, and source of payment for the delivery (Tables 4–6 and Supplemental Table 1–2).

- In 2016, three out of four women (75.6%) received at least adequate PNC, including 34.7% who received adequate-plus PNC, and 40.9% who received adequate PNC. Fifteen percent of women who received inadequate PNC (Table 4).

- Women under age 15 were least likely to receive at least adequate care (41.6%) compared with more than three out of four women aged 25 and over (76.0%–79.8%).
- Non-Hispanic white women (80.5%) were most likely to receive at least adequate PNC; non-Hispanic NHOPI (49.5%) and non-Hispanic AIAN (59.1%) women were least likely to receive at least adequate PNC:
  - Similar to the timing of PNC initiation, the largest variation among subgroups was for NHOPI women. Percentages of at least adequate PNC ranged from 42.6% (Other Pacific Islander) to 68.4% (Guamanian).
- Women having a first or second birth were more likely to receive at least adequate PNC (77.1% and 78.0%, respectively) compared with 66.5% of women with a fourth or higher-order birth.
- Women with higher educational attainment were more likely to receive at least adequate PNC—83.6% of women with a bachelor’s degree or higher had at least adequate PNC compared with 62.9% of women with less than a high school education.
- Receiving at least adequate PNC was more common among women with private insurance (83.9%) than for those in other payment groups; for example, 52.6% of women with self-pay had at least adequate PNC.
- The percentage of women with at least adequate PNC was highest in Vermont (90.9%), Maine (87.1%), and Rhode

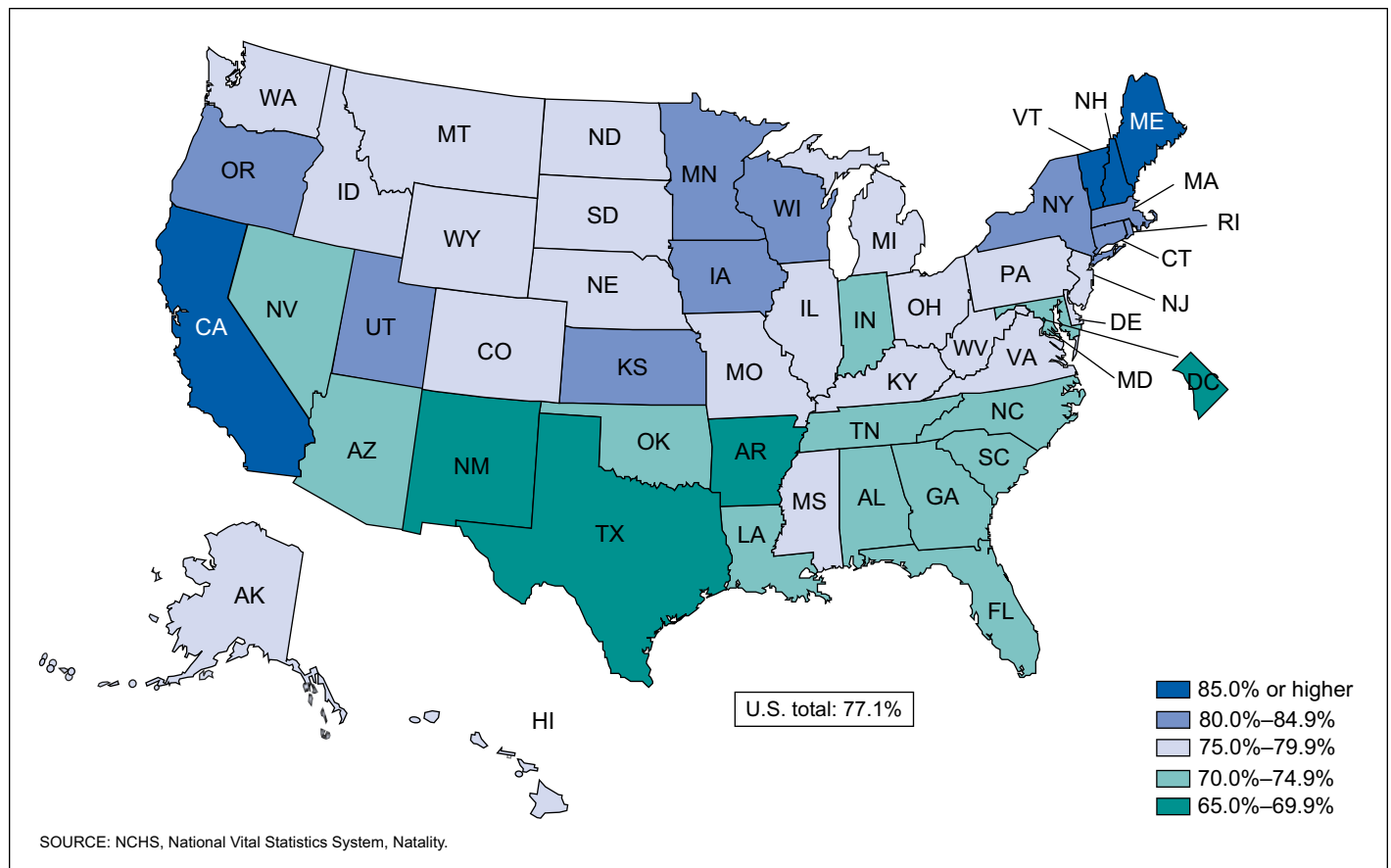


Figure 3. Prenatal care beginning in the first trimester, by state of residence: United States, 2016

Island (86.2%), and lowest in Colorado (65.1%), New Mexico (65.8%), and Hawaii (66.4%) (Table 6).

### Comparing both measures: First trimester PNC began and adequacy of PNC utilization

Figure 4 shows the relationship between the timing of PNC initiation and the adequacy of PNC, as measured by the APNCU Index.

- Among women who received first trimester PNC, 88.1% received at least adequate PNC, and 1.4% received inadequate care.
- Of the women who began PNC in the second trimester, similar percentages received at least adequate care (46.1%) and inadequate care (46.7%).
- All women with late or no PNC were classified as having inadequate care.

### Discussion

This is the first report on the timing and adequacy of PNC based on national data from the 2003 birth certificate. This study demonstrates variation in the timely receipt of PNC among U.S. women having a live birth, by age, race and Hispanic origin, education, birth order, state of residence, and source of payment for the delivery. Younger women, women with less education,

women having a fourth or higher-order birth, and non-Hispanic NHOPI, non-Hispanic AIAN, and non-Hispanic black women were the least likely to begin care in the first trimester of pregnancy or to have at least adequate PNC. Among states, a difference of 20 percentage points or more was observed in both the percentage of women who received care in the first trimester (67.0% in Texas compared with 89.5% in Vermont) and in the percentage of those with at least adequate care (65.1% in Colorado compared with 90.9% in Vermont).

Among the race and Hispanic-origin groups examined, NHOPI women were the least likely to receive care in the first trimester of pregnancy and the most likely to receive late or no care. Slightly more than one-half of all NHOPI women begin care in the first trimester (51.9%) compared with 82.3% of non-Hispanic white women; NHOPI women were more than four times as likely to have late or no care (19.2%) compared with their non-Hispanic white counterparts (4.3%). The NHOPI category includes women of Hawaiian, Guamanian, Samoan, and Other Pacific Islander origins. Analysis of these groups by trimester PNC began reveals that Hawaiian (69.9%) and Guamanian (72.1%) women, and to a lesser extent, Samoan (56.9%) women, were more likely to receive first trimester care in 2016 than all NHOPI women. The level for Other Pacific Islander (58.5% of all 2016 NHOPI births, which includes, for example, Marshallese, Kosraean, and Tongan women) was substantially lower at 43.8%. These large differences within the NHOPI

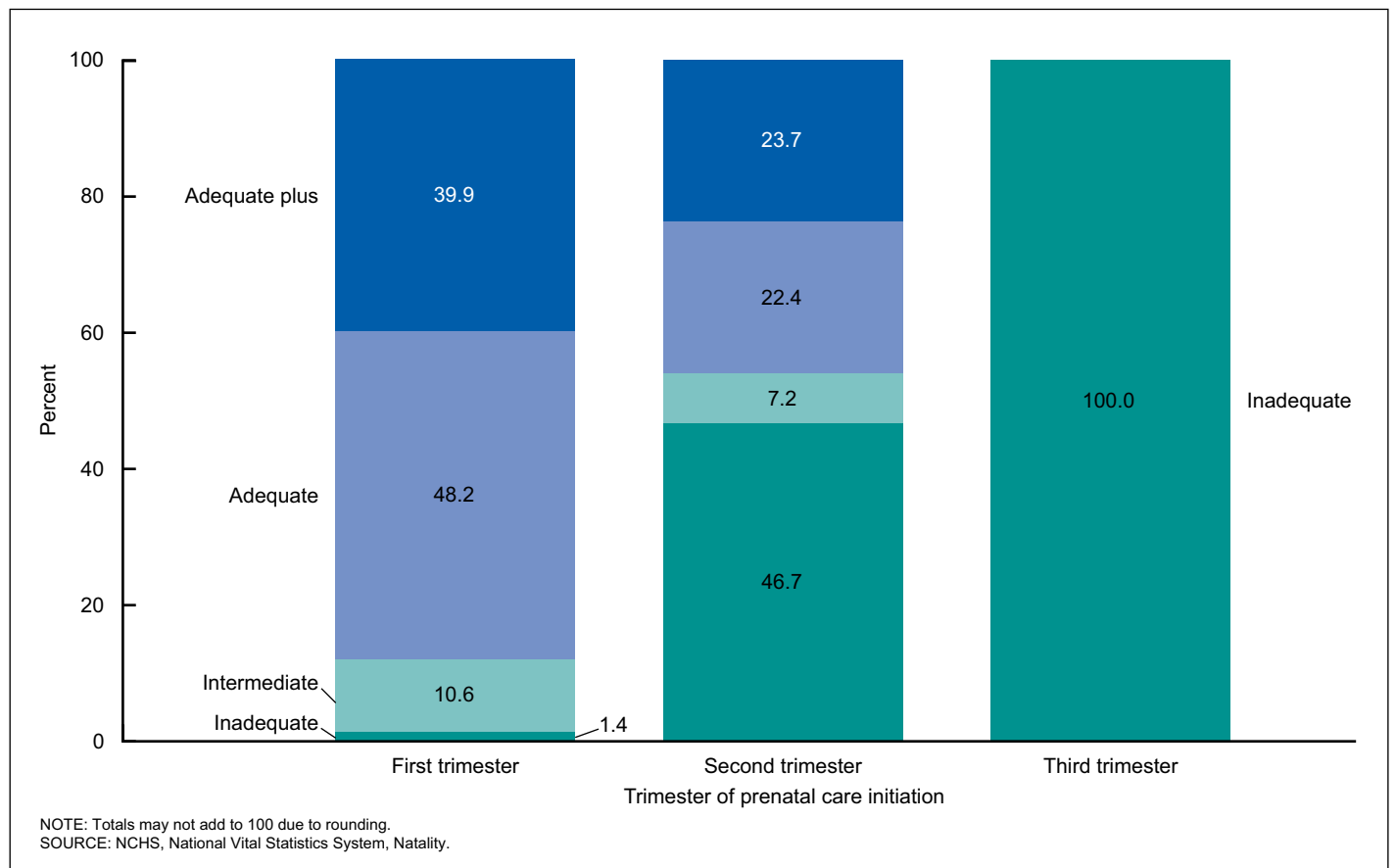


Figure 4. Trimester prenatal care began and Adequacy of Prenatal Care Utilization Index: United States, 2016

category demonstrate the usefulness of further delineating large racial and ethnic categories whenever feasible.

Another finding of this report is that most women who began care in the first trimester of pregnancy also had at least adequate care (88.1%), according to the APNCU. This indicates that the majority of women who began care in the first trimester continued with care throughout pregnancy (e.g., received at least the recommended number of PNC visits for pregnancy length), based on standard clinical recommendations. It also suggests that the simpler measure (first trimester care) may be, in some instances, a useful indicator of receipt of at least the recommended PNC.

## Limitations

### Quality of PNC data

*Missing data*—The month that PNC began was missing for 2.9% of all 2016 births (12). By state, the percentage of missing information for this item for 2016 ranged from 0.2% in Indiana, Kansas, South Carolina, and Vermont to 14.1% in Tennessee (12). The APNCU was missing for 3.6% of records, ranging from 0.3% for Indiana to 40.0% for Rhode Island. This percentage is a result of missing information for any of the components used in calculating the APNCU but is mainly attributable to the number of PNC visits. The number of PNC visits was missing for 2.8% of all 2016 birth records, with levels ranging from 0.1% in South Carolina to 38.2% in Rhode Island. Missing information on the number of PNC visits has been found to be, at least in part, the result of a lack of up-to-date records being sent to the hospital at the time of birth (17–20). Results from states with a high percentage of missing records should be viewed with caution.

*Data validity*—An earlier study based on a comparison of birth certificate data with hospital medical records in two states showed the date of the first PNC visit (both month and day) to be moderately well reported. Exact agreement for the month of the first prenatal visit was 76.6% and 79.6%; exact agreement for the day of the first visit was 71.1% and 66.5% (21). When examined according to the trimester in which PNC began, however, exact agreement rose to 83.0% and 89.5% for the two states.

Agreement for the exact total number of prenatal visits (used to calculate the APNCU but not used to calculate when the trimester care began) was classified as low (47.8%) and extremely low (22.1%) for the two states (21). When agreement was assessed within two visits, however, agreement increased to 65.0% and 84.3%. A difference of only two visits should have only a limited impact on findings because measures of adequacy are based on a percentage of the recommended number of visits.

Information on the date of the first PNC visit and the number of visits was more likely to be missing from the medical record than from the birth certificate. These findings suggest that, contrary to standard recommendations (10), information was either being asked of the mother or estimated by hospital staff (when PNC records were unavailable or out of date) (21).

### Data quality improvement efforts

A number of efforts are under way to improve the quality of the PNC and other birth certificate data. In the fall of 2016, NCHS launched an Internet-based training program for clinical and nonclinical hospital staff involved in birth certificate data collection (22). This training is aimed at raising awareness of the importance of accurate data collection, and provides best practices for collecting the correct information on the birth certificate. The training is available from the NCHS website (<https://www.cdc.gov/nchs/training/BirthCertificateElearning/>) and offers continuing education credits. NCHS is also fielding a study to assess the usefulness of the training in a hospital setting—findings from the study will be used to improve future training versions.

NCHS has also updated the “Guide to Completing the Facility Worksheets for the Certificate of Live Birth and Report of Fetal Death” (10), which is available to all hospital and state vital statistics staff members who are involved in collecting birth certificate data. The new guidebook has improved instructions for identifying the date of the first PNC visit and the number of visits, and provides guidance on what to do if information is missing.

NCHS has also collaborated on the development of national standards for the automatic transfer of medical and health birth certificate data directly from hospital electronic records to state electronic birth registration systems (23). This change would reduce, if not eliminate, problems caused by missing or out-of-date PNC records and user error related to locating complete and updated PNC information.

## Summary

The Healthy People 2020 (HP 2020) goal is for 77.9% of pregnant women to receive care in the first trimester of pregnancy (24), a target only about 1% higher than the 2016 national level of 77.1%. This target may be achievable for the United States as a whole but may be less achievable for certain subpopulations. For example, levels for NHOPI, AIAN, and non-Hispanic black women would need to rise by 34%, 20%, and 15%, respectively, to achieve the 2020 target. An important advantage of vital statistics data is the availability of detailed information on smaller population groups (e.g., births to mothers under age 15, births to NHOPI women). The availability of comparable national vital statistics on PNC data will enhance tracking of progress toward the HP 2020 goals and can potentially improve the ability to identify and target groups with less than the recommended levels of care.

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(Available from: [https://www.cdc.gov/nchs/data/nvsr/nvsr67/nvsr67\\_03\\_tables.pdf](https://www.cdc.gov/nchs/data/nvsr/nvsr67/nvsr67_03_tables.pdf))

- I–1. Prenatal care beginning in the first trimester, by source of payment and age and race and Hispanic origin of mother: United States, 2016
- I–2. At least adequate prenatal care utilization, by source of payment and age and race and Hispanic origin of mother: United States, 2016

**Table 1. Trimester prenatal care began, by selected characteristics: United States, 2016**

Selected characteristic	Timing of PNC				
	First trimester	Second trimester	Late or no PNC <sup>1</sup>		
			Total	Late PNC <sup>2</sup>	No PNC
Percent					
Total .....	77.1	16.7	6.2	4.6	1.6
Age of mother					
Under 20 .....	61.2	27.6	11.2	8.3	2.9
Under 15 .....	36.7	37.6	25.7	19.2	6.5
15–19 .....	61.5	27.5	11.0	8.2	2.9
20–24 .....	70.3	21.7	8.0	5.9	2.1
25–29 .....	77.8	16.3	6.0	4.4	1.5
30–34 .....	82.1	13.1	4.8	3.6	1.2
35–39 .....	81.7	13.5	4.8	3.6	1.2
40 and over .....	78.4	16.0	5.6	4.1	1.5
Race and Hispanic origin					
Non-Hispanic, single-race:					
White .....	82.3	13.4	4.3	3.3	1.1
Black .....	66.5	23.5	10.0	7.0	3.0
American Indian or Alaska Native .....	63.0	24.5	12.5	9.2	3.3
Asian .....	80.6	14.0	5.4	4.6	0.8
Asian Indian .....	83.4	12.1	4.6	3.9	0.7
Chinese .....	81.2	11.4	7.4	6.9	0.5
Filipino .....	82.8	13.4	3.8	3.0	0.8
Japanese .....	85.5	10.5	4.0	3.2	0.8
Korean .....	85.3	10.6	4.1	3.4	0.7
Vietnamese .....	80.2	15.3	4.5	3.3	1.2
Other Asian .....	71.7	22.0	6.3	5.0	1.3
Native Hawaiian or Other Pacific Islander .....	51.9	28.9	19.2	14.2	5.0
Hawaiian .....	69.9	20.5	9.6	6.0	3.6
Guamanian .....	72.1	21.4	6.6	5.0	1.6
Samoan .....	56.9	29.1	14.0	10.4	3.6
Other Pacific Islander .....	43.8	31.3	24.8	18.4	6.4
Hispanic .....	72.0	20.3	7.7	5.6	2.1
Mexican .....	71.4	20.6	8.0	5.7	2.3
Puerto Rican .....	76.2	18.1	5.7	4.3	1.4
Cuban .....	82.0	14.1	3.8	2.9	0.9
Central or South American .....	68.1	22.7	9.2	6.9	2.2
Other and unknown Hispanic .....	74.3	18.8	6.8	5.1	1.7
Live-birth order					
1st birth .....	79.0	15.3	5.7	4.4	1.3
2nd birth .....	80.1	14.8	5.1	3.9	1.2
3rd birth .....	75.8	18.0	6.2	4.6	1.6
4th birth or higher .....	66.2	23.8	10.0	6.7	3.3
Educational attainment <sup>3,4</sup>					
Less than high school .....	62.7	26.1	11.2	7.5	3.7
High school .....	73.4	19.5	7.2	5.0	2.2
Some college <sup>5</sup> .....	80.2	15.1	4.7	3.5	1.2
Bachelor's degree or higher .....	87.6	9.1	3.3	2.8	0.5
Source of payment for the delivery					
Medicaid .....	68.1	23.3	8.6	6.4	2.2
Private insurance .....	87.0	10.3	2.7	2.1	0.6
Self-pay .....	54.8	25.4	19.8	13.2	6.6
Other <sup>6</sup> .....	75.0	16.8	8.2	5.8	2.3

<sup>1</sup>PNC that began in the third trimester and no PNC.<sup>2</sup>PNC that began in the third trimester.<sup>3</sup>Excludes women under age 25.<sup>4</sup>Significantly increasing trend in first trimester PNC by educational attainment ( $p < 0.05$ ).<sup>5</sup>Includes associate's degree.<sup>6</sup>Includes Indian Health Service, CHAMPUS (Civilian Health and Medical Program of the Uniformed Services) or TRICARE, other government (federal, state, or local), and charity.NOTES: PNC is prenatal care. Chi-squared test statistics for each variable by trimester prenatal care began were statistically significant ( $p < 0.05$ ).

SOURCE: NCHS, National Vital Statistics System, Natality.



**Table 2. Trimester prenatal care began, by age and race and Hispanic origin of mother: United States, 2016**

Prenatal care	Age of mother					
	Under 20	20–24	25–29	30–34	35–39	40 and over
First trimester	Percent					
Non-Hispanic:						
White .....	68.7	75.2	82.4	86.1	85.8	82.8
Black .....	53.8	63.2	67.8	70.8	71.6	68.6
American Indian or Alaska Native.....	52.7	61.0	64.7	66.1	67.5	66.0
Asian .....	51.0	67.1	78.0	83.1	84.1	81.6
Native Hawaiian or Other Pacific Islander .....	38.5	46.2	54.3	56.5	54.5	54.4
Hispanic .....	58.2	67.9	73.9	76.4	76.2	73.5
Late or no PNC <sup>1</sup>						
Non-Hispanic:						
White .....	7.7	6.1	4.4	3.4	3.4	4.2
Black .....	13.7	10.4	9.4	9.4	9.0	9.7
American Indian or Alaska Native.....	15.1	12.5	12.3	12.4	11.2	9.9
Asian .....	14.4	8.5	6.3	4.8	4.5	4.9
Native Hawaiian or Other Pacific Islander .....	24.6	22.2	17.3	17.8	18.1	18.0
Hispanic .....	13.3	9.1	7.1	6.2	6.0	6.5

<sup>1</sup>PNC that began in the third trimester or no PNC.

NOTES: PNC is prenatal care. Chi-squared test statistics for each variable by trimester prenatal care began were statistically significant ( $p < 0.05$ ).

SOURCE: NCHS, National Vital Statistics System, Natality.

**Table 3. Trimester prenatal care began, by mother's state of residence: United States, 2016**

State of residence	Timing of PNC					
	First trimester	Second trimester	Late or no PNC <sup>1</sup>			Unknown
			Total	Late PNC <sup>2</sup>	No PNC	
Percent						
Alabama	71.8	21.0	7.2	5.1	2.1	0.4
Alaska	75.0	19.1	5.8	5.0	0.8	1.7
Arizona	73.2	18.3	8.6	6.1	2.5	2.3
Arkansas	68.4	20.7	10.9	7.8	3.1	11.7
California	85.0	11.2	3.8	3.0	0.7	1.6
Colorado	77.4	16.4	6.2	4.7	1.5	1.8
Connecticut	84.1	12.3	3.6	3.3	0.3	2.7
Delaware	78.8	14.8	6.4	4.0	2.4	1.5
District of Columbia	69.5	21.1	9.4	7.2	2.2	2.2
Florida	74.9	18.3	6.8	4.9	1.9	5.9
Georgia	74.8	17.0	8.2	4.8	3.4	4.9
Hawaii	75.9	16.4	7.7	6.0	1.7	3.5
Idaho	79.0	16.6	4.5	3.8	0.6	0.6
Illinois	77.6	16.6	5.8	4.4	1.4	3.9
Indiana	73.8	20.2	6.0	4.6	1.4	0.2
Iowa	81.1	14.5	4.4	3.6	0.7	0.5
Kansas	82.8	13.4	3.8	2.8	0.9	0.2
Kentucky	79.0	15.4	5.7	4.2	1.5	3.8
Louisiana	74.6	18.4	7.0	4.3	2.6	3.1
Maine	85.6	11.0	3.3	2.9	0.4	0.3
Maryland	72.0	20.2	7.8	6.3	1.5	6.8
Massachusetts	84.4	11.1	4.5	3.9	0.6	2.2
Michigan	79.8	15.5	4.7	3.3	1.5	2.8
Minnesota	81.8	14.2	3.9	3.3	0.6	1.5
Mississippi	78.3	17.0	4.7	3.5	1.3	1.7
Missouri	77.6	17.0	5.4	4.1	1.3	5.5
Montana	75.3	18.3	6.5	5.4	1.1	0.4
Nebraska	78.1	16.5	5.4	4.0	1.5	1.8
Nevada	73.1	18.7	8.2	3.4	4.9	5.1
New Hampshire	85.3	11.1	3.6	3.1	0.5	0.5
New Jersey	76.5	17.7	5.8	4.2	1.6	1.9
New Mexico	69.6	19.6	10.8	7.6	3.2	3.0
New York	80.7	14.2	5.1	4.5	0.5	2.2
North Carolina	74.9	19.1	6.0	4.4	1.6	0.6
North Dakota	78.1	16.0	5.9	5.5	0.3	4.3
Ohio	75.4	18.2	6.4	4.9	1.5	1.4
Oklahoma	72.8	19.9	7.3	5.5	1.8	2.3
Oregon	81.2	14.4	4.4	3.6	0.8	0.7
Pennsylvania	77.3	16.5	6.2	4.7	1.5	2.9
Rhode Island	84.9	13.4	1.7	1.3	0.4	5.3
South Carolina	72.0	20.8	7.2	5.7	1.5	0.2
South Dakota	76.8	17.6	5.7	4.9	0.8	1.0
Tennessee	74.2	19.7	6.1	4.5	1.6	14.1
Texas	67.0	22.6	10.4	7.0	3.5	1.6
Utah	82.1	13.9	3.9	3.5	0.5	0.9
Vermont	89.5	8.8	1.6	1.1	0.5	0.2
Virginia	79.9	15.7	4.4	3.5	1.0	4.6
Washington	77.5	16.2	6.3	5.2	1.1	4.8
West Virginia	79.2	15.1	5.7	4.3	1.4	0.8
Wisconsin	82.5	13.4	4.1	3.5	0.6	2.7
Wyoming	77.8	17.3	4.9	3.9	1.1	1.2

<sup>1</sup>PNC that began in the third trimester and no PNC.<sup>2</sup>PNC that began in the third trimester.

NOTE: PNC is prenatal care.

SOURCE: NCHS, National Vital Statistics System, Natality.

**Table 4. Adequacy of prenatal care utilization, by selected characteristics: United States, 2016**

Selected characteristic	At least adequate <sup>1</sup>				
	Total	Adequate <sup>2</sup>	Adequate plus <sup>3</sup>	Intermediate <sup>4</sup>	Inadequate <sup>5</sup>
	Percent				
Total.....	75.6	40.9	34.7	9.3	15.0
Age of mother					
Under 20.....	62.9	34.4	28.5	9.8	27.3
Under 15.....	41.6	21.9	19.7	6.7	51.7
15–19.....	63.1	34.5	28.6	9.9	27.0
20–24.....	69.9	38.3	31.6	10.0	20.1
25–29.....	76.0	41.9	34.1	9.4	14.6
30–34.....	79.4	43.6	35.8	9.2	11.4
35–39.....	79.8	41.0	38.7	8.8	11.4
40 and over.....	79.0	35.5	43.5	7.7	13.4
Race and Hispanic origin					
Non-Hispanic, single-race:					
White.....	80.5	43.7	36.9	8.4	11.0
Black.....	66.4	33.4	33.0	10.2	23.4
American Indian or Alaska Native.....	59.1	33.5	25.6	12.2	28.7
Asian.....	77.5	44.7	32.8	9.8	12.7
Asian Indian.....	79.9	45.2	34.8	9.2	10.9
Chinese.....	76.6	46.9	29.7	9.8	13.6
Filipino.....	78.8	43.0	35.7	10.9	10.3
Japanese.....	80.4	45.9	34.5	10.6	9.0
Korean.....	80.4	47.5	32.8	10.0	9.6
Vietnamese.....	77.5	45.5	32.0	10.7	11.8
Other Asian.....	72.4	40.3	32.1	9.7	17.9
Native Hawaiian or Other Pacific Islander.....	49.5	28.3	21.1	11.8	38.7
Hawaiian.....	65.9	37.9	28.0	12.1	22.0
Guamanian.....	68.4	36.7	31.6	13.6	18.0
Samoan.....	52.5	30.1	22.5	14.3	33.1
Other Pacific Islander.....	42.6	24.8	17.8	10.4	46.9
Hispanic.....	70.8	38.9	31.9	10.6	18.7
Mexican.....	70.3	38.9	31.4	10.6	19.0
Puerto Rican.....	72.7	38.3	34.5	11.5	15.8
Cuban.....	81.1	38.8	42.2	8.2	10.7
Central or South American.....	67.8	37.9	29.8	10.6	21.6
Other and unknown Hispanic.....	73.0	39.7	33.2	10.0	17.0
Live-birth order					
1st birth.....	77.1	41.6	35.5	9.2	13.7
2nd birth.....	78.0	42.9	35.0	9.2	12.9
3rd birth.....	74.8	40.3	34.5	9.4	15.8
4th birth or higher.....	66.5	34.7	31.8	10.0	23.5
Educational attainment <sup>6,7</sup>					
Less than high school.....	62.9	33.2	29.7	10.9	26.2
High school.....	73.0	38.7	34.3	9.6	17.4
Some college <sup>8</sup> .....	79.2	41.2	38.0	8.6	12.2
Bachelor's degree or higher.....	83.6	46.6	37.0	8.8	7.6
Source of payment for the delivery					
Medicaid.....	68.9	36.3	32.5	9.6	21.5
Private insurance.....	83.9	45.7	38.2	8.5	7.5
Self-pay.....	52.6	33.2	19.4	12.7	34.8
Other <sup>9</sup> .....	68.9	38.4	30.4	13.3	17.8

<sup>1</sup>Based on the Adequacy of Prenatal Care Utilization Index.<sup>2</sup>Prenatal care beginning by the fourth month of pregnancy and including 80%–109% of the recommended number of visits.<sup>3</sup>Prenatal care beginning by the fourth month of pregnancy and including 110% or more of the recommended number of visits.<sup>4</sup>Prenatal care beginning by the fourth month of pregnancy and including 50%–79% of the recommended number of visits.<sup>5</sup>Prenatal care beginning after the fourth month of pregnancy or including less than 50% of the recommended number of visits.<sup>6</sup>Excludes women under age 25.<sup>7</sup>Significantly increasing trend in at least adequate PNC by educational attainment ( $p < 0.05$ ).<sup>8</sup>Includes associate's degree.<sup>9</sup>Includes Indian Health Service, CHAMPUS (Civilian Health and Medical Program of the Uniformed Services) or TRICARE, other government (federal, state, or local), and charity.NOTE: Chi-squared test statistics for each variable by adequacy of prenatal care utilization were statistically significant ( $p < 0.05$ ).

SOURCE: NCHS, National Vital Statistics System, Natality.

**Table 5. Adequacy of prenatal care utilization, by age and race and Hispanic origin of mother: United States, 2016**

Adequacy of prenatal care utilization <sup>1</sup>	Age of mother					
	Under 20	20–24	25–29	30–34	35–39	40 and over
At least adequate <sup>2</sup>	Percent					
Non-Hispanic:						
White .....	71.7	75.6	80.6	83.0	83.3	82.4
Black .....	54.8	62.9	67.4	70.1	71.9	71.6
American Indian or Alaska Native.....	49.9	57.4	59.9	62.0	64.0	69.5
Asian .....	53.6	67.6	75.2	79.0	80.5	81.0
Native Hawaiian or Other Pacific Islander .....	38.1	43.2	51.1	54.8	52.4	53.3
Hispanic .....	59.1	66.5	72.0	74.8	75.6	75.4
Inadequate <sup>3</sup>						
Non-Hispanic:						
White .....	20.2	15.8	11.1	8.4	8.5	10.2
Black .....	34.3	26.1	22.3	20.2	19.2	20.8
American Indian or Alaska Native.....	36.6	29.8	27.7	26.8	24.9	22.8
Asian .....	36.5	21.9	14.7	10.9	10.1	11.2
Native Hawaiian or Other Pacific Islander .....	48.9	44.9	36.0	33.7	38.0	38.5
Hispanic .....	30.0	22.2	17.2	15.0	14.9	16.4

<sup>1</sup>Based on the Adequacy of Prenatal Care Utilization Index.

<sup>2</sup>Prenatal care beginning by the fourth month of pregnancy and including at least 80% of the recommended number of visits.

<sup>3</sup>Prenatal care beginning after the fourth month of pregnancy or including less than 50% of the recommended number of visits.

NOTE: Chi-squared test statistics for each variable by adequacy of prenatal care utilization were statistically significant ( $p < 0.05$ ).

SOURCE: NCHS, National Vital Statistics System, Natality.

**Table 6. Adequacy of prenatal care utilization, by mother's state of residence: United States, 2016**

State of residence	Adequacy of prenatal care utilization <sup>1</sup>					
	At least adequate			Intermediate <sup>4</sup>	Inadequate <sup>5</sup>	Unknown
	Total	Adequate <sup>2</sup>	Adequate plus <sup>3</sup>			
Percent						
Alabama	74.5	41.1	33.4	7.7	17.8	0.6
Alaska	68.2	38.6	29.6	14.5	17.2	3.2
Arizona	71.4	40.9	30.6	9.7	18.9	2.3
Arkansas	69.1	39.9	29.2	7.9	23.0	12.5
California	78.8	44.8	33.9	11.7	9.6	2.3
Colorado	65.1	40.6	24.5	19.2	15.7	1.8
Connecticut	80.5	38.6	41.9	8.4	11.1	3.2
Delaware	75.9	47.5	28.4	8.3	15.7	1.5
District of Columbia	67.8	39.7	28.1	10.5	21.7	2.9
Florida	71.2	39.6	31.6	12.2	16.6	6.7
Georgia	74.0	36.7	37.2	8.5	17.5	4.9
Hawaii	66.4	39.8	26.6	16.1	17.5	6.0
Idaho	79.8	45.2	34.6	8.2	11.9	1.0
Illinois	76.3	38.9	37.3	8.9	14.8	4.7
Indiana	78.5	38.8	39.7	5.7	15.8	0.3
Iowa	85.2	41.9	43.3	3.6	11.2	0.6
Kansas	83.6	56.2	27.4	6.3	10.1	0.4
Kentucky	78.8	37.3	41.5	7.3	14.0	3.8
Louisiana	75.7	35.7	39.9	7.9	16.4	3.6
Maine	87.1	40.3	46.9	3.8	9.0	0.4
Maryland	68.2	37.8	30.4	12.2	19.6	7.9
Massachusetts	83.9	45.7	38.2	5.9	10.2	4.0
Michigan	80.3	38.7	41.6	7.2	12.5	3.7
Minnesota	79.1	46.7	32.5	9.6	11.2	1.8
Mississippi	80.9	35.2	45.7	5.8	13.2	2.1
Missouri	79.3	45.0	34.3	6.2	14.5	8.1
Montana	75.1	44.3	30.8	8.8	16.1	0.5
Nebraska	76.2	43.4	32.9	9.5	14.3	2.0
Nevada	74.8	38.7	36.1	7.8	17.4	5.9
New Hampshire	84.9	40.9	44.0	5.7	9.4	0.6
New Jersey	72.5	44.1	28.5	12.5	15.0	1.9
New Mexico	65.8	41.8	24.0	11.3	22.9	3.4
New York	75.8	45.2	30.6	11.7	12.5	2.9
North Carolina	77.8	29.5	48.3	6.2	16.0	0.8
North Dakota	79.7	52.3	27.4	6.7	13.6	4.7
Ohio	75.9	35.4	40.4	7.7	16.5	1.6
Oklahoma	73.2	44.0	29.2	9.0	17.8	2.6
Oregon	79.6	46.9	32.8	8.7	11.6	1.2
Pennsylvania	75.5	40.5	35.0	8.9	15.6	3.8
Rhode Island	86.2	43.7	42.5	7.8	6.0	40.0
South Carolina	76.0	29.6	46.3	6.0	18.0	0.2
South Dakota	75.7	48.1	27.7	8.5	15.8	1.1
Tennessee	74.2	40.7	33.4	9.6	16.2	19.1
Texas	68.1	37.6	30.5	9.4	22.4	1.7
Utah	83.9	54.3	29.7	5.9	10.2	1.3
Vermont	90.9	47.6	43.3	4.2	4.9	0.3
Virginia	79.8	43.5	36.4	7.9	12.3	4.7
Washington	74.4	43.6	30.8	10.4	15.2	6.2
West Virginia	79.8	36.4	43.4	6.2	14.0	1.3
Wisconsin	83.6	41.8	41.8	5.4	11.0	3.8
Wyoming	74.6	43.8	30.8	11.3	14.1	1.2

<sup>1</sup>Based on the Adequacy of Prenatal Care Utilization Index.<sup>2</sup>Prenatal care beginning by the fourth month of pregnancy and including 80%–109% of the recommended number of visits.<sup>3</sup>Prenatal care beginning by the fourth month of pregnancy and including 110% or more of the recommended number of visits.<sup>4</sup>Prenatal care beginning by the fourth month of pregnancy and including 50%–79% of the recommended number of visits.<sup>5</sup>Prenatal care beginning after the fourth month of pregnancy or including less than 50% of the recommended number of visits.

SOURCE: NCHS, National Vital Statistics System, Natality.

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