# South Dakota
# Pregnancy Risk Assessment Monitoring System (PRAMS)-Like
# 2014 Data Report

# Acknowledgements

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# Introduction

**Quote from a 2014 SD PRAMS mother:**

*"I think it's awesome that there are surveys out here that are made to help the health of new moms and babies."*

The health status of South Dakotans is commonly reported from public health surveillance surveys. Surveys such as the Behavioral Risk Factor Surveillance System (BRFSS) provide information that is used by policy makers, public health professionals, advocacy groups, health care organizations, and others to develop initiatives to improve the health of the population. South Dakota has one of the highest infant mortality rates in the U.S., ranking in the bottom half of states, yet there are little data available on factors that influence health behaviors and attitudes of mothers that can ultimately influence birth outcomes. The Pregnancy Risk Assessment Monitoring System (PRAMS) survey is a Centers for Disease Control and Prevention (CDC) recommended tool to provide this type of information.

The CDC established the PRAMS in 1987 to obtain information about maternal behavior and experiences that may be associated with adverse birth outcomes. The survey is disseminated to women who have recently given birth to live-born infants. In 2014, 40 states participated in PRAMS and provided data to the CDC. South Dakota has not been funded by CDC and has not conducted a statewide PRAMS. In 2007, however, a Tribal PRAMS was conducted that included all South Dakota American Indian births over a 6-month period.

In 2013 the South Dakota Department of Health contracted with the Ethel Austin Martin Program at South Dakota State University to conduct a statewide PRAMS-like survey during 2014. It was decided that the 2014 South Dakota PRAMS would follow the CDC PRAMS protocol. A random sample of South Dakota residents who delivered a live-born infant in 2014 was selected from birth certificate files to complete the survey through mail, online website or by telephone. American Indian and other race infants were oversampled to ensure sufficient numbers to obtain reliable estimates. Data were collected on a variety of topics that included: intendedness of pregnancy, access to prenatal care, health insurance, infant sleeping positions, medical problems during pregnancy, delivery of the infant, and health-related behaviors of the mother (e.g., smoking and alcohol use). The majority of the questions came from the CDC PRAMS core and standardized questions. In addition, questions about adverse childhood experiences (ACE) were added due to the increasing recognition of the role of stress in early life on adult behaviors and health. Questions about illegal drug use during the three months prior to pregnancy also were added in August of 2014.

The 2014 PRAMS provides information for South Dakota to assess overall pregnancy experiences and maternal health behaviors, and data from the PRAMS may be used to develop, modify, or evaluate programs for new mothers and their children. Furthermore, the PRAMS will provide useful baseline data to assess future trends in problematic areas. The 2014 PRAMS was implemented to collect this information and to demonstrate the statewide capacity to successfully conduct the PRAMS in South Dakota.

# Executive Summary

The South Dakota Department of Health, in conjunction with the EA Martin Program at South Dakota State University, conducted a 2014 Pregnancy Risk Assessment Monitoring System (PRAMS)-like surveillance project. The 2014 South Dakota PRAMS-like survey was a statewide population-based survey based on a stratified random sample of women who gave birth to a live-born infant, thereby allowing rates to be estimated for South Dakota mothers giving birth in 2014. The topics included in this survey were selected to enhance our understanding of maternal attitudes and behaviors around the time of pregnancy and the weighted response rate was 71.3%. Key findings by major focus areas include:

**Health Insurance and Access to Services**

- More than 50% of South Dakota mothers had job-based insurance before pregnancy, during pregnancy, and at delivery. 18.6% of the South Dakota mothers had no health care coverage prior to their pregnancy.
- 11.3% of mothers reported receiving Medicaid before pregnancy, 26.0% during their pregnancy and 28.4% at the time of delivery. 35.5% reported that Medicaid covered their infant.
- 36.6% of South Dakota mothers received Supplemental Nutrition Program for Women, Infants and Children (WIC) services during their most recent pregnancy.

**Preconception Care, Topics Discussed Prior to Pregnancy and Health-Related Actions Prior to Pregnancy**

- 67.2% of South Dakota mothers did not talk to a health care worker about how to prepare for a healthy pregnancy prior to their most recent pregnancy.
- Percentage of mothers who did not talk to a health care worker prior to pregnancy differed by insurance status and was highest among younger mothers, unmarried mothers, and low-income mothers.

**Intendedness of Pregnancy and Current Birth Control**

- 46.1% of South Dakota births were unintended (not trying to become pregnant). When all characteristics were considered together the ones that remained important predictors of unintended pregnancy were being a young mother, being unmarried, and having a low household income. Of those not trying to get pregnant, 59.7% were not doing anything to keep from getting pregnant.
- Of South Dakota mothers who delivered in 2014, 27.9% stated that they wanted to be pregnant later and 8.6% stated they did not want to be pregnant then or at any time in the future.
- At the time of the survey, 82.0% of mothers stated they were currently doing something to prevent pregnancy. Among those not currently doing anything to prevent pregnancies, the main reason stated was that they did not want to use birth control (37.3%).

**Prenatal Care**

- 73.2% of South Dakota mothers began prenatal care in the first trimester and 94.3% began care in the first or second trimester.
- 87.3% of mothers were able to begin prenatal care as early as they wanted, but this varied by race with 92.5%, 65.3%, and 78.8% of white, American Indian and other race mothers, respectively. The main reasons for not getting prenatal care as early as they wanted varied by race.
- 79.2% of mothers received adequate prenatal care (attended more than 80% of expected visits) and this varied by race: 83.5%, 53.6% and 75.6% for white, American Indian and other race mothers, respectively. Higher rates of adequate prenatal care were seen among more educated mothers, married mothers, insured mothers, and higher income mothers. Similar results were found for initiation of prenatal care during the first trimester.

**Substance Use During Pregnancy**

*Tobacco Use*

- 86.9% of mothers did not smoke during the last three months of pregnancy. Of the 13.1% who did smoke during this time, the majority smoked 5 cigarettes per day or less. Those who smoked were more likely to have a preterm or low birthweight infant compared to those who did not smoke.
- Although American Indian mothers were more likely to have smoked in the last two years than white mothers (64.3% vs. 24.3% respectively), they were more likely to quit when they found out they were pregnant (44.9% vs. 33.3%) and if they continued to smoke, they tended to smoke fewer cigarettes than white and other race mothers.

*Alcohol Use*

- 68.8% of South Dakota mothers drank during the three months before pregnancy, with 36.1% having at least one episode of binge drinking. A higher percentage of white mothers (76.5%) drank the three months before pregnancy than American Indian and other race mothers (49.5% & 37.9% respectively).

- 8.7% of South Dakota mothers consumed alcohol in the last three months of pregnancy, with 1.2% having at least one episode of binge drinking. A higher percentage of white mothers (9.6%) drank the last three months of pregnancy than American Indian and other race mothers (5.0% & 6.8% respectively).

**Maternal Health during Pregnancy**

- 48.3% of South Dakota mothers were overweight or obese and 51.6% gained excessive weight during pregnancy.
- White mothers self-reported a lower prevalence of gestational diabetes (9.9%) than Other Race mothers (15.2%). American Indian mothers had a prevalence of 10.4%. Self-reported gestational diabetes was more prevalent in older mothers than younger mothers (24.3% in 35 years or older vs. 8.1% in less than 20 years).

**Breastfeeding**

- 87.9% of mothers breastfed or pumped breast milk for their infant, even for a short period of time and this varied by race: 90.8% for white, 75.5% for American Indian, and 84.4% for other race mothers.
- The main reason for stopping breastfeeding was the mother believed she was not producing enough milk.

**Postpartum Health and Infant Sleep Position**

- 17.4% of South Dakota mothers were classified as having depression. The risk of depression was higher among American Indian mothers, unmarried mothers, and mothers with an annual household income of less than $10,000. Mothers with depression were less likely to have been trying to become pregnant and less likely to ever breastfeed than mothers without depression.
- 12.4% of women indicated that a doctor, nurse, or other health care worker did not talk to them about postpartum depression since the birth of their baby.
- 86.7% of South Dakota mothers reported that they most often placed their baby to sleep on his/her back and this differed by race: 86.8% and 90.9% of white and American Indian mothers placed their infant on his/her back, while only 79.9% of mothers of other races reported placing their infant on his/her back.

**Stress, Social Supports and Domestic Abuse**

*Stressful events*

- 64.8% of mothers reported at least one stressful life event during the year prior to their most recent live birth, with 23% reporting three or more stressors. Financial stresses (moving to a new address, husband or partner lost job, mother lost job, had a lot of bills that couldn't pay) in the 12 months prior to giving birth were the most common type of stress (44.5%), followed by emotional stresses (very sick close family member, someone very close died) (29.9%).
- Having three or more stressors in the year prior to birth was independently associated with: being American Indian, a young maternal age, less maternal education, being unmarried and having a low household income. Mothers with three or more stressors were more likely to have an unintended pregnancy (75.0% vs. 33.6%), never breastfeed (18.8% vs. 9.0%), not begin prenatal care in the first trimester (37.7% vs. 25.2%), and were more likely to smoke during the past two years (56.8% vs. 15.5%) than mothers who had less than three stressors.

*Domestic abuse during and after pregnancy*

- South Dakota mothers experienced domestic abuse more often during pregnancy (7.4%) compared with after delivery (4.6%). The most common domestic abuse event either during, after or both before and after pregnancy included being controlled by the husband or partner (5.8%).
- When population characteristics were considered together only unmarried mothers and mothers with low household incomes had increased risk of domestic abuse during pregnancy; low household income was associated with abuse after pregnancy.
- Mothers who experienced domestic abuse during pregnancy had a higher rate of unintended pregnancy (71.3% vs. 43.9%), did not begin prenatal care in the first trimester (40.0% vs. 25.8%), and smoked in the last two years (69.6% vs. 27.5%) compared to mothers who did not experience abuse. In addition, risk of preterm birth and having a low birthweight baby were more likely among women who experienced domestic abuse during pregnancy compared to women who did not (14.7% vs. 6.6% for preterm birth and 13.8% vs. 4.9% for low birthweight infant).

*Social supports after delivery*

- More than 90% of the mothers reported having someone to help if they were tired, needed someone to take care of the baby, talk with, help if they were sick or loan them money. Family members were the main source of social support.

**Adverse Childhood Experiences (ACEs):** ACEs include 10 questions related to adverse childhood experiences (three on abuse, two on neglect, and five on household dysfunction). Adverse health outcomes have been reported in adults with ACE scores of four or greater.

- 17.5% of South Dakota mothers experienced four or more ACEs. The prevalence of mothers with high ACE Scores (4+) was higher among American Indian mothers, Hispanic mothers, younger mothers, less educated mothers, unmarried mothers, and mothers in households with low income.
- The most frequent ACE was parental divorce or separation (39.8%) followed by household substance abuse (25.8%).
- Mothers with higher ACE Scores were more likely to have smoked in the previous two years, used illicit drugs the three months prior to pregnancy, have shorter gestation, and increased prevalence of depression than mothers with low ACE Scores.

# Methodology

PRAMS is a population-based surveillance system developed by the CDC that is conducted by surveying mothers with infants between two and six months of age. The 2014 South Dakota PRAMS-like survey sample was derived from birth certificate data (stillbirths and fetal deaths were not included). The following exclusions were used when sampling 2014 births:

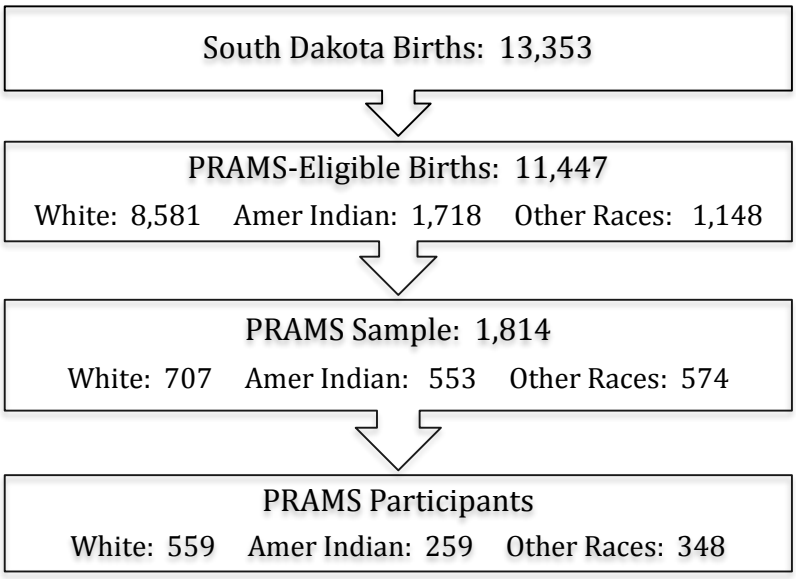
- Mothers less than 14 years of age
- Out-of-state births to residents
- In-state births to non-residents
- Missing key information (such as mother's last name or mother's mailing address)
- Delayed processing of birth certificates (>6 months after birth)
- All but one infant from twin and triplet births
- All infants from multiple gestation births with plurality >3
- Adopted infants
- Surrogate births

The sampling was stratified by the mother's race into three categories: white race, American Indian race, and an other races category for all remaining races and mixed-race mothers. Births within the race categories were randomly sampled each month at approximately 8% for white race, 31% for American Indian race, and 50% for the other race category. American Indian and other race births were sampled at higher rates to ensure that adequate precision for prevalence estimates were available in these smaller populations. The total sample size, as recommended by CDC, was targeted to be approximately 1,200 completed surveys over one year (2014). Sampling rates by strata (white, American Indian, other races) were based on the race distribution and numbers of births occurring in 2013 and adjusted for expected participation rates. The final sample included 1,816 births. The total numbers of South Dakota births, PRAMS-eligible births, PRAMS sample, and participants are shown in **Figure 1.** The sampling process was conducted using SAS statistical software (version 9.1) on a secure computer.

Multiple communication and collection methods were used to conduct the survey. To maximize the response rates, we used a combination of mailed questionnaires, an online website, and questionnaires completed via telephone. Initially, women received a pre-letter introducing and describing PRAMS to the mother and informing her that the questionnaire would arrive soon. The questionnaire was mailed to mothers seven days after the pre-letter and included a self-addressed, pre-paid return envelope. If the mother did not respond to the initial questionnaire, a reminder letter was sent to her 10 days after the initial packet. A second questionnaire was mailed to mothers who had not yet responded 10 days after the reminder letter. If the mother did not respond to the two mailings within 14 days after the second mailing, she was then contacted by telephone and had the opportunity to complete the questionnaire over the phone. Also, mothers would receive telephone calls if they returned an incomplete survey (<75% complete) or had undeliverable or returned mail. Questionnaires were available in English and Spanish and attempts were made to complete the survey in all non-English speaking mothers.

An online version of the questionnaire created using QuestionPro software was available and information on how to reach the online questionnaire was included in all correspondence. In addition, posters and brochures were placed in all Department of Health county WIC offices and Tribal Health offices throughout the state, and staff encouraged mothers to complete the PRAMS if they received a questionnaire in the mail.

**Figure 1. Total Number of 2014 South Dakota Births, PRAMS-eligible Births, PRAMS sample, and PRAMS Participants by Race**




Other efforts that were made in order to encourage participants to respond to and complete the survey were:

- **Inclusion of an up-front incentive:** All mothers asked to participate received an incentive ($2 bill) along with the initial questionnaire.
- **Inclusion of a PRAMS brochure:** The PRAMS brochure contained frequently asked questions and answers pertaining to the PRAMS project.
- **Providing pre-paid return envelopes**: In order to make this process as easy as possible for our participants and to show our appreciation for the mothers completing the survey, we included a self-addressed return envelope.
- **Providing a thank you:** A reward (infant book) was given to mothers who completed the questionnaire.
- **A monthly incentive drawing:** A monthly drawing was held for all women who had returned their questionnaire during the previous month. The selected mother could choose between a Pack 'n Play®, Bumbo® seat, or VTech® Sit To Stand Walker™.

**Management of Participants**

Each sampled mother was assigned a unique ID number and an Excel worksheet was used to track the sample of mothers and their scheduled mailings and phone calls.

**Data Analysis**

Data collected from paper surveys were double-entered into a Microsoft Access database. Data from online surveys were downloaded from QuestionPro into Microsoft Excel and processed with R statistical software to a format compatible with merging to the Access survey data. All data were imported into SAS and linked with information listed on birth certificates obtained through the Department of Health Office of Vital Records. The following variables were taken from Vital Statistics: trimester prenatal care began, gestational age, infant birthweight, maternal age, and maternal education. Statistical analyses were performed using SAS 9.4 software (SAS® Institute, Inc. Cary, NC) and Stata (StataCorp, Release 12 (2011), College Station, TX).

Confidence intervals (CI) are included that represent the margin of error around a point estimate (e.g., prevalence estimate). Finite population correction factors were used in the calculation of confidence intervals (see **Technical Appendix**). A confidence interval provides a range for the location of the true population value for a measure of interest, such as prevalence of a birth outcome, with the given level of certainty (e.g., 95%). Narrow confidence intervals indicate less variability in the estimate for that indicator and large confidence intervals indicate more variability. In general, smaller sample sizes result in larger confidence intervals, and prevalence values close to 50% have larger CI's than prevalence values close to 0% or 100%.

### Weighting

After all of the data were collected, they were statistically weighted. Weighting allows the PRAMS data to be representative of all PRAMS-eligible live-born births for South Dakota mothers in 2014. Responses were weighted to account for the sampling rates for each race category and survey non-response (surveys not returned). Weights for survey non-response were adjusted for specific characteristics related to non-response (i.e. women who had lower education attainment may be less likely to respond than those with higher education attainment). These non-response variables differed by race and this was taken into account in the weighting (see **Technical Appendix**).

South Dakota's weighted response rate was 71.3%, although this varied significantly among the three races: 79.1% for white race, 48.6% for American Indian race, and 60.6% for other race. Sampling fractions, response rates, reasons for non-response, and method of response are given in **Table 1** by race.

### Confidentiality & Data Privacy

IRB approval for this survey was obtained through the South Dakota State University Institutional Review Board. Participation in the survey was voluntary. Mothers were informed that they were not obligated to participate in the study, that their answers would be confidential, and there would not be any identifying information when the results of the study were published. All of the data were de-identified and aggregated for analysis.

### Limitations

Only live births satisfying the inclusion criteria were used in this study; therefore, results can only be generalized to eligible live births in South Dakota. The study was based on self-report, which indicates there might be some recall bias and reporting bias that cannot be controlled. CDC strongly recommends a weighted response rate of 60% or greater (2014 SD PRAMS-like survey weighted response rate was 71.3%).

## Table 1. Sampling Fractions (N) and Response Rates

| | Strata | | |
|---|---|---|---|
| | **White** | **American Indian** | **Other*** |
| **Total Eligible Births** | 8,581 | 1,718 | 1,148 |
| **% of Eligible Births Sampled** (N) | 8.2% (707) | 31.0% (533) | 50.0% (574) |
| **Contact Rate** [a] (contacted/sample) | 90.4% (639/707) | 72.6% (387/533) | 78.9% (453/574) |
| **Participation Rate** [b] (response/contacted) | 87.5% (559/639) | 66.9% (259/387) | 76.8% (348/453) |
| **Response Rate** [c] (response/sample) | 79.1% (559/707) | 48.6% (259/533) | 60.6% (348/574) |
| **Non-responders** | 148 | 274 | 226 |
| Time Expired | 68.2% (101) | 89.4% (245) | 75.2% (170) |
| Refused | 24.3% ( 36) | 5.1% (14) | 10.2% (23) |
| Could not Locate | 4.1% ( 6) | 4.7% (13) | 5.8% (13) |
| Language | 2.0% ( 3) | 0.4% (1) | 8.8% (20) |
| Tracking Error/lost | 1.4% ( 2) | 0.4% (1) | 0% (0) |
| **Method of Response** | 559 | 259 | 348 |
| Mail | 61.5% (344) | 56.4% (146) | 61.2% (213) |
| Online | 35.2% (197) | 25.1% (65) | 25.6% (89) |
| Desktop | 59% | 49% | 45% |
| Smartphone | 26% | 43% | 46% |
| Tablet | 15% | 8% | 9% |
| Phone | 2.2% (12) | 10.0% (26) | 4.0% (14) |
| WIC | 1.1% (6) | 8.5% (22) | 9.2% (32) |

* 'Other Races' (number sampled, response rate) included Asian (110, 69.1%), Black (146, 50.0%), Mixed Race (175, 60.6%), Pacific Islanders (6, 66.7%), and Unknown (137, 65.0%).

[a] Percentage of mothers who were contacted or of mothers, friends, or family members who spoke to SD-PRAMS personnel on the telephone, regardless of whether or not the mother responded.

[b] Percentage of contacted mothers who responded.

[c] Percentage of mothers in the total sample who responded.

# Demographic Characteristics and Infant Mortality

This report is based on 1,166 mothers who participated in the survey (559 white, 259 American Indian, 348 other races) of the 1,814 sampled. The responses have been weighted to represent 11,447 South Dakota female residents who had a PRAMS-eligible live birth in South Dakota in 2014. Demographics of the original PRAMS sample vs. South Dakota PRAMS-eligible births for 2014 and comparisons between responders and non-responders by maternal race are summarized in the **Technical Appendix**.

The demographic categories shown in **Table 2** are used consistently throughout this report after weighting for sampling and non-response rates.

**Table 2. Demographic Characteristics of 2014 SD PRAMS Participants**[1] (unweighted)

| | White (N=559) | American Indian (N=259) | Other Races (N=348) |
|---|---|---|---|
| **Age (years)** *(missing 0)* | | | |
| <20 | 2.9% | 15.1% | 10.1% |
| 20-24 | 15.6% | 32.4% | 26.1% |
| 25-29 | 37.2% | 23.9% | 27.9% |
| 30-34 | 32.7% | 18.9% | 20.7% |
| ≥35 | 11.6% | 9.7% | 15.2% |
| **Ethnicity** *(missing 5)* | | | |
| Hispanic | 3.9% | 3.9% | 25.0% |
| Non-Hispanic | 96.1% | 96.1% | 75.0% |
| **Education** *(missing 5)* | | | |
| <High School | 7.2% | 32.2% | 31.4% |
| High School | 15.5% | 32.2% | 30.8% |
| >High School | 77.3% | 35.6% | 37.8% |
| **Marital Status** *(missing 1)* | | | |
| Married | 79.4% | 16.7% | 58.1% |
| Unmarried | 20.6% | 83.3% | 41.9% |
| **Annual Household Income** *(missing 92)* | | | |
| <$10,000 | 7.2% | 65.4% | 25.5% |
| $10,000 - $24,999 | 12.5% | 19.0% | 28.0% |
| $25,000 - $49,999 | 25.4% | 12.6% | 28.9% |
| $50,000 - $74,999 | 24.1% | 1.7% | 8.8% |
| $75,000 or more | 30.8% | 1.3% | 8.8% |

[1] Ethnicity, age, education and marital status were obtained from South Dakota Department of Health, Office of Vital Records. Annual household income was obtained from PRAMS survey.

Statistics also are provided by region of the state as defined in the map below, where MSA = metropolitan statistical area:

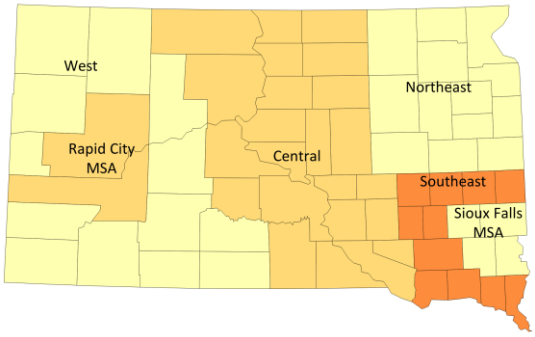



**Table 3. Birth Characteristics of PRAMS Participants and PRAMS-Eligible Births by Race** (unweighted)

| | PRAMS Participants | PRAMS-Eligible Births |
|---|---|---|
| Infant Death Rate (per 1,000 live births) | 3.4 | 5.4 |
| **White** | **N=559** | **N=8,581** |
| Maternal Age (years) [1] | 28.8 ± 4.8 | 28.4 ± 5.1 |
| Female (%) | 50.5% | 48.7% |
| Birthweight (g) [1] | 3,414 ± 606 | 3,367 ± 559 |
| Low Birthweight (<2500g) (%) | 5.4% | 5.5% |
| Preterm (<37 weeks) (%) | 7.0% | 7.9% |
| **American Indian** | **N=259** | **N=1,718** |
| Maternal Age (years) [1] | 25.8 ± 6.2 | 25.3 ± 5.6 |
| Female (%) | 49.0% | 49.0% |
| Birthweight (g) [1] | 3,403 ± 562 | 3,386 ± 618 |
| Low Birthweight (<2500g) (%) | 5.0% | 6.5% |
| Preterm (<37 weeks) (%) | 7.8% | 10.8% |
| **Other Race** | **N=348** | **N=1,148** |
| Maternal Age (years) [1] | 27.4 ± 6.2 | 27.0 ± 6.0 |
| Female (%) | 51.2% | 48.6% |
| Birthweight (g) [1] | 3,305 ± 534 | 3,262 ± 592 |
| Low Birthweight (<2500g) (%) | 5.5% | 7.1% |
| Preterm (<37 weeks) (%) | 6.0% | 7.7% |

[1] Data are mean ± standard deviation. Data obtained from South Dakota Department of Health, Office of Vital Records.

The overall infant death rates in 2014, based on vital records (birth data), for all births and PRAMS-eligible births were 5.9 and 5.4 per 1,000 live births, respectively. The slightly lower death rate among PRAMS-eligible births may be due to the inclusion of only one infant of twin and triplet births and exclusion of multiple births of greater than three, all of which have higher death rates than single births. The infant death rate among the PRAMS sample (regardless of survey completion) was 5.0 per 1,000 live births and did not differ between those mothers who completed the survey (3.4/1,000) and those who did not (7.7/1,000) (p=0.2).

Means for maternal age and birthweight based on Department of Health Vital Records data for the PRAMS participants and the PRAMS-eligible sample are shown by race in **Table 3**, along with the percent female, low birthweight (<2,500 g), and preterm (<37 weeks gestation).

# Health Insurance and Access to Services

**Quote from a 2014 SD PRAMS Mother:**

*"I'm happy that you are trying to help and look forward to future care for moms and children!"*

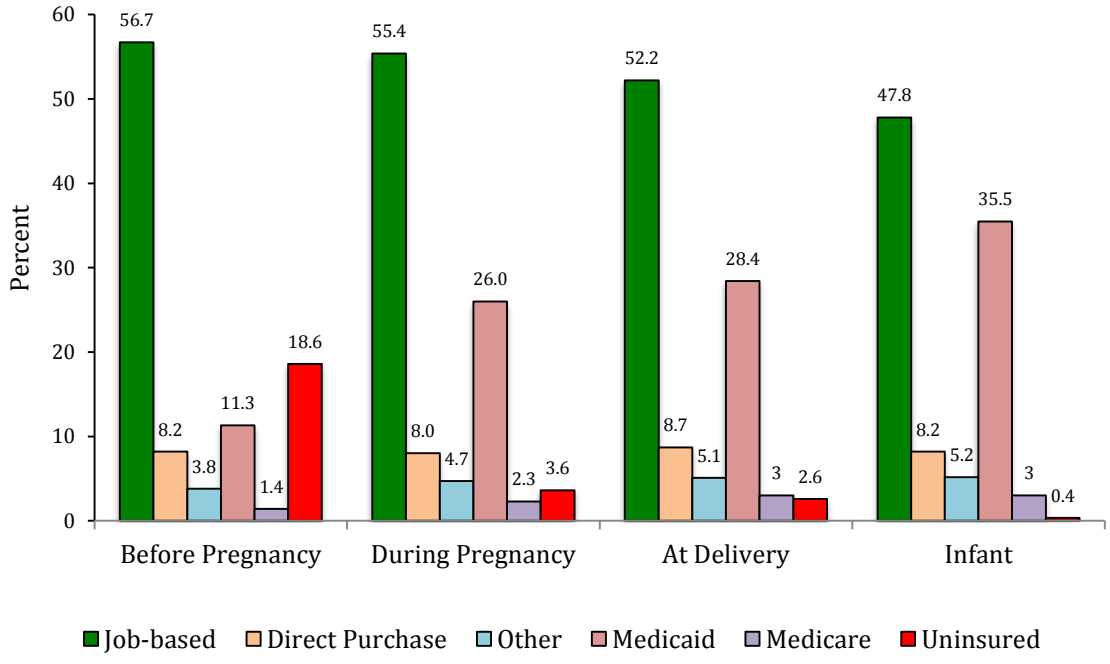
## Background

Health insurance coverage is important for accessing health care and staying healthy. Nationally, approximately 13% of women aged 19-64 years were not insured for health care in 2014 (1). Lack of health care coverage for pregnant women is associated with inadequate prenatal care, which can lead to poor outcomes (2). It has been estimated that every dollar spent on prenatal care can save approximately $3.33 in postnatal care costs and $4.63 in long-term costs (2). In addition, children without health insurance are less likely to have well-child visits, and more likely to have unmet medical care and unfilled prescriptions (3).

## Public Health Implications

The U.S. Healthy People 2020 goals are to have 100% of children and adults covered by health insurance. Prior to pregnancy, 18.6% of South Dakota mothers were uninsured, 3.6% were uninsured during pregnancy and 2.6% did not have health insurance at the time of the delivery (**Figure 2**). Following birth, 0.4% of the infants were uninsured.

**Figure 2. Percent of Mothers with Different Types of Insurance Before Pregnancy, During Pregnancy, At Delivery and for the Infant[1]** (weighted)




[1] If more than one type of insurance was selected, a hierarchy was established to report the individual's insurance status. The hierarchy, in order, was: Private; Job-based (includes self or as a dependent); Other (includes military, VA, Champus & TriCare or Other); Medicaid; Medicare; Uninsured (includes IHS). For example, if an individual selected both 'Private' and 'Medicaid', the individual's insurance status was reported as 'Private'.

Insurance status before and during pregnancy was associated with several demographic characteristics. The South Dakota 2014 PRAMS survey indicated that a higher percentage of uninsured was observed among American Indian mothers, Hispanic mothers, younger mothers, unmarried mothers, less educated mothers, mothers with lower household incomes, and mothers from the western region of the state **(Table 4)**. Being uninsured either before or during pregnancy was not associated with increased risk for low infant birthweight or preterm birth even after adjusting for race and maternal age (all, p>0.05), both of which are known to be associated with poorer birth outcomes.

**Table 4. Percent of Uninsured Mothers Before and During Pregnancy and Percent of Mothers Receiving WIC by Demographic Characteristics[1]** (weighted)

| | % Uninsured | | |
|---|---|---|---|
| **Demographics** | **Before Pregnancy** | **During Pregnancy** | **% on WIC** |
| **Race** | P<0.001 | P<0.001 | P<0.001 |
| White | 13.0% [10.2, 15.7] | 1.4% [0.5, 2.4] | 24.4% [20.9, 28.0] |
| American Indian | 39.4% [33.9, 45.0] | 11.5% [7.9, 15.1] | 83.9% [79.8, 88.0] |
| Other Races | 27.2% [23.2, 31.2] | 6.4% [4.2, 8.6] | 57.1% [52.7, 61.6] |
| **Ethnicity** | P<0.01 | P<0.01 | P<0.001 |
| Hispanic | 30.9% [20.9, 40.9] | 9.7% [3.0, 16.5] | 59.5% [48.7, 70.3] |
| Non-Hispanic | 17.8% [15.5, 20.2] | 3.2% [2.3, 4.1] | 34.9% [32.1, 37.8] |
| **Age (years)** | P<0.001 | P=0.02 | P<0.001 |
| <20 | 17.7% [9.6, 25.9] | 8.0% [3.1, 12.9] | 87.8% [79.6, 96.0] |
| 20-24 | 32.5% [26.3, 38.7] | 4.5% [2.1, 7.0] | 62.8% [56.0, 69.6] |
| 25-29 | 15.9% [12.1, 19.7] | 2.0% [0.9, 3.2] | 29.7% [24.9, 34.5] |
| 30-34 | 12.4% [8.6, 16.2] | 2.5% [0.9, 4.0] | 20.5% [16.0, 25.1] |
| ≥35 | 16.3% [10.4, 22.3] | 5.7% [1.7, 9.7] | 25.7% [18.7, 32.7] |
| **Marital Status** | P<0.001 | P<0.001 | P<0.001 |
| Married | 10.1% [7.8, 12.4] | 2.1% [1.1, 3.1] | 16.6% [13.8, 19.3] |
| Unmarried | 34.5% [29.8, 39.3] | 6.4% [4.4, 8.5] | 74.0% [69.3, 78.7] |
| **Education** | P<0.001 | P<0.001 | P<0.001 |
| Less than High School | 30.3% [23.4, 37.2] | 8.3% [4.3, 12.4] | 70.9% [64.1, 77.8] |
| High School | 35.4% [28.9, 41.8] | 6.7% [4.6, 8.8] | 60.2% [53.5, 67.0] |
| More than High School | 11.2% [8.9, 13.6] | 1.9% [1.1, 2.8] | 21.8% [18.7, 25.0] |
| **Region** | P<0.001 | P<0.001 | P<0.001 |
| Central | 20.4% [13.8, 27.0] | 2.1% [0, 4.5] | 45.6% [36.9, 54.3] |
| Northeast | 15.2% [10.3, 20.04] | 3.2% [0.8, 5.6] | 33.6% [26.9, 40.4] |
| Rapid City MSA | 18.4% [12.2, 24.7] | 3.5% [0.7, 6.3] | 40.7% [32.4, 49.0] |
| Sioux Falls MSA | 14.1% [10.4, 17.8] | 0.8% [0.3, 1.3] | 26.7% [22.0, 31.5] |
| Southeast | 16.9% [8.6, 25.2] | 1.9% [0, 4.6] | 29.3% [19.3, 39.3] |
| West | 36.0% [28.3, 43.7] | 14.6% [9.5, 19.8] | 63.4% [55.2, 71.5] |
| **Annual Household Income** | P<0.001 | P=0.02 | P<0.001 |
| <$10,000 | 37.3% [31.1, 43.6] | 6.4% [3.8, 9.0] | 82.1% [76.9, 87.3] |
| $10,000- $24,999 | 37.5% [29.6, 45.3] | 4.5% [2.2, 6.7] | 69.6% [62.0, 77.2] |
| $25,000 - $49,999 | 14.6% [10.1, 19.1] | 2.6% [1.0, 4.1] | 33.3% [27.1, 39.6] |
| $50,000 - $74,999 | 7.6% [3.3, 12.0] | 2.5% [0.1, 5.0] | 9.1% [4.4, 13.8] |
| $75,000 or more | 1.3% [0, 3.0] | 0.7% [0, 2.0] | 2.0% [0, 4.2] |

[1] 95% confidence intervals

Statewide, 36.6% of mothers reported being on WIC during their most recent pregnancy. A higher percent of mothers responding that they were receiving WIC was observed among the following populations: American Indian mothers, Hispanic mothers, younger mothers, unmarried mothers, less educated mothers, mothers with lower income, and mothers who reside in the western region of the state. Among South Dakota mothers receiving WIC, 3.1% had low birthweight infants compared to 2.5% of mothers not receiving WIC, reflecting the high-risk population who receive WIC.

## Summary

- Job-based insurance, either to the mother or as a dependent, was the most common source of insurance with more than 50% of the mothers having job-based insurance before and during the pregnancy, and at delivery.
- 18.6% of the PRAMS mothers had no health care coverage, public or private, prior to their pregnancy.
- 11.3% of mothers reported receiving Medicaid before pregnancy, while 26.0% reported receiving Medicaid during their pregnancy and 28.4% at the time of delivery.
- Less than 1% of the infants were uninsured, and 35.5% reported being covered by Medicaid.
- 36.6% of South Dakota mothers received WIC services during their most recent pregnancy.

## References


1. "Women's Health Insurance Coverage, Women's Health Policy". Kaiser Family Foundation, November 11, 2015. http://kff.org/womens-health-policy/fact-sheet/womens-health-insurance-coverage-fact-sheet/, accessed 12/31/15.
2. Lu MC, Lin YG, Prietto NM, Garite TJ. Elimination of public funding of prenatal care for undocumented immigrants in California: A cost/benefit analysis. *American Journal of Obstetrics and Gynecology* 182:233-239, 2000.
3. Olson LM, Tang SS, Newacheck PW. Children in the United States with discontinuous health insurance coverage. *New England Journal of Medicine* 353:382-391, 2005.

# Preconception Care, Topics Discussed Prior to Pregnancy and Health-Related Actions Prior to Pregnancy

**Quote from a 2014 SD PRAMS Mother:**

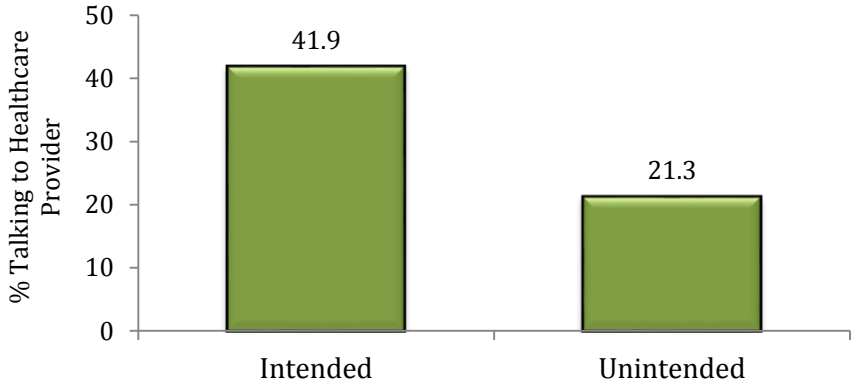
*"I think it's great you are working on helping women and children…I was kind of frustrated with how little information was given to me about how to have a healthy pregnancy at the clinic. I felt like the doctor expected me to just know…"*

**Background**

In 2006 the CDC made national recommendations to improve preconception health, including improvements in preconception health surveillance (1). These recommendations were a result of the availability of several evidence-based interventions that may reduce many potentially harmful maternal behaviors and chronic conditions such as tobacco and alcohol use, inadequate folic acid intake, obesity, diabetes, and hypertension that are associated with adverse pregnancy outcomes.

Only 33% of South Dakota mothers talked to a doctor, nurse or other health care provider about how to prepare for a healthy pregnancy and baby before their most recent pregnancy, and the percent of women talking to a healthcare provider differed significantly ($p<0.001$) by whether they were trying to get pregnant or not (**Figure 3**). Among women trying to get pregnant, 41.9% talked to a healthcare provider compared to 21.3% of women not trying to get pregnant.

**Figure 3. Percent of Women Who Talked to a Doctor, Nurse or Other Health Care Provider About Preparing for a Healthy Pregnancy BEFORE They Got Pregnant by Intendedness of Pregnancy*** (weighted)




* This included only discussions, not reading materials or videos.

Only 46.1% of mothers reported taking a multivitamin, prenatal vitamin or folic acid vitamin four times per week or more the month before pregnancy (**Figure 4**). Vitamin use differed significantly by race, with white mothers being more likely to use vitamins than American Indian mothers (**Figure 5**, $p<0.001$). Since approximately half of the pregnancies in the United States are unintended (2), it is important to establish healthy behaviors and improve women's health before conception.

**Figure 4. Number of Times per Week a Multivitamin, Prenatal Vitamin or Folic Acid Vitamin was Taken During the Month Before Pregnancy** (weighted)

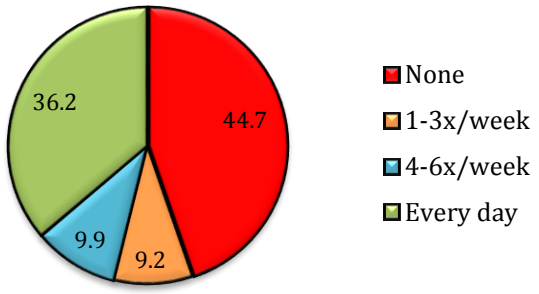
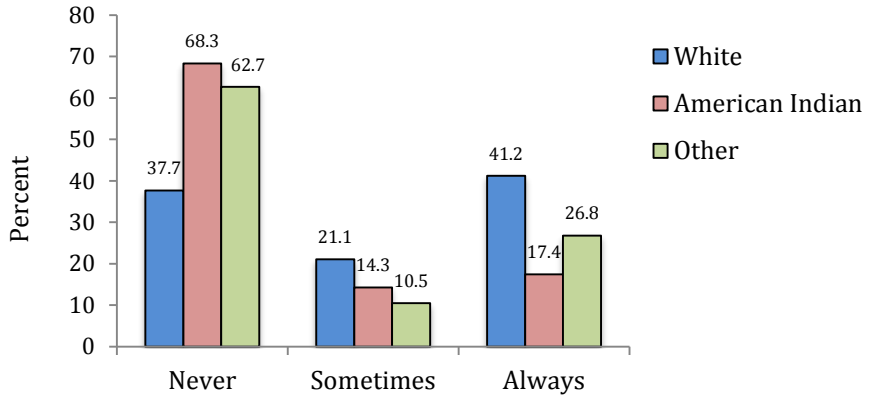



**Figure 5. Percent of Women Who Never, Sometimes, or Always* Took a Multivitamin, Prenatal Vitamin or Folic Acid Vitamin During the Month Before Pregnancy by Race** (weighted)




* 'Sometimes' category defined as individuals who indicated they took a multivitamin, prenatal vitamin or folic acid vitamin 1-6 times/week in the month before pregnancy. 'Always' category includes individuals who answered 'every day' and 'Never' category includes individuals who answered 'none' to times per week they took a multivitamin, prenatal vitamin or folic acid vitamin.

## Public Health Implications

Preconception health and care is an important component of Healthy People 2020. Women of reproductive age may not be receiving the appropriate preventative and management care for behavioral risk factors and chronic diseases (most of which are modifiable) that are related to adverse pregnancy outcomes such as low birthweight, birth defects, fetal/infant death, preterm birth or sudden infant death syndrome (SIDS) (1,3). Birth defects affect approximately 3% of all infants born and account for almost 20% of infant deaths while preterm birth has been estimated to be related to up to 36.5% of infant deaths (4). The combined annual cost of these, notwithstanding the emotional burden, is estimated at approximately $30 billion dollars in the United States (3). Recognizing the need for action, the Centers for Disease Control & Prevention (CDC) and an external expert panel introduced a set of goals and recommendations to improve preconception health and health care. This initiative reported that screening for maternal risk factors and timely interventions can be effective in improving preconception/interconception health (1,3), which can help reduce detrimental pregnancy outcomes.

More than 60% of South Dakota mothers did *not* talk to a health care worker about preparing for a healthy pregnancy before they became pregnant (67.2%) (**Table 5**). The percent of mothers who did not talk to a health care worker about preparing for a healthy pregnancy was higher among younger mothers, unmarried mothers, and mothers with lower household incomes.

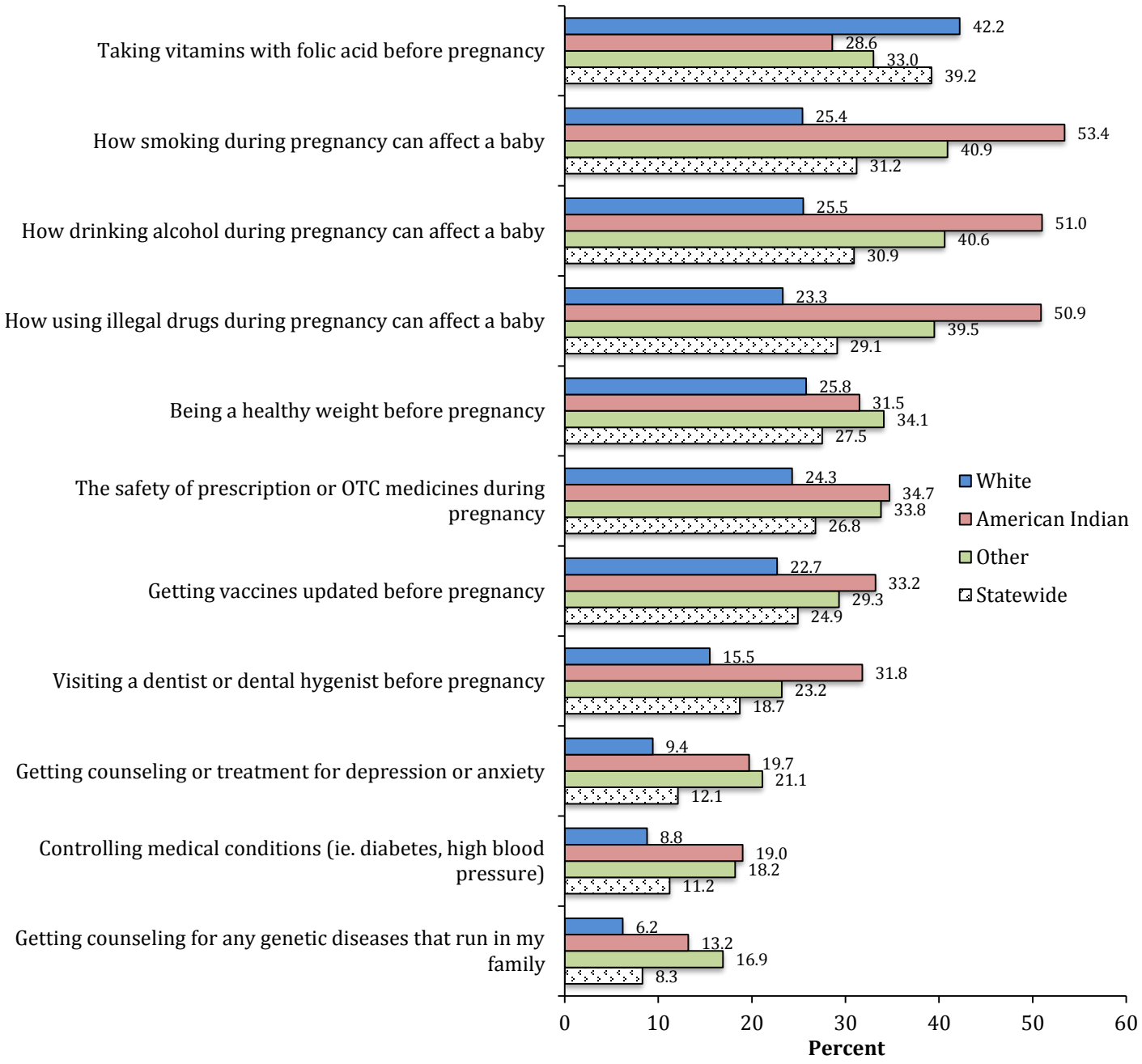
**Table 5. Percent of Women Who Did Not Talk to a Health Care Worker About Preparing for a Healthy Pregnancy BEFORE They Got Pregnant by Demographic Characteristics** (weighted)

| | % Did Not Talk (95% C.I.) |
|---|---|
| **Race** | **not significant** |
| White | 68.4% [64.6, 72.1] |
| American Indian | 63.0% [57.5, 68.6] |
| Other Races | 64.8% [60.5, 69.1] |
| **Ethnicity** | **not significant** |
| Hispanic | 65.4% [54.7, 76.1] |
| Non-Hispanic | 67.3% [64.2, 70.4] |
| **Age (years)** | **p<0.01** |
| <20 | 80.3% [71.7, 88.3] |
| 20-24 | 71.2% [65.3, 77.1] |
| 25-29 | 69.5% [64.3, 74.7] |
| 30-34 | 60.2% [54.3, 66.2] |
| ≥35 | 64.1% [55.4, 72.8] |
| **Education** | **not significant** |
| <High School | 64.9% [58.3, 71.5] |
| High School | 70.6% [64.6, 76.7] |
| >High School | 66.8% [62.9, 70.7] |
| **Region** | **not significant** |
| Central | 64.9% [56.5, 73.4] |
| Northeast | 73.8% [67.4, 80.3] |
| Rapid City MSA | 70.9% [63.1, 78.7] |
| Sioux Falls MSA | 61.8% [56.4, 67.2] |
| Southeast | 73.2% [63.4, 83.0] |
| West | 64.6% [56.9, 72.4] |
| **Marital Status** | **p<0.001** |
| Married | 62.9% [59.0, 66.8] |
| Unmarried | 75.3% [71.4, 79.5] |
| **Health Insurance Status the MONTH BEFORE pregnancy [1]** | **p<0.001** |
| Private (direct purchase) | 84.6% [76.5, 92.8] |
| Job-based | 62.2% [57.9, 66.5] |
| Medicaid | 58.9% [51.3, 66.5] |
| Medicare | 51.5% [30.7, 72.4] |
| Other | 85.9% [74.8, 97.0] |
| Uninsured | 75.8% [70.2, 97.0] |
| **Annual Household Income** | **p=0.004** |
| <$10,000 | 70.7% [65.2, 76.3] |
| $10,000- $24,999 | 71.0% [63.7, 78.2] |
| $25,000 - $49,999 | 74.0% [68.0, 80.0] |
| $50,000 - $74,999 | 67.3% [59.7, 75.0] |
| $75,000 or more | 56.7% [49.5, 63.9] |

[1] If more than one type of insurance was selected, a hierarchy was established to report the individual's insurance status. The hierarchy, in order, was: Private; Job-based (includes self or as a dependent); Other (includes military, VA, Champus & TriCare or Other); Medicaid; Medicare; Uninsured (includes IHS). For example, if an individual selected both 'Private' and 'Medicaid', the individual's insurance status was reported as 'Private'.

Women of reproductive age may not be receiving the necessary education regarding behavioral risk factors, preventive actions, and chronic diseases prior to conception. **Figure 6** indicates whether or not a doctor, nurse, or health care worker talked to the mother about various risk factors, preventive actions and behaviors prior to her most recent pregnancy.

**Figure 6. Percent of Mothers Who Indicated Topic was Covered by Health Care Worker Prior to Pregnancy** (weighted) *




* There were significant race differences in all of the topics that were discussed

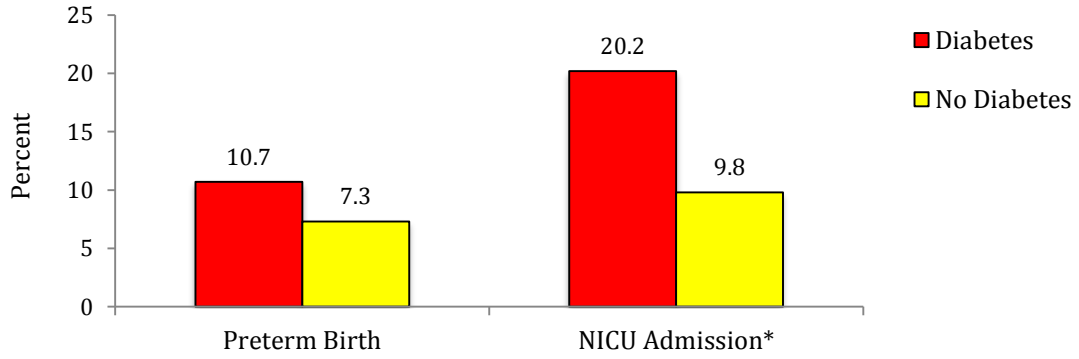
The importance of these topics being covered by a doctor, nurse, or health care worker during the preconception period is illustrated in **Table 6** as mothers who always or sometimes took a multivitamin, prenatal vitamin or folic acid vitamin were more likely to have been talked to about the importance of taking vitamins than mothers who never took vitamins. There was a significant difference in the percent of women who were talked to about taking vitamins by vitamin use ($p<0.01$). For example, 59.9% of the women who always took vitamins were talked to about the importance of taking vitamins while only 18.6% of the women who never took vitamins were talked to about vitamins.

**Table 6. Percent of Women Who Were Talked to by a Health Care Worker about Taking Vitamins with Folic Acid Before Pregnancy by Vitamin Use** (weighted)

| Vitamin Use | % Talked To About Taking Vitamins Before Pregnancy |
|---|---|
| Never | 18.6% |
| Sometimes | 48.5% |
| Always | 59.9% |

The health of a mother before she becomes pregnant is very important as it can affect the future pregnancy and health of the baby. Approximately 3% of South Dakota mothers indicated that they were told that they had pre-pregnancy diabetes (either Type 1 or Type 2). Early, effective preconception care has been shown to reduce diabetes-related outcomes such as preterm delivery (5). The relationship between individuals who were told they had diabetes and pregnancy outcomes such as preterm birth and NICU admission are presented in **Figure 7**.

**Figure 7. Preterm Birth and NICU Admission by Diagnosis of Type 1 or Type 2 Diabetes Prior to Pregnancy** (weighted)

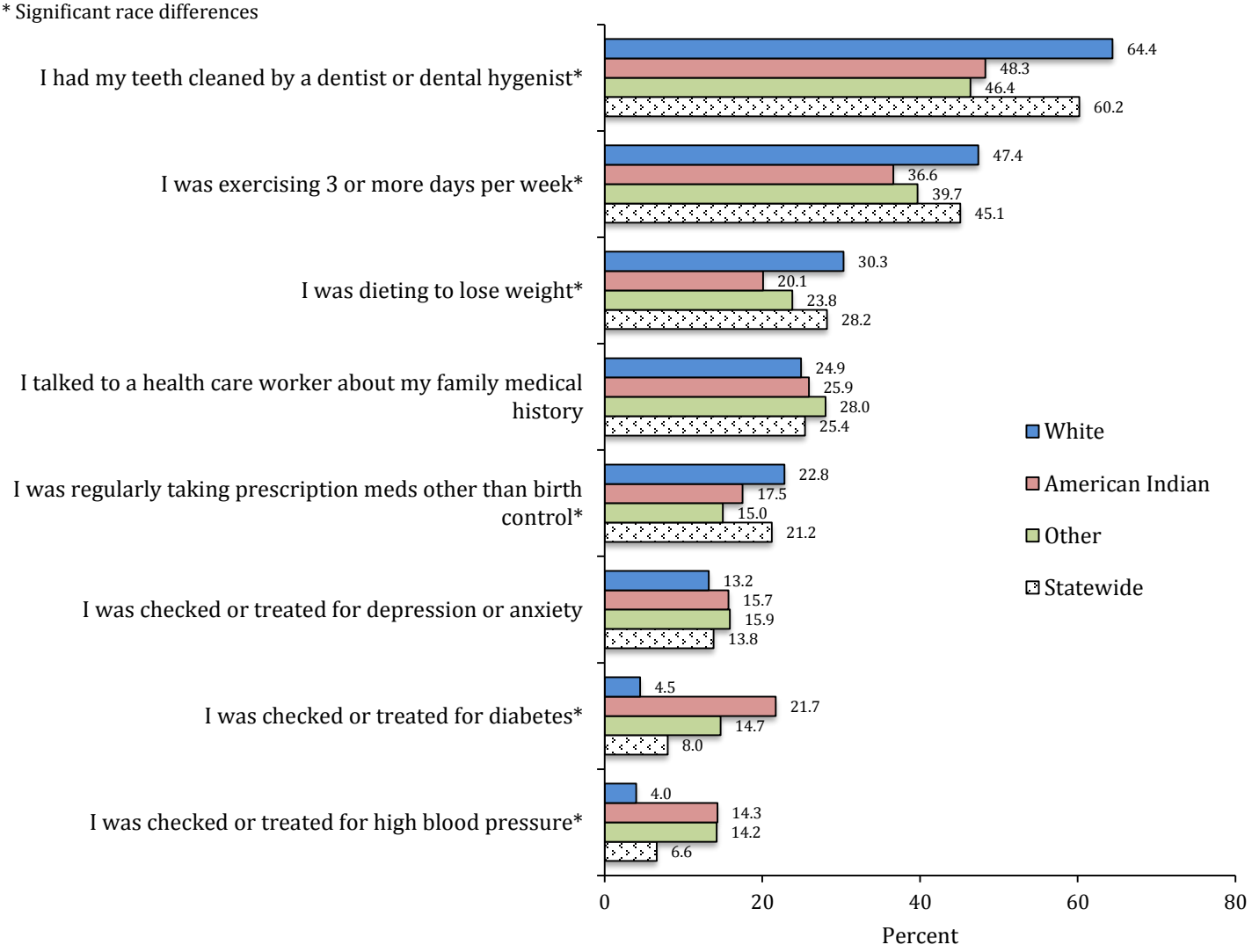



* NICU admission approached significance at $p=0.06$. Rate of preterm birth was not different between diabetics and non-diabetics. Preterm birth and NICU admission based on vital records.

Women were asked about a variety of health-related actions in the year before they got pregnant with their new baby. Proper nutrition, regular physical activity throughout pregnancy and staying at a healthy body weight can help reduce the risks of pregnancy complications and the risk of postpartum depression [6]. Less than half of women reported engaging in physical activity three times per week or more (**Figure 8**). Furthermore, less than 30% saw a health care worker to talk about family medical history or were checked for mental illness, diabetes or high blood pressure in the 12 months before pregnancy. Most unfavorable behaviors and conditions are amendable if identified early and confronted in preconception health screenings, which can help avoid poor outcomes later in the prenatal and postnatal period.

**Figure 8. Percent of Mothers Participating in Health-related Actions the Year Prior to Pregnancy** (weighted)

* Significant race differences




## Summary

- 67.2% of South Dakota mothers (68.4% white, 63.0% American Indian, 64.8% other races) did *not* talk to a health care worker about how to prepare for a healthy pregnancy prior to their most recent pregnancy.
- The percentage of mothers who did not talk to a health care worker prior to pregnancy was highest in the youngest age category (80.3%, <20 years) and tended to decrease in the older age groups with the exception of mothers older than 35 years of age.
- Unmarried women were more likely not to have talked to a health care worker before pregnancy than married women (75.3% and 62.9% respectively).

- 68.3% of American Indian mothers never took a multivitamin, prenatal vitamin, or folic acid supplement in the month before conception compared to 37.7% of white mothers. This coincided with only 28.6% of American Indian mothers indicating a health care worker spoke with them about taking vitamins with folic acid before pregnancy vs. 42.2% of White mothers.
- Approximately 64% of white mothers indicated that they had their teeth cleaned prior to pregnancy while only 48% of American Indian and 46% of other race mothers visited a dentist or dental hygienist in the 12 months before conception.

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# Pregnancy Intendedness and Birth Control Use

**Quote from a 2014 SD PRAMS Mother:**

*"…I couldn't imagine my family without our new child, even though I initially did not want to be pregnant. My heart goes out to those facing an unexpected pregnancy without the loving support I have."*

**Background**

Data on the intendedness of pregnancy is sparse. Researchers at the Guttmacher Institute have estimated that for births between 2001 and 2006, nearly one-half of all pregnancies in the United States were unintended (1) and this decreased to about 40% in 2010 (2). Among mothers who delivered an infant in South Dakota in 2014, 46.1% were not trying to become pregnant (**Figure 9**). A question also was asked about the mother's feelings about the timing of the pregnancy (**Figure 10)** and 8.6% of the mothers stated they did not want to be pregnant then or any time in the future. Unintended pregnancies may lead to adverse health outcomes for the mother and infant. Certain populations may be at higher risk for unintended pregnancies than others. The intendedness of pregnancy may influence the timing of prenatal care, which is important to healthy birth outcomes.

**Figure 9. Percent of Pregnancies That Were Unintended** (weighted)

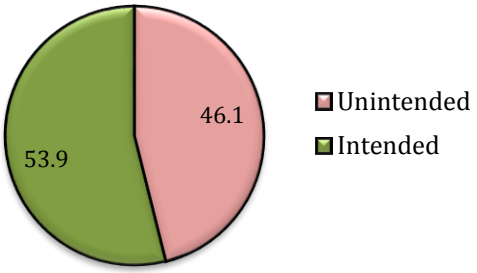
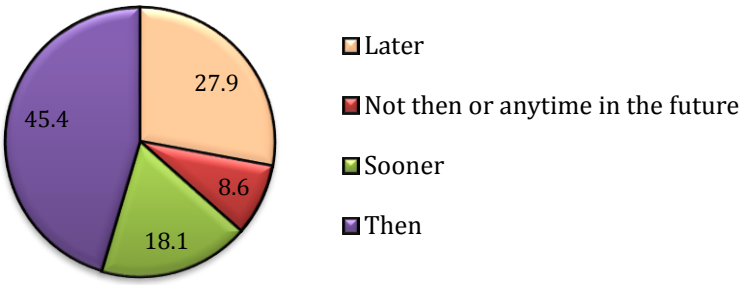



**Figure 10. Distribution of When Mothers Wanted to Be Pregnant Just Before They Became Pregnant** (weighted)



## Public Health Implications

While the actual definition of unintended pregnancy is debatable, the argument of the adverse public health implications of unintended pregnancies is not. The cost burden for publicly funded pregnancies was estimated to be around $11.1 billion in 2006 (1) and $21.4 billion in 2010 (2). An estimate for South Dakota's total public cost for the estimated 2,400 publicly funded unintended births was $49.4 million in 2010, with $35 million from federal funds and $14.4 million from state funds (2).

Intendedness of pregnancy was associated with several demographic characteristics (**Table 7**):

- American Indian mothers had the highest prevalence of unintended pregnancy and white mothers had the lowest. Mother's in the other race group had a higher prevalence of unintended pregnancy than white mothers but lower than the American Indian mothers.
- Women less than 20 years of age had the highest prevalence of unintended pregnancy. Women aged 20-24 years had a higher prevalence of unintended pregnancy than women in the 25-29, 30-34, and 35 and older groups.
- Women with greater than a high school education were less likely to have an unintended pregnancy than women with high school or less than high school education.
- Married women were less likely to have an unintended pregnancy than other women.
- Women who were covered by Medicare, Medicaid, utilized Indian Health Services, or were uninsured were more likely to have an unintended pregnancy than women with insurance from their work or their partner's work, insurance purchased by them or someone else, or through the military, CHAMPUS, TriCare, or VA coverage.
- Women whose annual household income was less than $10,000 were the most likely to have an unintended pregnancy followed by women with an annual household income of $10,000 to $24,999. Women with annual household incomes of $50,000 to $74,999 and greater than $75,000 had the lowest prevalence of unintended pregnancy. Women with a household income of $25,000 to $49,999 had a prevalence of unintended pregnancy between that of the lower and higher incomes.

When the above characteristics were considered together the ones that remained important predictors of unintended pregnancy were ***maternal age***, ***marital status***, and ***annual household income***.

Of those not trying to get pregnant, 59.7% (55.1-64.2%) were not doing anything to keep from getting pregnant. The reasons for not trying to prevent the pregnancy are listed in **Figure 11**. When asked about whether they were currently doing anything to prevent pregnancies, 82.0% (79.6-84.4%) of the mothers stated they were. Among those *not currently* doing anything to prevent pregnancies, the main reason stated was that they did not want to use birth control (see **Figure 12**).

Intendedness of pregnancy was associated with receiving early prenatal care: a higher percent of women who had an unintended pregnancy did not receive prenatal care as early as they wanted compared to women who had an intended pregnancy (**Figure 13**, $p<0.001$).

**Table 7. Percent of Mothers with Unintended Pregnancies by Demographic Characteristics** (weighted)

| | % Unintended (95% C.I.) |
|---|---|
| **Race** | **p<0.001** |
| White | 40.0% [36.0, 44.0] |
| American Indian | 71.3% [66.0, 76.6] |
| Other Races | 55.0% [50.4, 59.6] |
| **Ethnicity** | **not significant** |
| Hispanic | 53.9% [42.8, 65.1] |
| Non-Hispanic | 45.5% [42.3, 48.8] |
| **Age (years)** | **p<0.001** |
| <20 | 86.3% [79.1, 93.5] |
| 20-24 | 65.3% [58.6, 72.0] |
| 25-29 | 40.8% [35.3, 46.2] |
| 30-34 | 36.3% [30.4, 42.1] |
| ≥35 | 33.9% [25.3, 42.5] |
| **Marital Status** | **p<0.001** |
| Married | 32.7% [28.9, 36.4] |
| Unmarried | 71.5% [66.8, 76.1] |
| **Education** | **p<0.001** |
| <High School | 63.7% [56.6, 70.7] |
| High School | 59.6% [52.8, 66.4] |
| >High School | 38.5% [34.5, 42.4] |
| **Region** | **p<0.01** |
| Central | 56.0% [47.0, 65.1] |
| Northeast | 40.4% [33.1, 47.7] |
| Rapid City MSA | 51.2% [42.5, 59.8] |
| Sioux Falls MSA | 40.0% [34.6, 45.5] |
| Southeast | 47.6% [36.5, 58.7] |
| West | 56.9% [48.7, 65.2] |
| **Health Insurance Status the MONTH BEFORE pregnancy [1]** | **p<0.001** |
| Private (direct purchase) | 45.8% [33.9, 57.8] |
| Job-based | 34.9% [30.7, 39.1] |
| Medicaid | 69.1% [62.0, 76.2] |
| Medicare | 71.1% [51.3, 91.0] |
| Other | 35.5% [19.1, 51.8] |
| Uninsured | 64.9% [58.3, 71.6] |
| **Annual Household Income** | **p<0.001** |
| <$10,000 | 71.6% [65.6, 77.6] |
| $10,000- $24,999 | 62.8% [54.9, 70.7] |
| $25,000 - $49,999 | 48.0% [41.0, 54.9] |
| $50,000 - $74,999 | 35.8% [27.9, 43.6] |
| $75,000 or more | 33.1% [25.9, 40.4] |

[1] If more than one type of insurance was selected, a hierarchy was established to report the individual's insurance status. The hierarchy, in order, was: Private; Job-based (includes self or as a dependent); Other (includes military, VA, Champus & TriCare or Other); Medicaid; Medicare; Uninsured (includes IHS). For example, if an individual selected both 'Private' and 'Medicaid', the individual's insurance status was reported as 'Private'.

**Figure 11. Reasons for Not Doing Anything to Prevent Pregnancy Among Mothers Not Trying to Become Pregnant** (weighted, more than one answer could be checked)

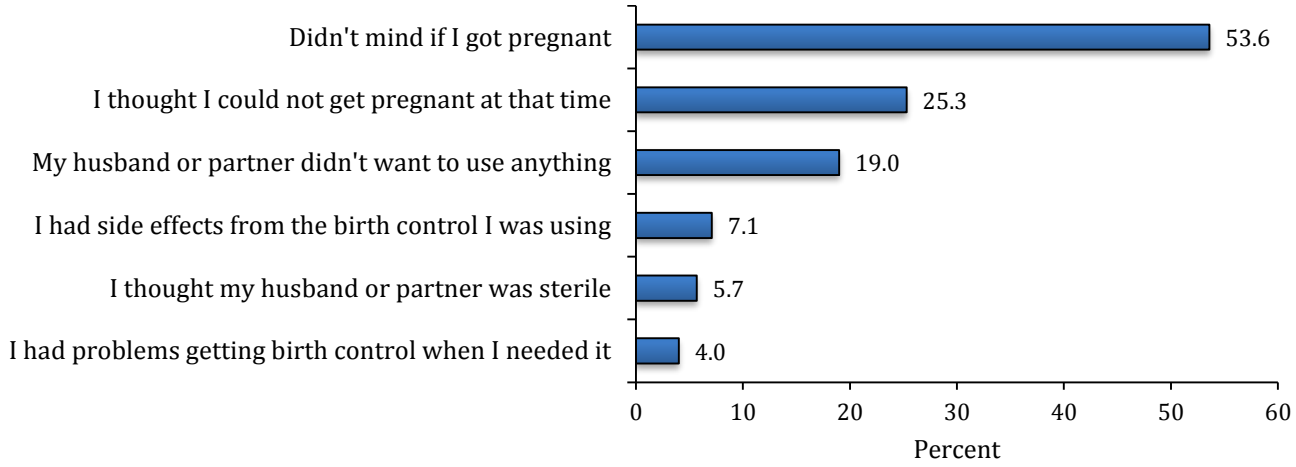



**Figure 12. Reasons for Not Currently Doing Anything to Prevent a Pregnancy** (weighted, more than one answer could be checked)

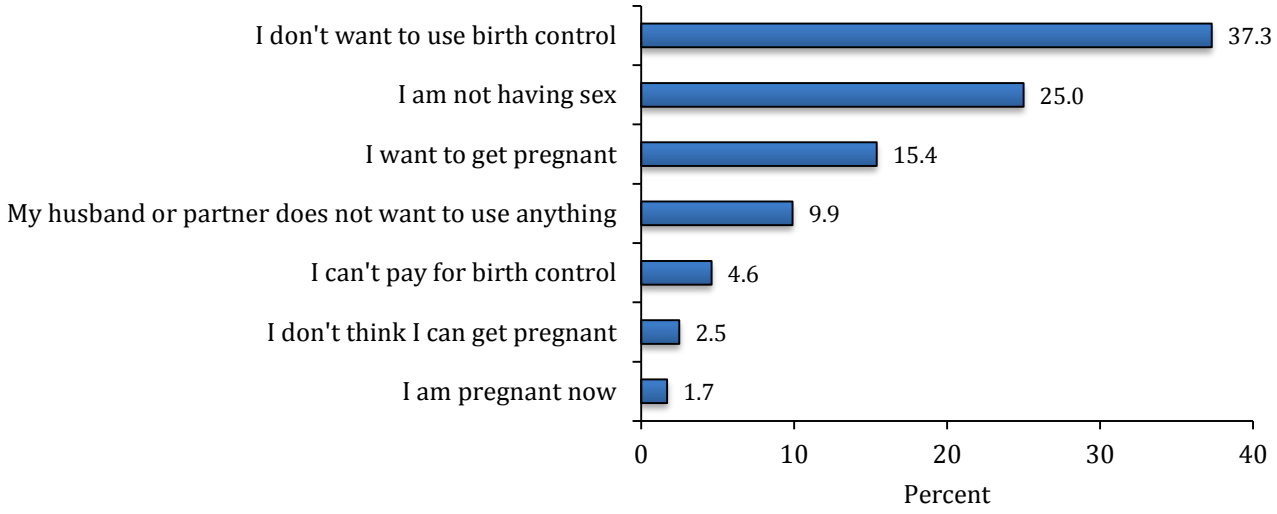
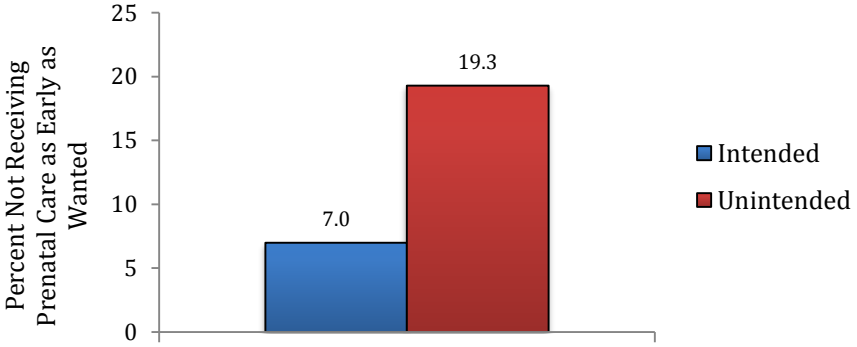



**Figure 13. Percent of Mothers Not Receiving Prenatal Care as Early as They Wanted by Intendedness of Pregnancy** (weighted)



## Summary

- 46.1% of South Dakota births in 2014 were unintended (not trying to become pregnant).
- Of South Dakota mothers who delivered in 2014, 27.9% stated that they wanted to be pregnant later and 8.6% did not want to be pregnant then or at any time in the future.
- High rates of unintended pregnancy were seen among the following populations: American Indian mothers, younger mothers, unmarried mothers, and mothers with low household income.
- Of those not trying to get pregnant, 59.7% were not doing anything to keep from getting pregnant.
- Of the mothers who were not doing anything to keep from getting pregnant, 53.6% did not care if they became pregnant and 25.3% thought they could not become pregnant.
- At the time of the survey, 82.0% of mothers stated they were currently doing something to prevent pregnancy. Among those not currently doing anything to prevent pregnancies, the main reasons stated were that they did not want to use birth control (37.3%) or they were not having sex (25.0%).
- 19.3% of mothers with an unintended pregnancy did not receive prenatal care as early as they wanted compared to 7.0% of mothers with an intended pregnancy.

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# Prenatal Care

**Quote from a 2014 SD PRAMS Mother:**

*"I think I did receive proper information after I found out I was pregnant. Very helpful people."*

*"South Dakota doctors should see pregnant moms as EARLY as they can. Not make us wait 13 weeks."*

## Background

Prenatal care beginning in the first trimester is essential for detecting problems early in fetal development. Women who receive no prenatal care are more likely to have preterm births, low birthweight infants, and stillbirths (1). The U.S. Healthy People 2020 target rate for the percent of infants born to women receiving prenatal care beginning in the first trimester is 77.9%. Although there has been a significant increase over the last five years in the percent of South Dakota women receiving early prenatal care, only 70.6% of South Dakota mothers in 2013 received prenatal care beginning in the first trimester according to birth certificate data. The increase in percent of infants born to mothers receiving prenatal care during the first trimester of pregnancy is limited to white mothers as the percent among American Indian mothers receiving early prenatal care has decreased over the last 7 years. Only 45.5% percent of American Indian mothers received early prenatal care in 2013 compared to 75.9% of white mothers.

## Public Health Implications

Studies have shown that women who receive no prenatal care have poorer obstetrical and birth outcomes than women who receive prenatal care (1). Lack of prenatal care is not only associated with adverse health outcomes, but disparities exist among different population groups in accessing early prenatal care and obtaining adequate prenatal care. Disparities in access to prenatal care can lead to disparities in birth outcomes. Based on vital records of 2014 PRAMS participants, 73.2% of South Dakota mothers began prenatal care during the first trimester, 21.1% during the second, and 5.0% during the third. Less than 1% of mothers received no prenatal care (**Figure 14**). There were differences by race, with 78.6% of white mothers, 52.7% of American Indian mothers, and 55.4% of other race mothers beginning prenatal care during the first trimester (**Table 8**). In addition to race differences in obtaining early prenatal care, the following populations also were less likely to have early prenatal care: Hispanic mothers, younger mothers, less educated mothers, unmarried mothers, uninsured mothers, and mothers with lower household incomes. The western region of the state had a lower percent of mothers receiving early prenatal care than other regions of the state. When the above characteristics were considered together the ones that remained important predictors of early prenatal care were ***race*** and ***household income*** (both $p<0.001$).

**Figure 14. Initiation of Prenatal Care by Trimester** (weighted, data from vital records of PRAMS participants)

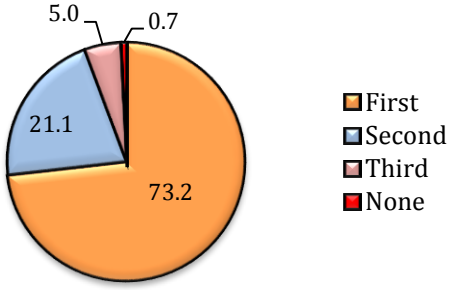


**Table 8. Percent of Mothers Obtaining Early and Adequate Prenatal Care by Demographic Characteristics[1]** (weighted)

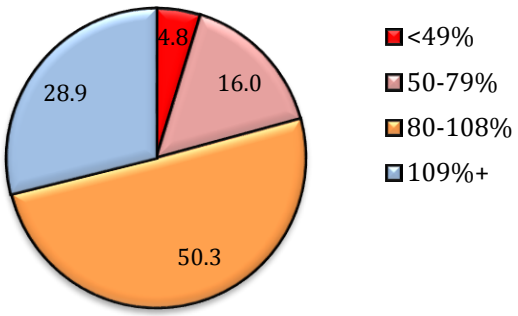
| | % Obtaining Care in 1st Trimester (95% CI) | % Going to 80% or More of Their Prenatal Visits (95% CI) |
|---|---|---|
| **Race** | **P<0.001** | **P<0.001** |
| White | 78.6% [75.3, 81.9] | 83.5% [80.6, 86.5] |
| American Indian | 52.7% [47.0, 58.4] | 53.6% [47.0, 59.3] |
| Other Races | 55.4% [50.9, 59.8] | 75.6% [71.7, 79.4] |
| **Ethnicity** | **P<0.001** | **Not significant** |
| Hispanic | 54.8% [43.9, 65.7] | 80.2% [71.8, 88.6] |
| Non-Hispanic | 73.6% [70.9, 76.4] | 78.1% [75.6, 80.7] |
| **Age (years)** | **P<0.001** | **Not significant** |
| <20 | 59.2% [47.9, 70.6] | 72.0% [61.8, 82.2] |
| 20-24 | 62.2% [55.7, 68.7] | 75.8% [70.5, 81.1] |
| 25-29 | 74.2% [69.5, 78.8] | 81.6% [77.6, 85.6] |
| 30-34 | 79.1% [74.3, 83.8] | 78.8% [74.0, 83.6] |
| ≥35 | 74.6% [67.0, 82.1] | 74.5% [66.5, 82.5] |
| **Maternal Education** | **P<0.001** | **P<0.001** |
| Less than High School | 50.2% [43.0, 57.5] | 62.3% [55.4, 69.2] |
| High School | 66.9% [60.8, 73.1] | 76.6% [71.4, 81.8] |
| More than High School | 79.0% [75.8, 82.3] | 82.3% [79.3, 85.3] |
| **Marital Status** | **P<0.001** | **P=0.001** |
| Married | 77.2% [73.9, 80.4] | 81.5% [78.4, 84.5] |
| Unmarried | 63.6% [58.9, 68.3] | 72.3% [68.2, 76.5] |
| **Insurance During Pregnancy[2]** | **P<0.001** | **P<0.001** |
| Private (direct purchase) | 62.0% [50.3, 73.8] | 79.1% [69.4, 88.8] |
| Job-based | 81.8% [78.3, 85.2] | 84.5% [81.2, 87.8] |
| Medicaid | 63.2% [58.0, 68.3] | 70.4% [65.8, 75.1] |
| Medicare | 62.3% [43.8, 80.7] | 63.5% [45.0, 82.0] |
| Other | 66.6% [52.2, 81.1] | 79.5% [66.8, 92.2] |
| Uninsured | 55.2% [41.5, 68.9] | 59.9% [45.9, 73.8] |
| **Annual Household Income** | **P<0.001** | **P<0.001** |
| <$10,000 | 51.7% [45.2, 58.2] | 65.5% [59.8, 71.2] |
| $10,000- $24,999 | 70.0% [63.0, 76.9] | 75.2% [68.7, 81.8] |
| $25,000 - $49,999 | 75.1% [69.3, 80.9] | 83.8% [78.9, 88.8] |
| $50,000 - $74,999 | 79.8% [73.3, 86.2] | 84.9% [79.1, 90.7] |
| $75,000 or more | 86.7% [81.8, 91.5] | 81.9% [76.1, 87.5] |
| **Region** | **P=0.02** | **P<0.001** |
| Central | 68.7% [60.9, 76.4] | 78.0% [71.5, 84.5] |
| Northeast | 71.0% [64.6, 77.4] | 83.4% [78.2, 88.6] |
| Rapid City MSA | 77.1% [70.1, 84.2] | 70.7% [63.0, 78.4] |
| Sioux Falls MSA | 77.1% [72.7, 81.4] | 85.2% [81.4, 88.9] |
| Southeast | 69.9% [59.7, 80.0] | 73.8% [64.2, 83.5] |
| West | 60.5% [52.8, 68.2] | 61.4% [53.9, 68.8] |

[1] Initiation & adequacy of prenatal care based on Kotelchuck variables using vital records data

[2] If more than one type of insurance was selected, a hierarchy was established to report the individual's insurance status. The hierarchy, in order, was: Private; Job-based (includes self or as a dependent); Other (includes military, VA, Champus & TriCare or Other); Medicaid; Medicare; Uninsured (includes IHS). For example, if an individual selected both 'Private' and 'Medicaid', the individual's insurance status was reported as 'Private'.

In addition to early prenatal care, attending scheduled prenatal visits should lead to improved birth outcomes for both the mother and infant. Defining adequacy of prenatal care based on the Kotelchuck Adequacy Index (2) as the percent of expected visits that were attended[i], 28.9% of South Dakota mothers had more than adequate care (attended 109% or more of expected visits), 50.3% had adequate care (attended 80-108% of expected visits), 16.0% had intermediate adequacy of care (attended 50-79% of expected visits) and 4.8% had inadequate care (attended less than 50% of expected visits) (**Figure 15**). Only 53.6% of American Indian mothers had adequate or more than adequate care, compared to 83.5% of white mothers and 75.6% of other race mothers (**Table 8**). Obtaining adequate or more than adequate care was associated with a higher maternal education, being married, having job-based insurance, and having a higher household income. Mothers from the western region of South Dakota were less likely to have adequate care than mothers from other regions of the state. However, when the above characteristics were considered together the ones that remained important predictors of adequate prenatal care were ***race*** and ***maternal education*** (both, $p<0.05$).

**Figure 15. Adequacy of Prenatal Care Based on the Kotelchuck Adequacy Index** (weighted, data from Department of Health Vital Records of PRAMS participants)

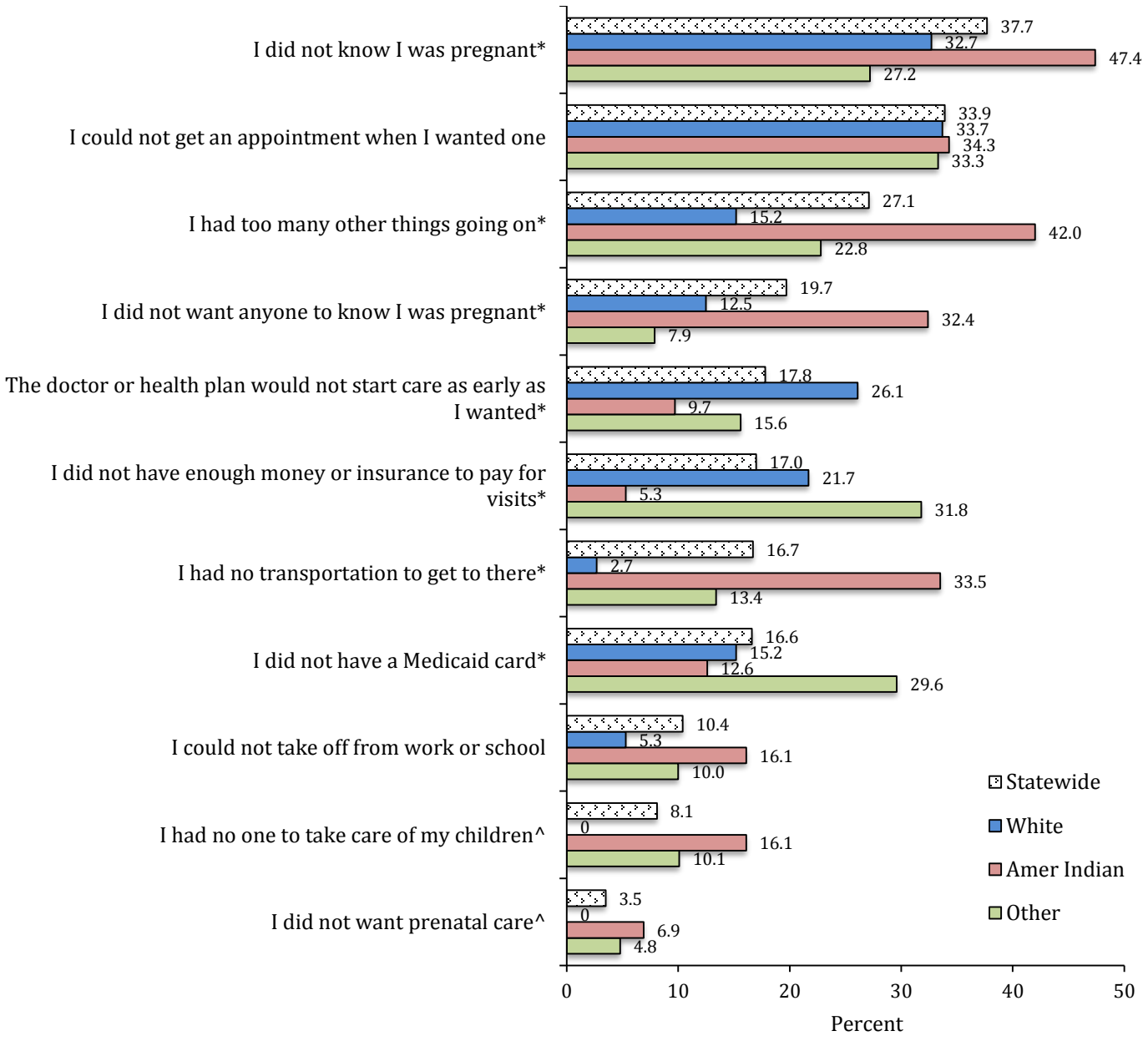



In order to improve early initiation of prenatal care for pregnant women, it is important to understand what factors influence access to early prenatal care in South Dakota. Studies suggest that external barriers such as financial difficulties, lack of insurance, and problems with transportation contribute to delays in seeking prenatal care, and that these barriers differ by age and race of the mother (3). Insight was gained from the 2014 PRAMS as to the reasons for the delay in seeking prenatal care among South Dakota mothers. Statewide, 87.3% of mothers received prenatal care as early in their pregnancy as they wanted, but this varied by race with 92.5% white, 65.3% American Indian, and 78.8% mothers of other races receiving prenatal care as early as they wanted. The barriers that prevented the other 12.7% from receiving prenatal care as early as they wanted are shown in **Figure 16**.

As shown in **Figure 16**, there were significant race differences in seven of the 11 reasons why mothers did not receive prenatal care as early as they wanted. Not knowing they were pregnant was the main reason among all races for not getting early prenatal care. Among white mothers, the inability to get an appointment as early as they wanted and the doctor or health plan would not start care as early as they wanted were on top of the list. Reasons most often stated among American Indian mothers included being too busy, lack of transportation, and not wanting others to know they were pregnant. Among other race mothers, not being able to get an appointment, not having money or insurance to pay for visits, and not having a Medicaid card were the top reasons given.

i The expected number of visits is based on the American College of Obstetricians and Gynecologists prenatal care standards for uncomplicated pregnancies and is adjusted for the gestational age when care began and for the gestational age at delivery.

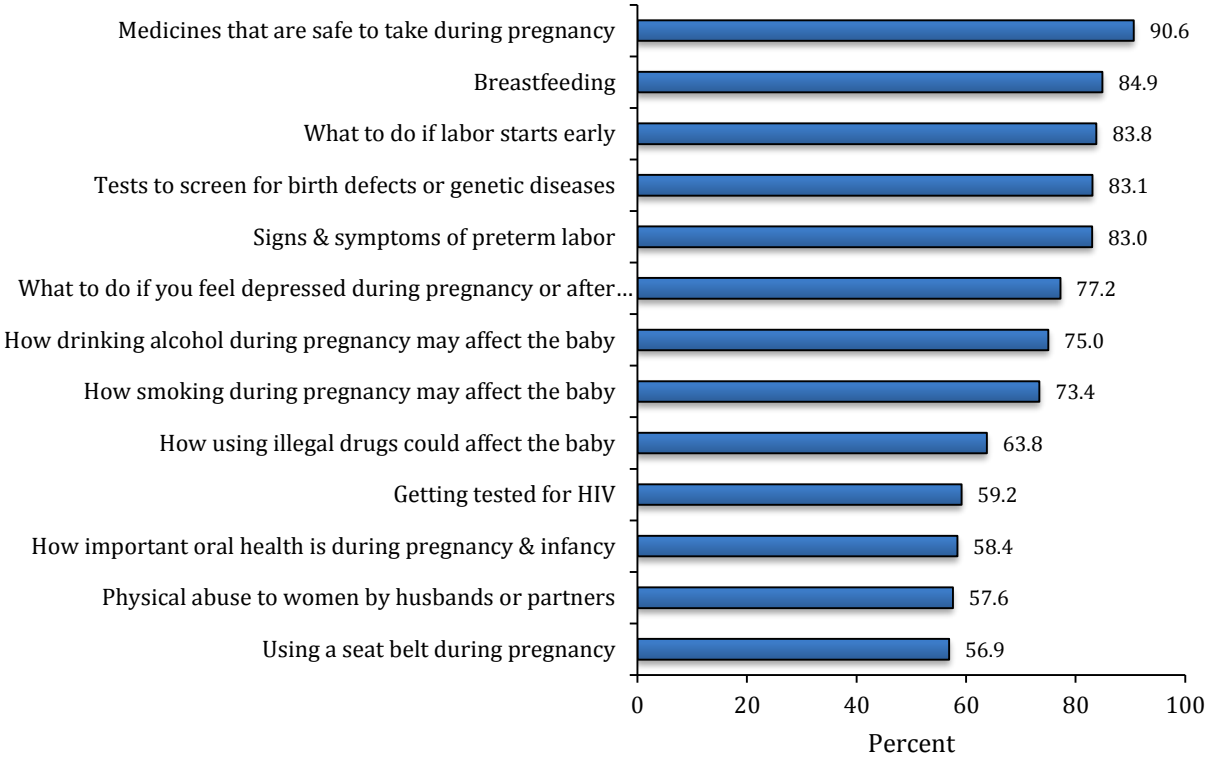
**Figure 16. Barriers that Prevented Mothers from Receiving Prenatal Care as Early as They Wanted**
(weighted, more than one reason could be given)




^ Could not determine race differences due to 0% among White mothers. * Significant race differences.

**Figure 17** summarizes the information that the mothers reported their healthcare provider talked with them about during any of their prenatal care visits. All topics were discussed more than 50% of the time, with safe medicines and breastfeeding being the top two topics and physical abuse and use of a seat belt during pregnancy being discussed the least often.

**Figure 17. Percent of Mothers Who Reported that These Topics were Discussed During Their Prenatal Visit** (weighted)




In addition to HIV testing being discussed during the prenatal visit, 42.6% of mothers were actually tested for HIV and 17.0% were not sure whether they were or not (**Figure 18**). The percent of mothers tested differed by race, with 37.9%, 62.8%, and 47.6% of white, American Indian and other race mothers being tested.

**Figure 18. Percent of Mothers Tested for HIV During Most Recent Pregnancy or At Delivery** (weighted)

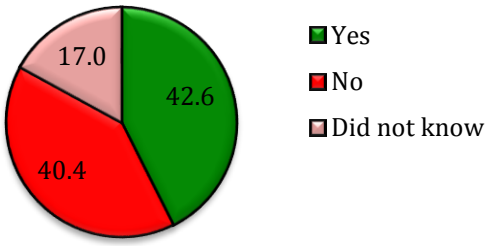
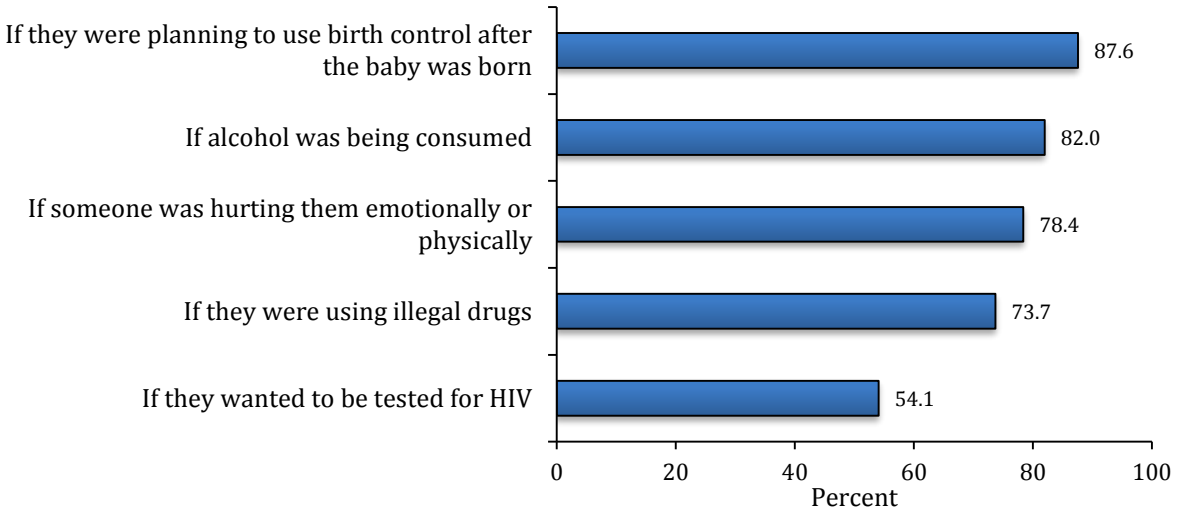



**Figure 19** summarizes questions that the mothers reported being asked during any of their prenatal care visits. More than 70% of the mothers were questioned specifically about use of alcohol and illegal drugs, being abused either emotionally or physically, and about the future use of birth control. In addition, 80.0% (77.5-82.6%) of the mothers stated that a doctor, nurse, or other health care provider advised them not to drink alcohol while they were pregnant and 75.5% (72.8-78.3%) were talked to about how much weight they should gain during their pregnancy (data not shown).

**Figure 19. Percent of Mothers Who Reported that These Questions Were Asked During Their Prenatal Visit** (weighted)




## Summary

- 73.2% of South Dakota mothers began prenatal care in the first trimester and 94.3% began care in the first or second trimester.
- A higher percentage of mothers who had job-based insurance obtained care in the first trimester and attended more than 80% of their expected prenatal visits compared to other mothers.
- Higher rates of beginning prenatal care during the first trimester were seen by race and household income: White mothers were more likely to begin prenatal care during the first trimester than American Indian and Other Race mothers, and higher income mothers were more likely to begin early prenatal care than mothers with lower income.
- 87.3% of mothers were able to begin prenatal care as early as they wanted, but this varied by race with 92.5%, 65.3%, and 78.8% of white, American Indian and other race mothers, respectively. The main reasons for not getting prenatal care as early as they wanted also varied by race.
- 79.2% of mothers received adequate prenatal care defined as attending more than 80% of expected visits once prenatal care was initiated, and this varied by race with 83.5%, 53.6% and 75.6% of white, American Indian and other race mothers, respectively, attending more than 80% of expected visits.
- Higher rates of receiving adequate prenatal care were seen by race and maternal education: white mothers and mothers with more education were more likely to receive adequate prenatal care.

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# Substance Use During Pregnancy (Tobacco, Alcohol, Illicit Drugs)

**Quote from a 2014 SD PRAMS Mother:**

*"Maybe add more questions about if parents did drugs while pregnant for better results since I do see a lot of parents who do bad things while pregnant."*

## Background

Substance abuse (abuse of alcohol, tobacco or illicit drugs) is a significant public health issue among pregnant women. In 2011-2012, about 15.9% of pregnant women in the United States aged 15 to 44 years had smoked cigarettes during the previous month (1). Nationally, the prevalence of alcohol use during the past 30 days among pregnant women aged 18–44 years was 7.6% based on 2006–2010 Behavioral Risk Factor Surveillance System (BRFSS) data (2), and illicit drug use among pregnant women aged 15 to 44 years was 5.4% based on data averaged across 2012 and 2013 (3). The use of tobacco, alcohol and drugs by pregnant women could lead to significant maternal, fetal, and neonatal morbidity (4-6). Studies have shown that pregnant women with substance use disorders have lower rates of seeking prenatal care, and they have higher rates of low birthweight infants and preterm births (4,7-8).

## Public Health Implications

Substance abuse is a major contributor to the costs of health care and social and public health problems such as crime, domestic violence, etc. The Healthy People 2020 goals set by the U.S. Department of Health and Human Services are a list of national benchmarks that will help improve maternal and fetal outcomes. They cover many areas, but the ones specific to substance abuse are listed below (9):

- MCH 11: Increase abstinence from alcohol, cigarettes, and illicit drugs among pregnant women.
- MCH 16.3: Increase the proportion of women delivering a live birth who did not smoke prior to pregnancy.
- MCH 16.4: Increase the proportion of women delivering a live birth who did not drink alcohol prior to pregnancy.
- MCH 18: Reduce postpartum relapse of smoking among women who quit smoking during pregnancy.
- MCH 25: Reduce the occurrence of fetal alcohol syndrome (FAS).

Although the goals listed above are national goals, they are also important to South Dakota, and evaluating where South Dakota lies within those goals can give health professionals and researchers an indication on which of these areas needs attention in order to improve the health of mothers and infants in our state.

## Tobacco Use

**Figure 20** shows the percentage of South Dakota mothers in 2014 that did not smoke cigarettes in the last two years, smoked cigarettes in the last two years but not the last three months of pregnancy, and smoked in the last three months of pregnancy. Of the 13.1% of mothers who smoked during the last three months of pregnancy, the majority smoked five or fewer cigarettes per day. **Figure 21** shows the percentages that smoked in the last two years, smoked in the last two years but not the last three months of pregnancy, and those who smoked the last three months of pregnancy by race. A higher percent of American Indian mothers smoked in the past two years compared to white mothers and mothers of other races ($p<0.001$).

**Figure 20. Smoking Status of South Dakota Mothers and Quantity Smoked During the Last Three Months of Pregnancy** (weighted)

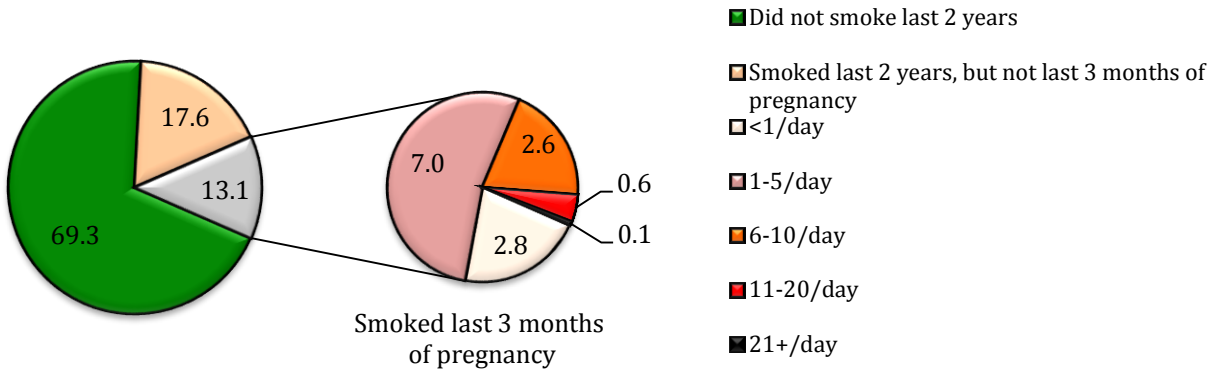
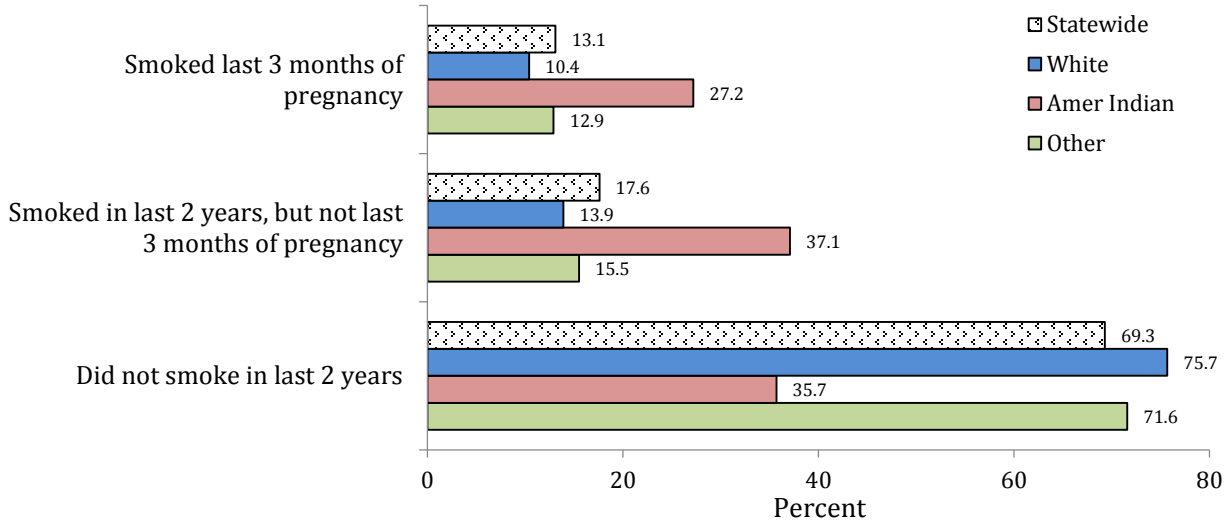


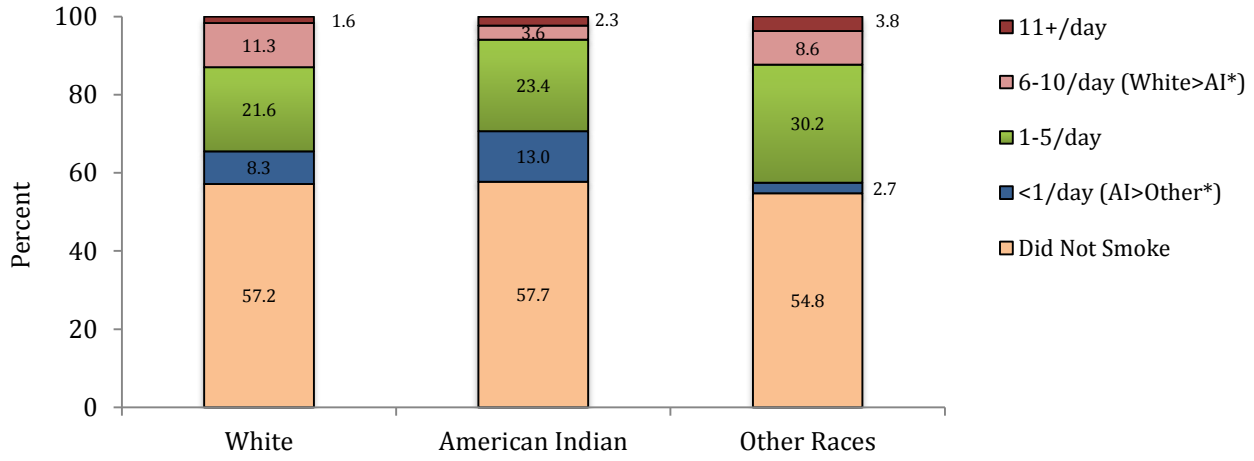

**Figure 21. Smoking Status of South Dakota Mothers by Race** (weighted)




* There were significant race differences in the above three variables (p<0.001)

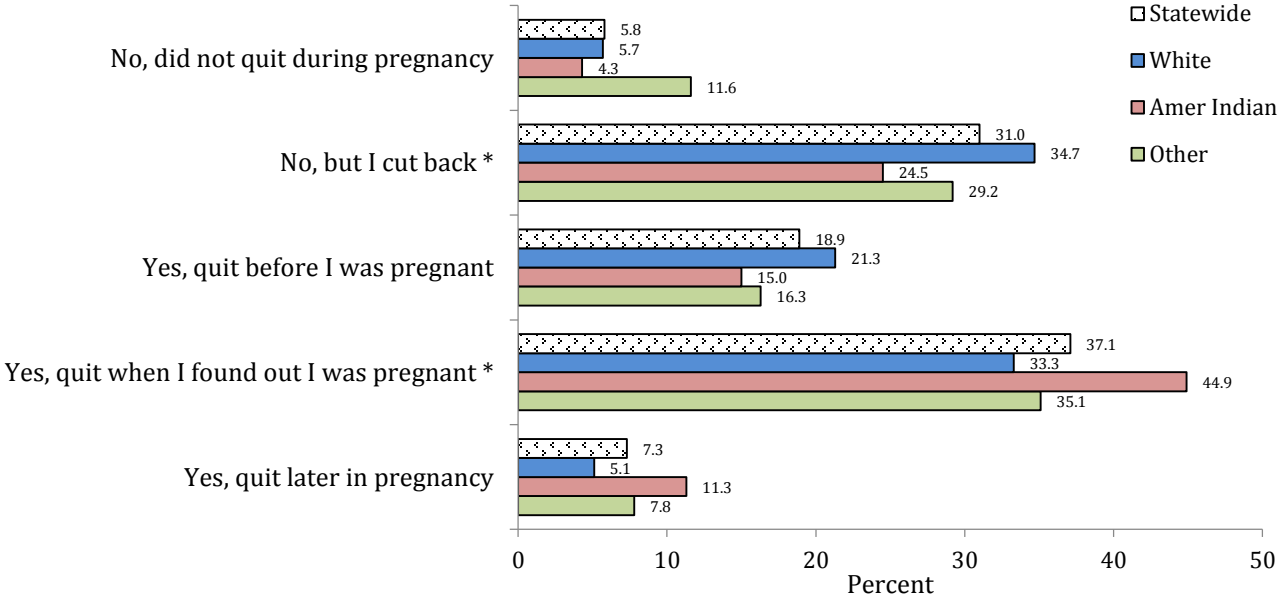
Although American Indians were more likely to have smoked cigarettes in the last two years than white mothers (64.3% vs. 24.3% respectively), they tended to smoke fewer cigarettes (**Figure 22,** p=0.08) and were more likely to quit smoking when they found out they were pregnant compared to white mothers (**Figure 23**, p<0.05).

**Figure 22. Smoking Status During the Last Three Months of Pregnancy for Those Mothers Who Smoked During the Last Two Years by Race** (weighted)




* Significant race differences (p<0.05)

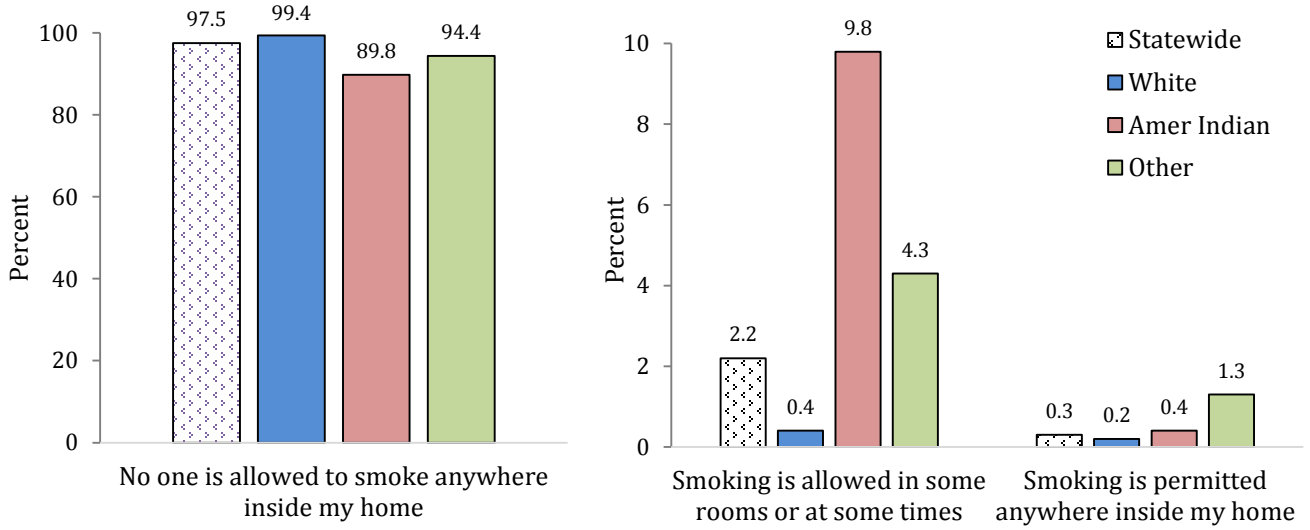
**Figure 23. Quit Status of South Dakota Mothers Who Reported Smoking Cigarettes in the Past Two Years** (weighted)




* Significant race differences (p<0.05)

**Figure 24** shows the percentage of mothers who allow smoking in their home by race. Of those surveyed, most mothers do not allow smoking in their home (97.5%), while 2.2% allow smoking in some rooms or at some times in their home. White mothers had the highest percent that did not allow smoking in their homes (99.4%), and this differed significantly from American Indian and other race mothers (both, p<0.05). There were significant differences among all racial groups in the percent allowing smoking in some rooms or at some times (all, p<0.05). Other race mothers had a significantly higher percent that permitted smoking anywhere inside the home compared to white mothers (p<0.05).

**Figure 24. Percentage of Mothers' Homes Where Smoking is Not Allowed or Allowed by Race** (weighted)

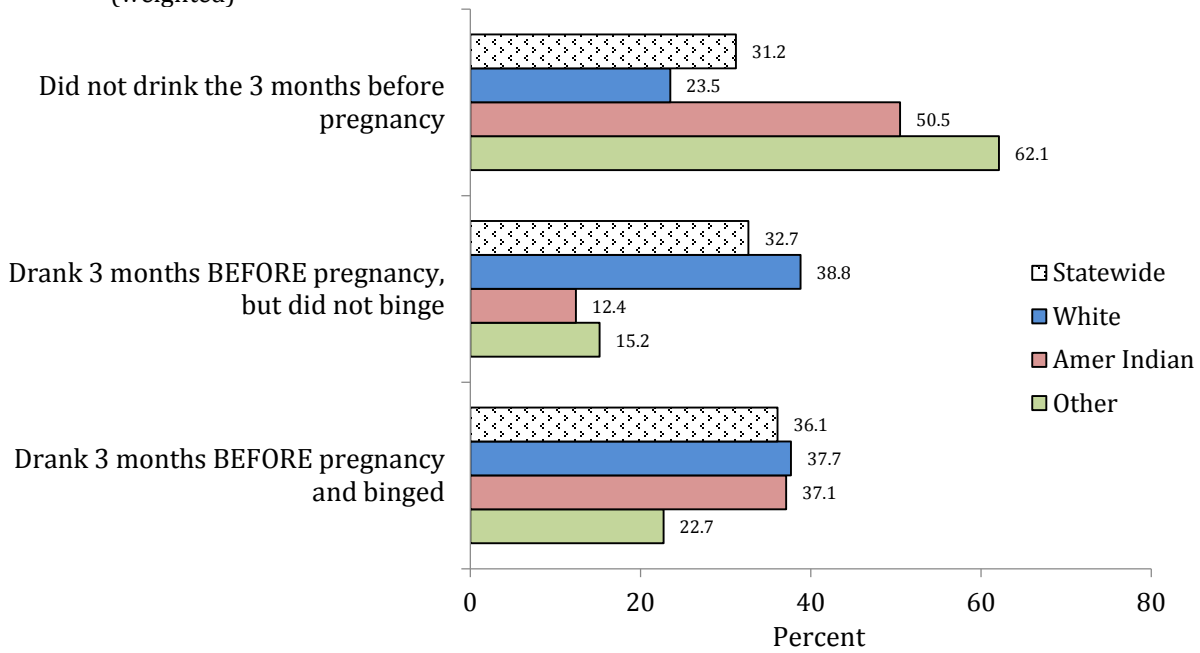



## Alcohol Use

Early fetal exposure to alcohol is associated with congenital abnormalities and behavioral issues later in life. Since many pregnancies are unintended and often not known until late in the first trimester, it is important to reduce alcohol consumption in women of childbearing age who are at high risk of pregnancy. **Figure 25** shows the statewide alcohol consumption and binge drinking rates of South Dakota mothers during the three months ***before*** pregnancy. Statewide, 68.8% of mothers drank at some time during the three months before pregnancy; alcohol consumption with binge drinking (four or more drinks within a two hour span) occurred in 36.1% of South Dakota mothers. A higher percentage of white mothers drank compared to American Indian and other race mothers (both, $p<0.001$), and American Indian mothers drank more than Other Race mothers ($p=0.003$). Binge drinking was the lowest among other race mothers ($p<0.001$).

**Figure 26** shows the statewide rates of South Dakota mothers who drank and binge drank during the last three months of pregnancy. Statewide, 21.1% of mothers did not drink during the last 2 years, 70.2% drank at some time during the last two years but not during the last three months of pregnancy, and 6.9% drank less than one drink per week, 1.1% drank one to three drinks per week and 0.7% drank four or more drinks per week during the last three months of pregnancy. Binge drinking (4 or more drinks within a two hour span) during the last three months of pregnancy occurred in 1.2% of South Dakota mothers, with more than half of these binge-drinking episodes occurring only once (**Figure 27**).

**Figure 25. Drinking Status of South Dakota Mothers the Three Months *BEFORE* Pregnancy by Race**
(weighted)




Significant race differences in all three of the above categories at p<0.01 (see text)

**Figure 26. Drinking Status of South Dakota Mothers during the Last Three Months of Pregnancy**
(weighted, all races)

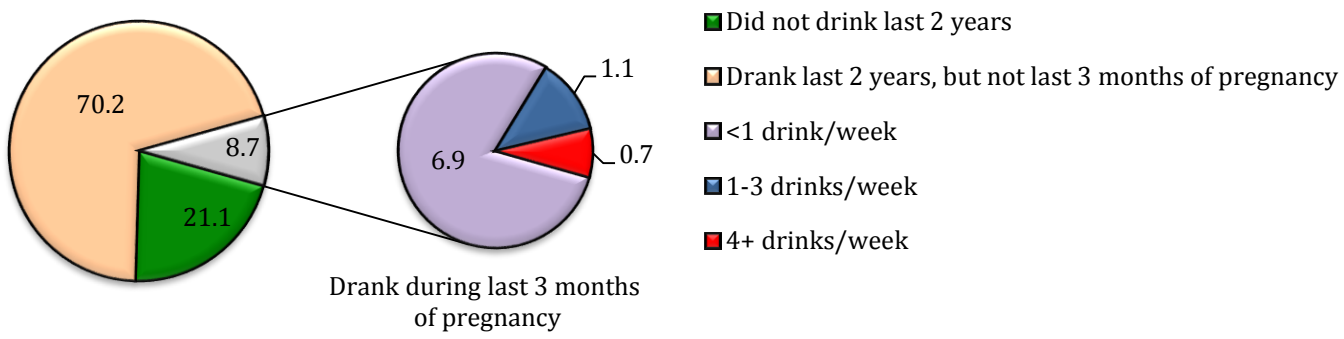


**Figure 27. Binge-Drinking (4+ Drinks at One Sitting) Rates of South Dakota Mothers during the Last Three Months of Pregnancy** (weighted, all races)

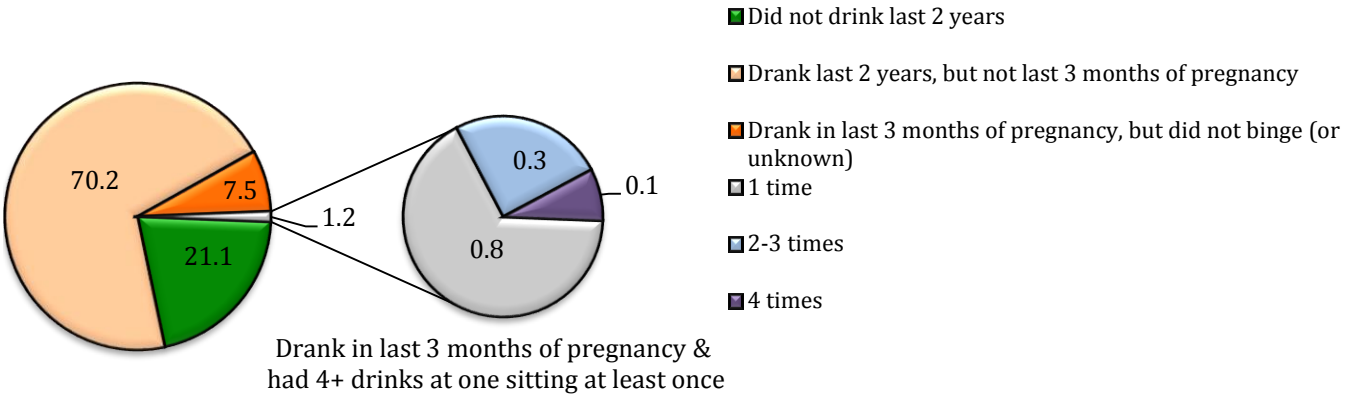
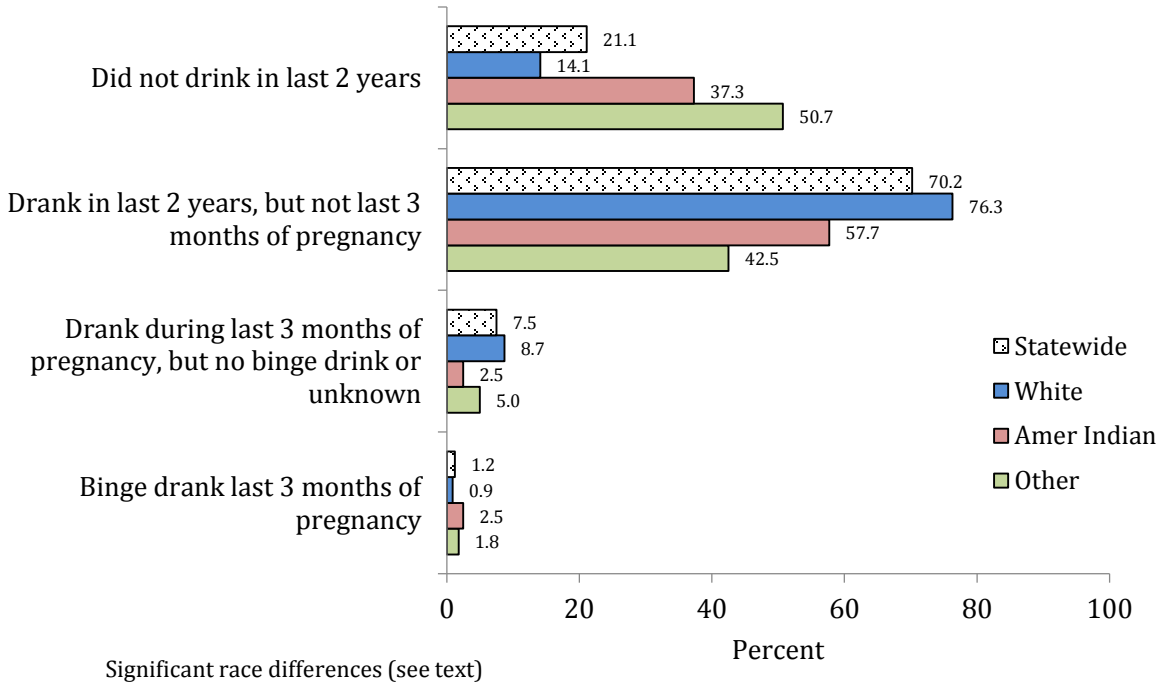



**Figure 28** shows drinking status during the ***last*** three months of pregnancy by race. These data show that across all races, most mothers who consumed alcohol in the past two years did not drink during the ***last*** three months of pregnancy. Of white, American Indian and other race mothers in South Dakota, 8.7%, 2.5%, and 5.0%, respectively, drank at least one drink per week but did not binge during the ***last*** three months of pregnancy and 0.9%, 2.5%, and 1.8% had at least one episode of binge drinking. Although American Indian mothers were less likely to drink over the last two years compared to white mothers ($p<0.001$), those who did drink were more likely to binge drink.

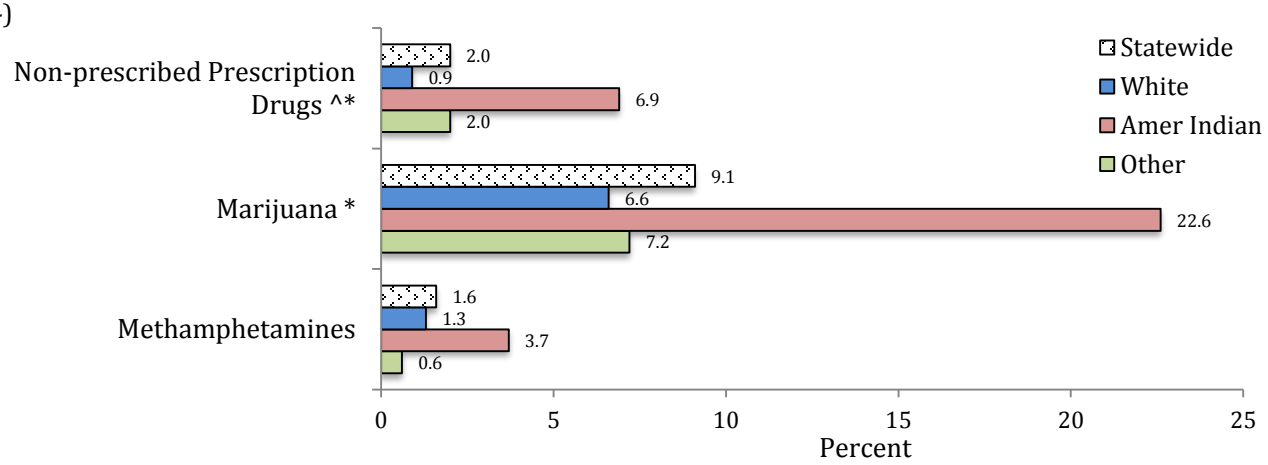
**Figure 28. Drinking Rates of South Dakota Mothers During the Last Three Months of Pregnancy by Race** (weighted)



## Illicit Drug Use

**Figure 29** shows illicit drug use among PRAMS mothers. While the PRAMS survey was in progress, questions about drug use during the three months prior to pregnancy were added with 708 out of the 1,166 mothers (60.7%) being questioned regarding illicit drug use. Because of this, there are missing data. However, the data that were collected show that 9.1% of the mothers surveyed used marijuana during the three months prior to their pregnancy, while 2.0% used non-prescribed prescription drugs and 1.6% used methamphetamines. Non-prescribed prescription drug use and marijuana use were highest among American Indian mothers compared to White and other race mothers (all, $p<0.05$). Use of heroin, hallucinogens, cocaine and inhalants (glue, paint, etc.) was less than 1% statewide and in all race groups (data not shown).

**Figure 29. Drug Use Among Mothers 3 Months Before Pregnancy** [1] (weighted, questions added in the middle of 2014)




Heroin, hallucinogens, cocaine and inhalants (glue, paint, etc.) were <1% statewide and across all races and are not shown.

^ Includes oxycodone, hydrocodone, & oxycontin

* Significant ($p<0.05$) race differences

**Table 9** shows the prevalence of smoking tobacco, alcohol consumption, and drug use in the three months ***before*** their pregnancy by demographic characteristics of mothers in South Dakota in 2014. The prevalence of smoking the three months before pregnancy was highest for mothers in the following demographic categories: American Indian race, younger age, less educated, not married, lower income, and reside in the western region of South Dakota. The prevalence of alcohol consumption the three months before pregnancy was highest for mothers in the following demographic categories: white race, Non-Hispanic ethnicity, older age, more educated, married, higher income and reside in the central region of the state. The prevalence of illicit drug use the three months before pregnancy was highest for mothers in the following demographic categories: American Indian race, non-Hispanic ethnicity, younger age, less educated, not married, lower household income, and reside in the western region of the state.

**Table 10** shows the prevalence of smoking tobacco and alcohol consumption in the ***last*** three months of pregnancy by demographic characteristics of mothers in South Dakota in 2014. The prevalence of smoking in the last three months of pregnancy was highest for mothers in the following demographic categories: American Indian race, non-Hispanic ethnicity, younger age, less educated, not married, having lower income, and residing in the western region of South Dakota. The prevalence of alcohol consumption in the last three months of pregnancy was significantly higher for white mothers than for American Indian mothers or mothers of other races. The prevalence of drinking in the last three months of pregnancy was not associated with ethnicity, age, education, region of the state, marital status or household income.

**Table 9. Percent of Mothers Who Smoked, Drank or Used Drugs Three Months *Before* Pregnancy by Demographic Characteristics [1]** (weighted)

| | (95% C.I.) | | |
|---|---|---|---|
| | **% Smoking** | **% Drinking** | **% Using Drugs[2]** |
| **Race** | **p<0.001** | **p<0.001** | **p<0.001** |
| White | 20.7% [17.3, 24.1] | 76.4% [72.9, 79.9] | 7.2% [4.4, 10.0] |
| American Indian | 61.4% [55.8, 67.0] | 49.6% [43.8, 55.4] | 25.3% [18.8, 31.8] |
| Other Races | 25.3% [21.3, 29.4] | 38.1% [33.7, 42.5] | 8.0% [4.9, 11.2] |
| **Ethnicity** | **Not significant** | **p=0.005** | **p=0.006** |
| Hispanic | 18.8% [10.2, 27.5] | 54.5% [43.4, 65.6] | 2.8% [0.1, 5.4] |
| Non-Hispanic | 27.7% [24.8, 30.5] | 68.4% [66.8, 72.6] | 10.4% [7.9, 12.9] |
| **Age (years)** | **p<0.001** | **p<0.001** | **p<0.001** |
| <20 | 54.2% [42.1, 66.2] | 37.4% [25.7, 49.2] | 19.1% [7.7, 30.5] |
| 20-24 | 46.4% [39.4, 53.3] | 68.8% [62.6, 75.0] | 22.0% [14.7, 29.2] |
| 25-29 | 23.9% [19.3, 28.6] | 72.7% [67.9, 77.4] | 9.1% [4.8, 13.5] |
| 30-34 | 16.4% [12.1, 20.7] | 73.3% [68.2, 78.4] | 4.6% [1.6, 7.6] |
| ≥35 | 17.5% [10.8, 24.2] | 60.9% [52.7, 69.6] | 2.1% [0.2, 4.1] |
| **Education** | **p<0.001** | **p<0.001** | **p<0.001** |
| <High School | 44.5% [37.3, 51.7] | 45.1% [37.6, 52.7] | 26.5% [17.5, 35.5] |
| High School | 49.1% [42.2, 56.0] | 52.1% [45.3, 59.0] | 15.4% [9.2, 21.6] |
| >High School | 16.9% [13.9, 19.8] | 78.8% [75.6, 81.9] | 4.9% [2.8, 7.0] |
| **Region** | **p<0.001** | **p=0.003** | **p<0.001** |
| Central | 33.0% [25.0, 40.9] | 75.5% [68.2, 82.8] | 11.0% [5.3, 16.7] |
| Northeast | 22.2% [16.2, 28.3] | 67.1% [60.3, 74.0] | 7.0% [2.1, 12.0] |
| Rapid City MSA | 30.9% [23.1, 38.7] | 68.2% [60.4, 76.9] | 5.0% [0.6, 9.4] |
| Sioux Falls MSA | 19.4% [14.8, 23.9] | 71.7% [67.1, 76.4] | 10.7% [6.2, 15.3] |
| Southeast | 23.8% [13.9, 33.7] | 71.8% [61.8, 81.8] | 2.5% [0.0, 7.2] |
| West | 51.2% [44.0, 60.3] | 52.5% [44.4, 60.7] | 24.5% [15.9, 33.1] |
| **Marital Status** | **p<0.001** | **p<0.001** | **p<0.001** |
| Married | 13.0% [10.3, 15.6] | 72.9% [69.5, 76.4] | 3.8% [1.8, 5.8] |
| Unmarried | 53.6% [48.5, 58.7] | 60.9% [56.0, 65.7] | 21.5% [16.2, 26.8] |
| **Annual Household Income** | **p<0.001** | **p<0.001** | **p<0.001** |
| <$10,000 | 61.9% [55.6, 68.2] | 52.2% [45.6, 58.7] | 24.6% [17.4, 31.8] |
| $10,000- $24,999 | 44.0% [35.7, 52.2] | 61.3% [53.6, 69.0] | 15.2% [7.7, 22.8] |
| $25,000 - $49,999 | 22.6% [16.8, 28.3] | 69.6% [63.6, 75.6] | 8.2% [3.4, 13.0] |
| $50,000 - $74,999 | 14.0% [8.4, 19.7] | 78.8% [72.4, 85.3] | 3.0% [0, 6.7] |
| $75,000 or more | 4.6% [1.7. 7.6] | 81.0% [75.4, 86.6] | 1.0% [0, 2.8] |

[1] Mothers who did not smoke or drink in the last 2 years were included, along with mothers who quit, in these calculations.

[2] Drug use was asked of 708 of the 1,166 respondents. Includes marijuana, non-prescribed prescription drugs (e.g., oxycodone, hydrocodone, etc.), methamphetamines, heroin, hallucinogens, cocaine and inhalants (glue, paint, etc.)

MSA = metropolitan statistical area

**Table 10. Percent of Mothers Who Smoked or Drank during the Last Three Months of Pregnancy by Demographic Characteristics [1] (weighted)**

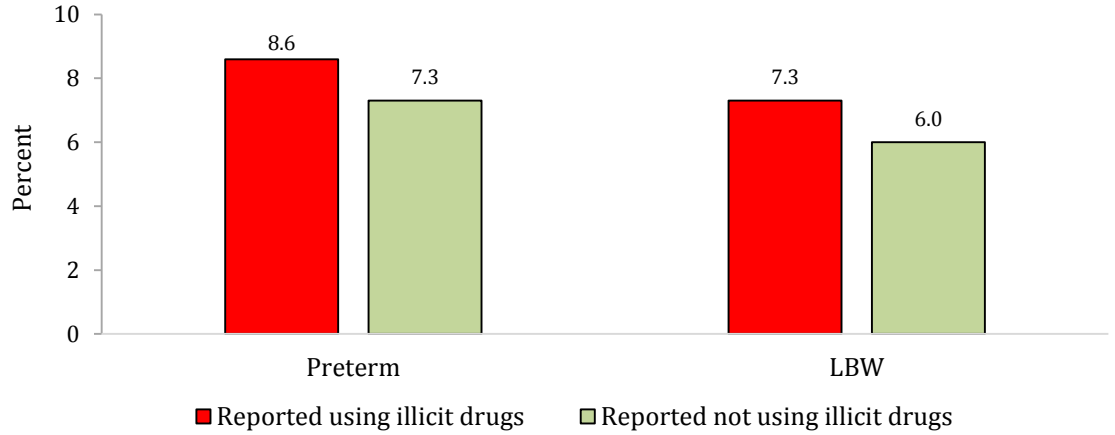
| | % Smoking [95% C.I.] | % Drinking [95% C.I.] |
|---|---|---|
| **Race** | **p<0.001** | **p=0.02** |
| White | 10.4% [7.8, 13.0] | 9.6% [7.2, 12.0] |
| American Indian | 27.0% [21.8, 32.2] | 5.0% [2.5, 7.5] |
| Other Races | 12.7% [9.5, 15.9] | 6.7% [4.4, 9.0] |
| **Ethnicity** | **p=0.01** | **Not significant** |
| Hispanic | 5.5% [2.1, 9.0] | 8.2% [3.2, 13.2] |
| Non-Hispanic | 13.4% [11.2, 15.6] | 8.7% [6.7, 10.6] |
| **Age (years)** | **p<0.001** | **Not significant** |
| <20 | 19.9% [10.1, 29.7] | 5.5% [0, 12.1] |
| 20-24 | 21.5% [15.7, 27.3] | 7.4% [3.8, 11.1] |
| 25-29 | 13.0% [9.3, 16.7] | 6.6% [3.8, 9.4] |
| 30-34 | 8.2% [4.9, 11.4] | 12.7% [8.5, 16.9] |
| ≥35 | 7.7% [3.6, 11.8] | 8.3% [3.2, 13.4] |
| **Education** | **p<0.001** | **Not significant** |
| <High School | 25.7% [19.1, 32.4] | 7.5% [2.9, 12.2] |
| High School | 26.3% [20.1, 32.4] | 8.4% [4.7, 12.2] |
| >High School | 6.3% [4.4, 8.3] | 9.0% [6.6, 11.4] |
| **Region** | **p=0.003** | **Not significant** |
| Central | 13.4% [8.3, 19.7] | 3.8% [0.4, 7.2] |
| Northeast | 9.5% [5.5, 13.6] | 8.8% [4.5, 13.2] |
| Rapid City MSA | 15.5% [9.0, 22.1] | 8.4% [3.7, 13.2] |
| Sioux Falls MSA | 10.7% [7.2, 14.3] | 11.3% [7.7, 15.0] |
| Southeast | 10.3% [3.2, 17.3] | 5.1% [0.4, 9.8] |
| West | 25.6% [18.7, 32.5] | 8.6% [3.3, 13.9] |
| **Marital Status** | **p<0.001** | **Not significant** |
| Married | 5.7% [3.8, 7.6] | 9.5% [7.0, 11.9] |
| Unmarried | 26.7% [22.1, 31.3] | 7.1% [4.3, 9.9] |
| **Annual Household Income** | **p<0.001** | **Not significant** |
| <$10,000 | 34.2% [27.8, 40.6] | 5.2% [2.3, 8.1] |
| $10,000- $24,999 | 18.3% [11.8, 24.8] | 10.8% [5.3, 16.2] |
| $25,000 - $49,999 | 12.0% [7.4, 16.5] | 7.6% [4.0, 11.2] |
| $50,000 - $74,999 | 4.3% [0.9, 7.6] | 10.5% [5.5, 15.5] |
| $75,000 or more | 1.9% [0, 4.1] | 10.0% [5.7, 14.4] |

[1] Mothers who did not smoke or drink in the last 2 years, along with mothers who quit, were included in these calculations.

MSA = metropolitan statistical area

**Figure 30** shows the percent of mothers with a preterm or low birthweight infant in relation to illicit drug use the three months before pregnancy. There were no significant associations between illicit drug use and these birth outcomes.

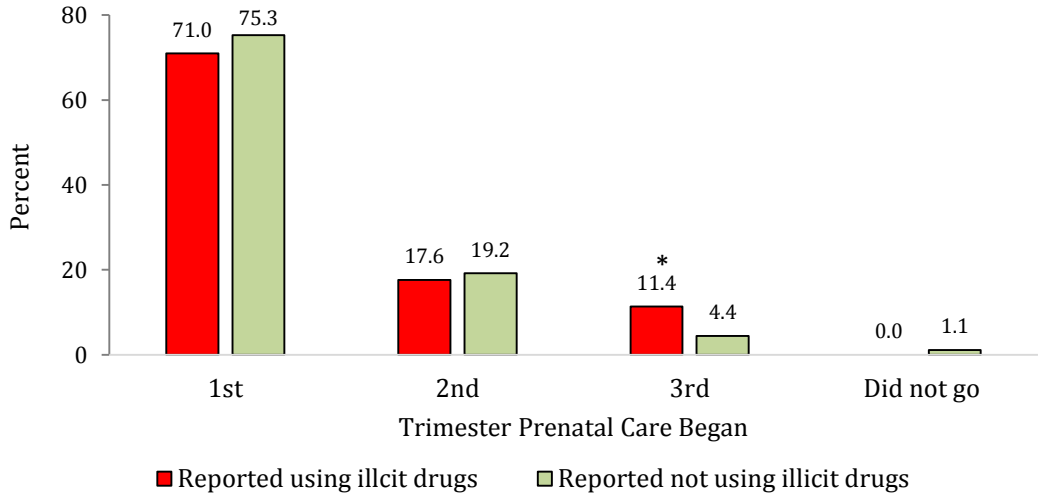
**Figure 30. Percentages of Preterm Births and Low Birthweight (LBW) Infants by Whether the Mothers Used Illicit Drugs in the 3 Months Before Pregnancy** [1] (weighted)




[1] Preterm birth is defined as an infant born prior to 37 weeks gestation; low birthweight (LBW) is defined as a child weighing <2,500 grams.

A higher percent of mothers who reported illicit drug use began prenatal care in the third trimester compared to mothers not reporting illicit drug use ($p<0.05$). **Figure 31** shows the trimester the mothers began prenatal care by whether or not they reported using illicit drugs the three months before pregnancy.

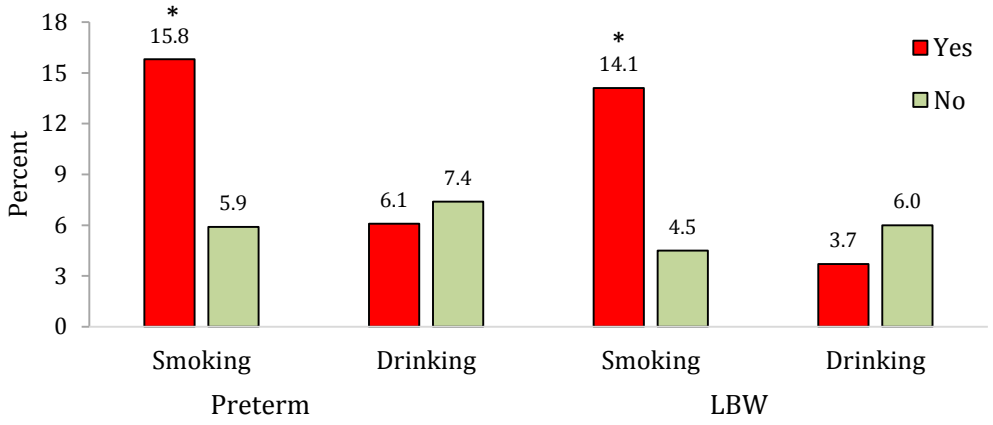
**Figure 31. Trimester Prenatal Care Began by Use of Illicit Drugs** (weighted)




* Significantly different at $p<0.05$.

**Figure 32** shows the percent of mothers with a preterm or low birthweight infant in relation to smoking and drinking during the last three months of pregnancy. Smoking in the last three months of pregnancy was associated with both preterm and low birthweight infants (both, p<0.001).

**Figure 32. Percentages of Preterm and Low Birthweight (LBW) Births by Whether the Mothers Smoked or Drank the Last 3 Months of Pregnancy [1]** (weighted)




[1] Mothers who did not smoke or drink in the last 2 years were included in the non-smoking and non-drinking groups along with mothers who quit. LBW is defined as a child weighing less than 2,500 grams; preterm birth is defined as a child born <37 weeks gestation.

* Significantly different from non-smokers at p<0.001.

## Summary

*Tobacco Use*

- Statewide, 86.9% of mothers did not smoke during the last three months of pregnancy. Of the 13.1% who smoked, the majority smoked five cigarettes per day or less.
- Although American Indian mothers were more likely to have smoked in the last two years than white mothers (64.3% vs. 24.3% respectively), they were more likely to quit when they found out they were pregnant (44.9% vs. 33.3%) and if they continued to smoke, they tended to smoke fewer cigarettes than white and other race mothers.
- 97.5% of South Dakota mothers did not allow smoking anywhere in their home, but this varied by race with 99.4%, 89.8%, and 94.4% of white, American Indian, and other race mothers did not allow smoking in their home.
- Mothers who smoked in the last three months of pregnancy were more likely to have a preterm birth or low birthweight infant compared to mothers who had not smoked.

*Alcohol Use*

- A total of 68.8% of South Dakota mothers drank during the three months before pregnancy, with 36.1% having at least one episode of binge drinking.
- A higher percentage of white mothers drank the three months before pregnancy than American Indian and other race mothers (76.5%, 49.5% & 37.9%, respectively).

- 8.7% of South Dakota mothers consumed alcohol in the last three months of pregnancy; 9.6%, 5.0%, and 6.8% of white, American Indian and other race mothers, respectively, consumed alcohol during the last three months of pregnancy.
- Binge drinking at least once during the last three months of pregnancy occurred in 1.2% of South Dakota mothers, with 0.9%, 2.5%, and 1.8% of white, American Indian and other race mothers binge drinking at least once during the last three months.
- Drinking in the last three months of pregnancy was not associated with preterm births or low birthweight infants.

*Illicit Drug Use*

- An estimated 9.1% of South Dakota mothers smoked marijuana, 2.0% used non-prescribed prescription drugs, and 1.6% used methamphetamines in the three months before pregnancy.
- Illicit drug use in the three months before pregnancy varied significantly by race and was highest among American Indian mothers.
- Illicit drug use in the three months before pregnancy was not associated with preterm birth, low birthweight infants, or the initiation of prenatal care. However, a higher percent of mothers who reported illicit drug use began prenatal care in third trimester compared to those who did not report using illicit drugs.

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# Maternal Health During Pregnancy

**Quote from 2014 SD PRAMS Mothers:**

*"Overall my pregnancy was great... My delivery was amazing and I'm thankful for a healthy baby girl."*

**Background**

An infant's health at birth can be greatly affected by the mother's health during pregnancy. Health risks such as gestational diabetes, preeclampsia, and placenta previa pose threats to the health of the infant and mother. In 2014, the infant mortality rate was 5.9 per 1,000 live births in South Dakota**.** Awareness of the potential maternal health risks during pregnancy and receiving adequate prenatal care can reduce infant mortality and other adverse outcomes for mother and fetus. Based on 2014 vital records, 73.2% percent of South Dakota mothers received prenatal care in the first trimester (**see Section on Prenatal Care**)**.** Being able to recognize the dangers or potential risks can help create a healthy life for both the mother and infant.

**Public Health Implications**

Gestational diabetes can lead to health concerns for the mother and baby not only during pregnancy and delivery, but also for a lifetime. Women with gestational diabetes have an increased risk of high blood pressure and preterm labor. Possible complications for the baby at delivery include low blood sugar, respiratory distress and birth trauma due to increased birthweight. In addition, the long-term concern is that gestational diabetes increases the future risk of developing Type 2 diabetes in both the mother and her infant (1).

Preeclampsia, a type of hypertension that affects pregnant mothers, is a major factor in maternal and fetal mortality. Mild preeclampsia is characterized by a blood pressure greater than 140/90 mmHg (2). Along with hypertension, preeclampsia can be diagnosed by excessive protein loss in the urine, liver and kidney dysfunction, and issues with the central nervous system, such as headaches and vision problems. Preeclampsia is associated with intrauterine growth retardation (IUGR), placental abruption, and oligohydramnios (low amniotic fluid levels). Placenta previa is typically seen during the third trimester. The covering of the cervix by the placenta can either be marginal, covering less than 2 cm of the cervical opening, or complete. Placenta previa causing painless vaginal bleeding increases the risk of hemorrhage and maternal and fetal mortality (3).

The prevalence of medical problems during pregnancy based on self-report by 2014 South Dakota mothers by race are shown in **Table 11**. Mothers in the other race category had a higher rate of gestational diabetes than white mothers, and a higher percent of American Indian mothers reported kidney or bladder infections during pregnancy than white and other race mothers. Both American Indian and other race mothers reported higher rates of severe nausea, vomiting or dehydration than white mothers. Mothers in the other race category had a higher rate of cerclage and need for a blood transfusion compared to white mothers. There were no race differences in the rate of self-reported vaginal bleeding, hypertension, placental problems, early labor pains, premature rupture of membranes, or car accidents.

Due to the high morbidity and mortality associated with gestational diabetes, hypertension, and placenta problems, the prevalence of mothers reporting these conditions by demographic characteristics are shown in **Table 12.** The rate of gestational diabetes was higher in older mothers. For all other demographic characteristics, there were no associations with percent of self-reported gestational diabetes, hypertension, or placenta problems.

**Table 11. Prevalence (95% Confidence Intervals) of Pregnancy Related Problems Reported by the Mother by Race** (weighted)

| | White | American Indian | Other Races | Statewide |
|---|---|---|---|---|
| Severe nausea, vomiting, or dehydration | 21.3% (18.0, 24.7) [AB] | 34.2% (28.7, 39.7) [A] | 28.9% (24.7, 33.0) [B] | 24.0% (21.3, 26.7) |
| Labor pains more than 3 weeks before my baby was due (preterm or early labor) | 16.7% (13.6, 19.7) | 21.9% (17.1, 26.6) | 17.4% (13.9, 21.0) | 17.5% (15.1, 19.9) |
| Kidney or bladder (urinary tract) infection | 14.8% (11.9, 17.7) [A] | 25.6% (20.5, 30.6) [AB] | 16.1% (12.8, 19.4) [B] | 16.6% (14.2, 18.9) |
| Vaginal bleeding | 15.2% (12.3, 18.1) | 15.9% (11.6, 20.1) | 14.5% (11.3, 17.7) | 15.2% (12.9, 17.5) |
| High blood pressure, hypertension (including pregnancy, induced hypertension [PIH], preeclampsia, or toxemia) | 12.0% (9.4, 14.6) | 10.7% (7.2, 14.2) | 8.4% (5.9, 10.9) | 11.4% (9.4, 13.5) |
| Gestational Diabetes (diagnosed) | 9.9% (7.5, 12.4) [A] | 10.4% (6.8, 13.9) | 15.2% (12.0 18.4)[A] | 10.5% (8.6, 12.4) |
| Problems with the placenta (such as abruption placentae or placenta previa) | 5.3% (3.5, 7.1) | 5.2% (2.7, 7.7) | 3.7% (1.9, 5.5) | 5.1% (3.7, 6.6) |
| Water broke more than 3 weeks before my baby was due (premature rupture of membranes [PROM]) | 4.2% (2.5, 5.9) | 6.9 % (4.0, 9.9) | 3.4% (1.7, 5.1) | 4.6% (3.2, 5.9) |
| I was hurt in a car accident | 0.7% (0.0, 1.4) | 1.4% (0.1, 2.7) | 1.1% (0.2, 2.0) | 0.9% (0.3, 1.4) |
| Cervix had to be sewn shut (cerclage for incompetent cervix) | 0.4% (0.0, 0.8) [A] | 1.2% (0.0, 2.4) | 1.9% (0.6, 3.3) [A] | 0.6% (0.2, 1.1) |
| I had to have a blood transfusion | 0.2% (0.0, 0.6) [A] | 1.8% (0.3, 3.2) | 2.1% (0.8, 3.4) [A] | 0.6% (0.2, 1.0) |

* Similar letters indicate percentages that differ within the categories using Bonferroni adjustment

** Mothers could check more than one

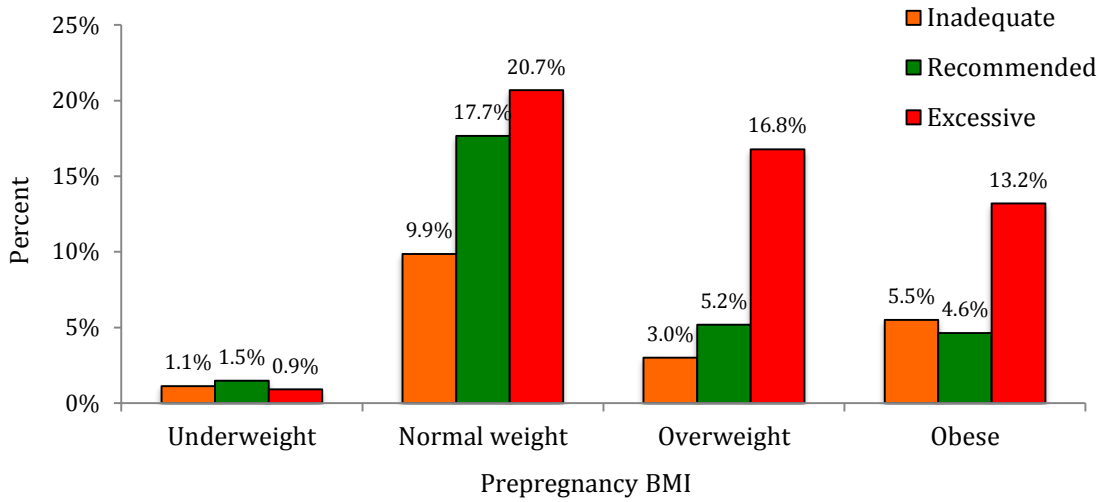
**Table 12. Percent [95% Confidence Intervals] of Mothers Self-reporting Placenta Problems or Placenta Previa, Hypertension, and Gestational Diabetes by Demographic Characteristics** (weighted)

| | % Gestational Diabetes | % Hypertension | % Placenta Problems |
|---|---|---|---|
| **Age (years) p<0.001** | **<0.001** | Not significant | Not significant |
| < 20 Years | 8.1% [1.7, 14.5] | 13.3% [5.4, 21.1] | 6.0% [0, 12.2] |
| 20- 24 Years | 6.3% [2.9, 9.8] | 11.4% [6.8, 16.0] | 4.5% [1.6, 7.3] |
| 25-29 Years | 7.8% [5.0, 10.7] | 11.3% [7.7, 14.8] | 4.3% [1.9, 6.7] |
| 30-34 Years | 11.6% [7.8, 15.4] | 11.4% [7.4, 15.4] | 5.7% [2.8, 8.5] |
| ≥ 35 Years | 24.3% [16.4, 32.2] | 11.3% [5.7, 16.8] | 7.0% [2.4, 11.5] |
| **Ethnicity** | Not significant | Not significant | Not significant |
| Hispanic | 15.9% [7.9, 24.0] | 5.7% [1.1, 10.3] | 7.4% [1.3, 13.4] |
| Non-Hispanic | 10.1% [8.1, 12.0] | 11.7% [9.6, 13.9] | 5.0% [3.5, 6.5] |
| **Maternal Education p<0.001** | Not significant | Not significant | Not significant |
| Less Than High School | 12.4% [7.8, 17.1] | 9.8% [5.3, 14.3] | 2.6% [0.4, 4.9] |
| High School | 9.9% [5.9, 14.0] | 9.8% [5.6, 14.0] | 6.2% [2.7, 9.8] |
| Greater Than High School | 10.3% [7.9, 12.8] | 12.3% [9.6, 15.0] | 5.4% [3.5, 7.2] |
| **Region** | Not significant | Not significant | Not significant |
| Central | 11.7% [5.9 17.5] | 14.1% [7.7, 20.6] | 5.6% [1.5, 9.6] |
| Northeast | 9.4% [5.2, 13.6] | 13.0% [7.7, 18.3] | 6.7% [3.0, 10.4] |
| Rapid City MSA | 7.2% [2.8, 11.6] | 9.3% [4.1, 14.5] | 5.7% [1.5, 10.0] |
| Sioux Falls MSA | 12.4% [8.9, 16.0] | 10.5% [7.1, 13.9] | 4.2% [1.8, 6.6] |
| Southeast | 13.7% [6.2, 21.3] | 10.7% [4.1, 17.4] | 2.1% [0.0, 4.9] |
| West | 7.0% [3.3, 10.7] | 12.0% [6.9, 17.1] | 6.5% [2.4, 10.7] |
| **Marital Status** | Not significant | Not significant | Not significant |
| Married | 11.7% [9.1, 14.3] | 11.9% [9.2, 14.6] | 5.3% [3.4, 7.2] |
| Unmarried | 8.3% [5.7, 11.0] | 10.6% [7.5, 13.7] | 4.8% [2.7, 7.0] |
| **Household Income** | Not significant | Not significant | Not significant |
| Less than $10,000 | 9.2% [5.8, 12.7] | 9.2% [5.5, 12.8] | 4.2% [1.7, 6.6] |
| $10,000, $24,999 | 10.4% [5.7, 15.2] | 11.6% [6.3, 16.8] | 7.9% [3.3, 12.6] |
| $25,000, $49,999 | 13.5% [8.9, 18.2] | 12.9% [8.2, 17.7] | 7.9% [4.0, 11.7] |
| $50,000, $74,999 | 11.2% [6.2, 16.2] | 12.8% [7.4, 18.3] | 3.0% [0.2, 5.8] |
| $75,000 or more | 10.0% [5.6, 14.3] | 11.6% [6.9.2, 16.2] | 4.3% [1.4, 7.3] |

NS = not significant

A high body mass index (BMI) prepregnancy and excessive weight gain during pregnancy are associated with adverse pregnancy outcomes including increased risk of maternal hypertension and increased rates of cesarean section (4). Of South Dakota mothers, 48.3% were overweight or obese in 2014 and 51.6% gained excessive weight during pregnancy (**Figure 33**).

**Figure 33: Percent of South Dakota Mothers by Prepregnancy BMI and Gestational Weight Gain Categories, 2014 Singleton Births** (South Dakota Department of Health Vital Records data).




## Summary

- White mothers' self-reported prevalence of gestational diabetes (9.9%) was lower than Other Race mothers (15.2%). American Indian mothers had a prevalence of 10.4%.
- Self-reported gestational diabetes was more prevalent in older mothers than younger mothers, with 24.3% of mothers 35 years of age or older having gestational diabetes compared to 8.1% of mothers less than 20 years of age.
- Self-reported kidney, bladder, and urinary tract infections were more prevalent in American Indian mothers (25.6%) than White (14.8%) and Other Race (16.1%) mothers.
- American Indian and Other Race mothers reported a greater prevalence of severe nausea, vomiting, and dehydration than White mothers (34.2% and 28.9% vs. 21.3% respectively).
- Other Race mothers reported a higher prevalence of cerclage (1.9%) and needing a blood transfusion (2.1%) than White mothers (0.4% and 0.2% respectively). Prevalence rates among American Indian mothers for cerclage and needing a blood transfusion were 1.2% and 1.8% respectively.
- 48.3% of South Dakota mothers were overweight or obese and 51.6% gained excessive weight during pregnancy.

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# Breastfeeding

**Quote from a 2014 SD PRAMS Mother:**

*"…I'm stock piling breast milk to last him at least until six months…"*

## Background

The American Academy of Pediatrics 2012 Policy Statement on breastfeeding and human milk considered breastfeeding to be a "public health issue and not only a lifestyle choice" (1). The recommendation of exclusive breastfeeding for approximately 6 months with continued breastfeeding up to 1 year as other foods are introduced was reaffirmed in the policy statement.

Breastfeeding as the optimal method for infant feeding has been universally accepted for some time. Following childbirth, breastfeeding helps mothers to heal by decreasing postpartum blood loss through increased contractions of the uterus. Long-term, breastfeeding may provide women a lower risk of diabetes, ovarian cancer, and certain types of breast cancer (1). Human milk provides the appropriate proportion of proteins, carbohydrates and fats for the infant and most minerals and vitamins needed for optimal growth with the exceptions of vitamins D and K. Advantages of breastfeeding for the infant may include reduced risks of obesity, Type 1 and 2 diabetes, infections, atopic dermatitis, and asthma later in life (1-3).

## Public Health Implications

The U.S. Healthy People 2020 target rates for breastfeeding are shown in **Table 13**. Data from the CDC 2013 Breastfeeding Report Card indicate that South Dakota is close to or above the national rates for all of the breastfeeding categories, and exceeding the U.S. Healthy People 2020 target rates for exclusive breastfeeding at 3 and 6 months (4).

**Table 13. Breastfeeding Rate Comparisons based on CDC Data** (4).

| | % Ever | % at 6 months | % at 12 months | % Exclusive at 3 months | % Exclusive at 6 months |
|---|---|---|---|---|---|
| Healthy People 2020 Target | 81.9 | 60.6 | 34.1 | 46.2 | 25.2 |
| U.S. National – CDC 2013 Report Card | 76.5 | 49.0 | 27.0 | 37.7 | 16.4 |
| South Dakota – CDC 2013 Report Card | 76.2 | 49.7 | 31.5 | 51.9 | 26.3 |

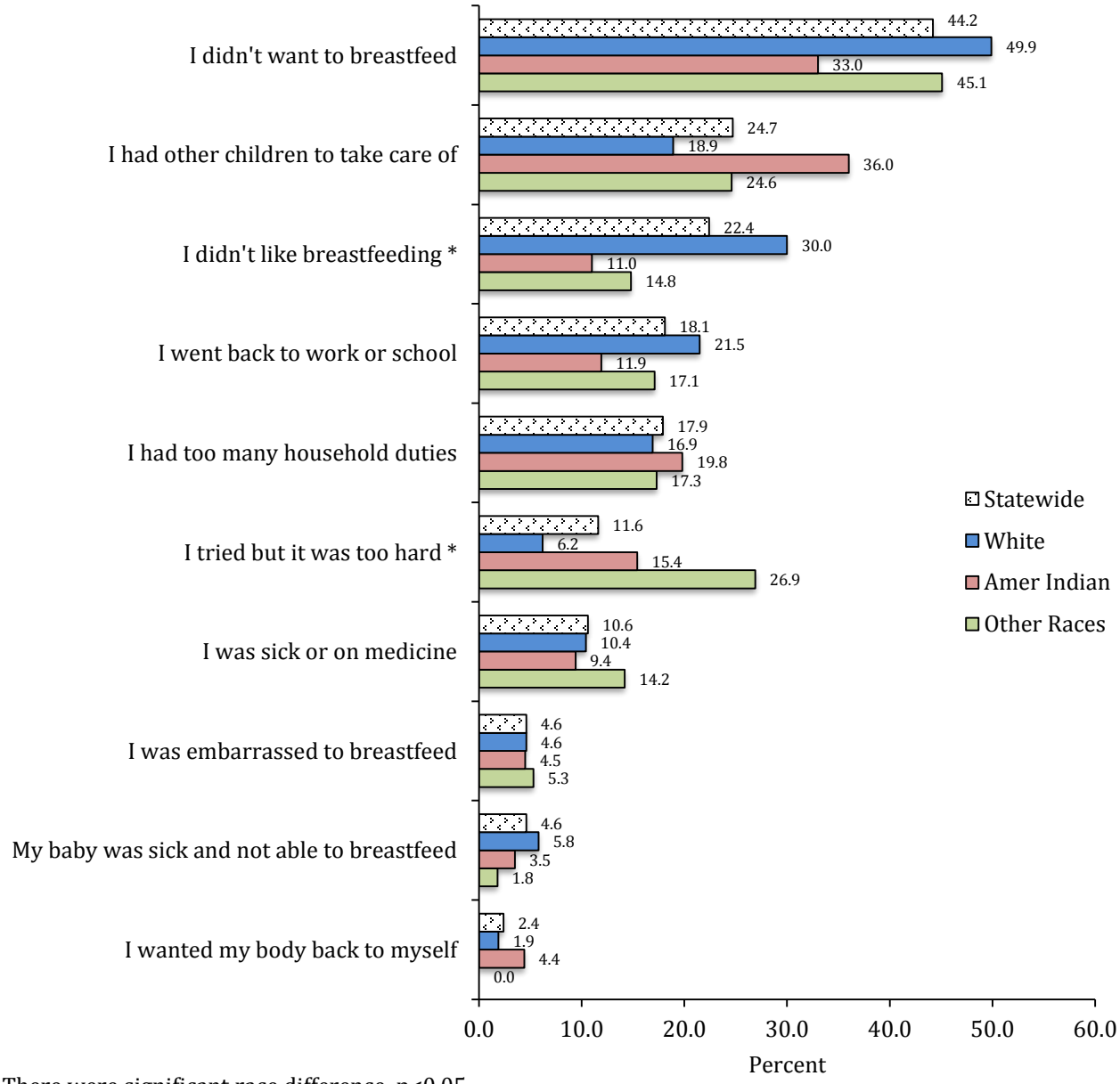
More South Dakota women are attempting breastfeeding than before. Based on 2014 PRAMS data, 87.9% of South Dakota mothers breastfed after delivery even for a short period of time, compared to 76.2% on the CDC 2013 Report Card. The percent of mothers who ever *breastfed or pumped breast milk to feed their baby after delivery, even for a short period of time* is given in **Table 14** by demographic characteristics (e.g., 90.8% of white, 75.5% American Indian and 84.4% other race mothers *breastfed or pumped breast milk to feed their baby after delivery, even for a short period of time).* Breastfeeding rates did vary by race, maternal age, education, marital status and household income, but not by ethnicity. A greater percentage of white mothers breastfed than both American Indian and other race mothers. Younger mothers initiated breastfeeding less than older mothers. Mothers with a post-high school education were more likely to breastfeed as were mothers who were married. Mothers with household incomes greater than $25,000/year were also more likely to breastfed than mothers with less household income.

**Table 14. Percent of Mothers Who Ever Breastfed, Even for a Short Period of Time by Demographic Characteristics (weighted)**

| | % Breastfed (95% C.I.) |
|---|---|
| **Race** | **p<0.001** |
| White | 90.8% [88.4, 93.2] |
| American Indian | 75.5% [70.5, 80.5] |
| Other Races | 84.4% [81.0, 87.8] |
| **Ethnicity** | **not significant** |
| Hispanic | 88.0% [80.4, 95.6] |
| Non-Hispanic | 88.0% [85.9, 90.1] |
| **Age (years)** | **p<0.001** |
| <20 | 69.1% [57.7, 80.5] |
| 20-24 | 82.3% [77.1, 87.5] |
| 25-29 | 91.1% [88.0, 94.3] |
| 30-34 | 90.2% [86.8, 93.5] |
| ≥35 | 92.2% [87.8, 96.6] |
| **Education** | **p<0.001** |
| <High School | 83.8% [78.7, 88.8] |
| High School | 76.6% [70.7, 82.5] |
| >High School | 92.1% [90.0, 94.3] |
| **Region** | **p=0.02** |
| Central | 85.6% [79.9, 91.3] |
| Northeast | 86.0% [80.7, 91.2] |
| Rapid City MSA | 91.7% [87.2, 96.1] |
| Sioux Falls MSA | 90.2% [86.9, 93.6] |
| Southeast | 91.4% [85.2, 97.7] |
| West | 79.0% [72.7, 85.4] |
| **Marital Status** | **p<0.001** |
| Married | 93.9% [92.0, 95.7] |
| Unmarried | 76.5% [72.2, 80.9] |
| **Annual Household Income** | **p<0.001** |
| <$10,000 | 73.3% [67.3, 79.2] |
| $10,000- $24,999 | 79.4% [72.5, 86.2] |
| $25,000 - $49,999 | 93.9% [90.8, 97.0] |
| $50,000 - $74,999 | 92.5% [88.2, 96.7] |
| $75,000 or more | 94.9% [91.6, 98.1] |

Reasons given by mothers for never breastfeeding are given in **Figure 34** by race. For all races combined, and for white and other race mothers, not wanting to breastfeed was the main reason given. Having other children to take care of was the main reason for not breastfeeding among American Indian mothers. There were significant race differences in the percent of mothers who stated they did not like breastfeeding and the percent that said they tried but it was too hard.

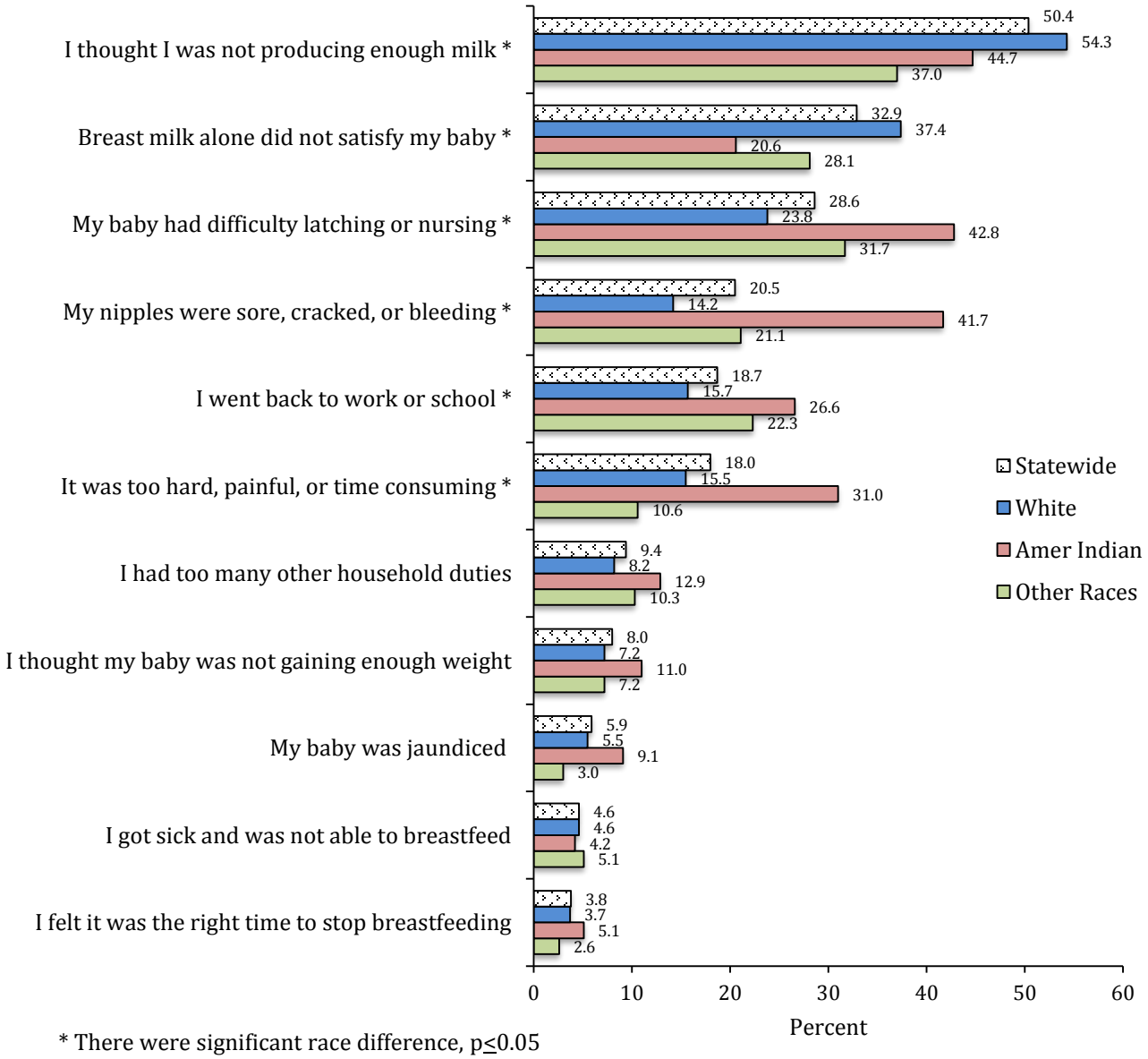
**Figure 34. Reasons for Never Breastfeeding Among Mothers Who Never Breastfed by Race** (weighted, more than one reason could be checked)




* There were significant race difference, p<0.05

Reasons for stopping breastfeeding are given in **Figure 35** by race. The most common reason for stopping breastfeeding among all racial groups was that the mother thought she was not producing enough milk to satisfy her baby. There were significant race differences in several of the reasons, including the mother thinking she was not producing enough milk or that breast milk alone did not satisfy the baby; difficulty with latching or nursing; nipples being sore, cracked or bleeding; returning to work or school; and breastfeeding was considered too hard, painful or time consuming.

**Figure 35. Reasons for Stopping Breastfeeding by Race** (weighted, more than one reason could be checked)




* There were significant race difference, $p \leq 0.05$

## Summary

- 87.9% of mothers breastfed or pumped breast milk to feed their baby after delivery, even for a short period of time.
- 90.8% of white, 75.5% of American Indian, and 84.4% of other race mothers breastfed or pumped breast milk to feed their baby after delivery, even for a short period of time.
- The main reason for not breastfeeding among white and other race mothers was not wanting to breastfeed, while the main reason among American Indian mothers was the need to take care of other children.
- The main reason for stopping breastfeeding was the mother believed she was not producing enough milk.

## Where do we go from here?

The South Dakota WIC Program promotes breastfeeding as the ideal method for infant feeding. The WIC Program receives federal dollars for South Dakota's Breastfeeding Peer Counseling Program, which is operated in six counties in the state. In 2012, this program offered breastfeeding information and reassurance to approximately 3,053 pregnant and breastfeeding mothers (5). Support is provided on a monthly basis individually or in a group setting. In addition, the South Dakota Breastfeeding Coalition promotes breastfeeding efforts statewide. Because of these efforts, 87.9% of mothers in South Dakota have initiated breastfeeding, which already surpasses the Healthy People 2020 goal of 81.9%.

According to a review on interventions promoting breastfeeding (6), interventions with formal breastfeeding education or individual-level professional support did not increase initiation or duration rates. However, evidence suggests that lay support may be effective in increasing short- and long-term breastfeeding rates. According to the U.S. Centers for Disease Control and Prevention, peer support groups are especially helpful in the first few days after childbirth, although many mothers benefit from long term participation. Training is a necessary component of peer support as well as monitoring by a professional with specific training in skilled lactation care. Among other factors, access to International Board Certified Lactation Consultants (IBCLC's) and community partnerships for making and receiving referrals are critical for successful peer support programs (7). The South Dakota WIC Program plans to improve the quality and expand the coverage of its Peer Counseling Program through increased coverage area, contact hours, enhanced trainings and early prenatal visits. To further support breastfeeding in the state, the Office of Child and Family Services will train healthcare professionals working for the South Dakota Department of Health as Certified Lactation Counselors (CLC) some of whom work closely with the Peer Counseling Program. Support groups such as the Breastfeeding Peer Counseling Program mentioned above and La Leche League will be instrumental in maintaining high breastfeeding rates. Increased referrals from physicians and professional lactation consultant to expectant and new mothers to these organization for support and encouragement may further breastfeeding success.

A recent study on the use of technologies to support breastfeeding and the use of human milk included breast pumps, nipple shields, and scales to measure pre- and post-weights for determining milk intake (8). In the US, 85% of women who breastfeed also provide expressed human milk for their infants due to separation by illness, return to work, convenience, or to provide human milk but not through breastfeeding. Nipple shields can aid women with flat or inverted nipples and facilitate latch and suction for the infant. Breastfeeding support groups that have added scales give mothers immediate feedback to know how much milk the infant receives. The use of these technologies helps women meet their breastfeeding and lactation goals.

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# Postpartum Health and Infant Sleep Position

**Quote from a 2014 SD PRAMS Mother:**

*"I am currently taking Zoloft for postpartum depression. I was comfortable talking to my doctor about my mental state and saw a counselor about depression before my baby was born. I wish I would have known of a hotline I could call just to talk about my frustrations or depressed and suicidal feelings."*

## Background

Early postpartum care of the mother offers opportunities for healthcare providers to assess specific behaviors and needs of the mother, which ultimately can affect infant health care. The American College of Obstetricians and Gynecologists recommends that mothers attend a postpartum care visit four to six weeks after delivery (1). Nationwide, the overall percentage of mothers attending postpartum care visits (PPCV) is high (89%); however, certain subgroups had significantly lower PPCV rates such as those with little or no prenatal care (71.2% and 65.7%, respectively), those with less than nine years of education (71.2%), and mothers who did not have their infant seen for a well-baby checkup (59.5%) (2). Other factors such as maternal age, race/ethnicity, marital status, insurance coverage, smoking and alcohol use during last three months of pregnancy, breastfeeding, and parity also may influence the prevalence of postpartum care visits (2).

Nationally, 5.7% of all singleton and 6.7% of all multiple births in 2008 resulted in the infant being admitted to the neonatal intensive care unit (NICU) (3). In 2014, 12.4% of South Dakota mothers self-reported having their baby placed in a NICU following birth (**Figure 36**), although based on birth certificate data 10.2% were admitted to the NICU (94.2% agreement between mother's self-report and birth certificate). **Figure 37** shows the infant's length of hospital stay following birth.

**Figure 36. Percent of Infants Placed in a Neonatal Intensive Care Unit (NICU) Following Birth Based on Mother's Self-Report** (weighted)

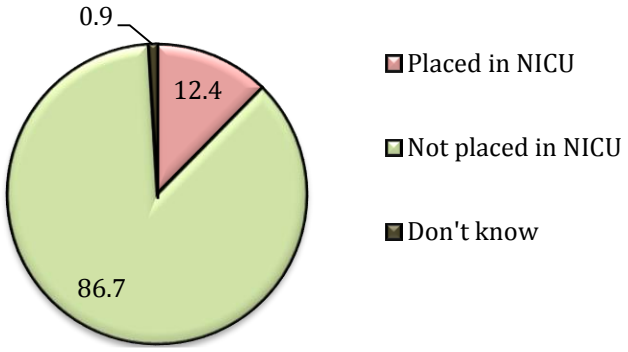
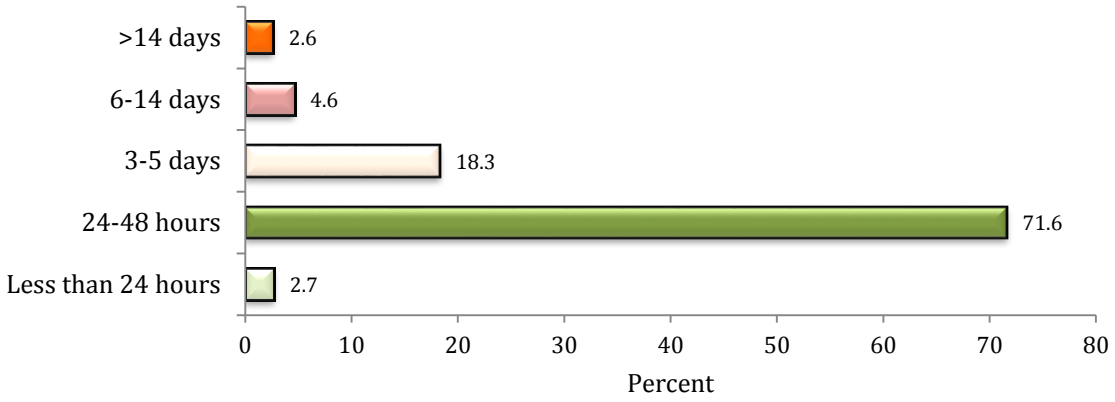


**Figure 37. Length of Infant Hospital Stay Following Birth** (weighted)




Less than 0.5% born outside of hospital or still in hospital.

While reducing the number of NICU admissions is an important goal, ensuring adequate postnatal care in infants is also important. *Recommendations for Preventive Pediatric Health Care* is a comprehensive set of guidelines for pediatricians to follow for well-child care and was developed by the American Academy of Pediatrics (AAP) and Bright Futures (4). According to these guidelines, every infant should have a newborn evaluation at birth, within three to five days of birth, and within 48 to 72 hours after discharge from the hospital. *In 2014, 95.3% of South Dakota mothers reported having their baby seen for a one-week checkup after he/she was born.*

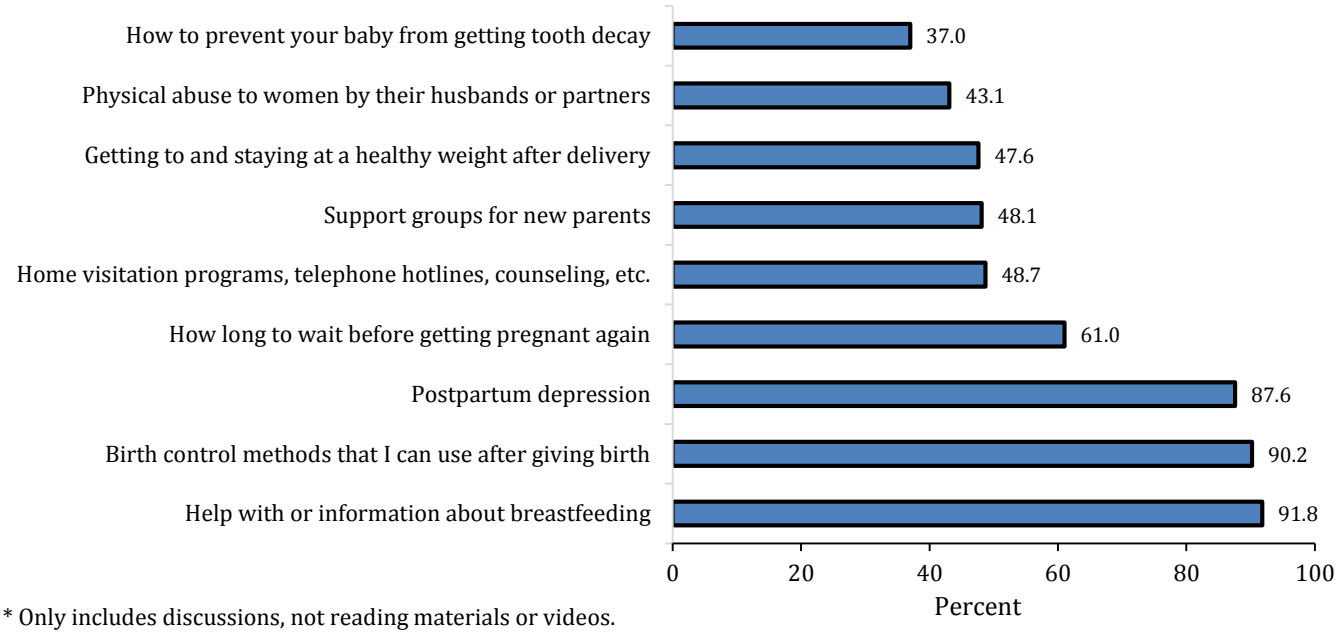
Educating parents on safe and unsafe sleep positions for the infant is an important area to cover during postnatal care visits. Each year, approximately 3,500 US infant deaths occur suddenly and unexpectedly, most often referred to as Sudden Unexpected Infant Deaths (SUID) or Sudden Infant Death Syndrome (SIDS), and though in many cases the cause of death cannot be explained, the majority of cases occur while the infant is in an unsafe sleeping environment (5).

## Public Health Implications

Discussion with and education to mothers on postpartum topic areas is important for the health of the mother as well as the health and development of the infant; therefore, early education in postpartum care is critical.

While the 2014 SD PRAMS did not specifically ask if a mother attended a postpartum care visit, the survey did assess whether or not a healthcare provider discussed various topics with the mother after the baby was born. **Figure 38** displays percentages of mothers who indicated 'Yes' to a variety of topics covered by their healthcare provider since their baby was born.

**Figure 38. Percent of Mothers Who Indicated Topic Was Covered by a Doctor, Nurse, or Other Health Care Worker SINCE Their Baby was Born** (weighted) *




* Only includes discussions, not reading materials or videos.

Postpartum depression is an important mental health issue that affects approximately 7-13% of women (6). Left untreated, serious detriments can occur to the infant, mother, family, and society. According to the U.S. Preventative Services Task Force (USPSTF), depression is among the leading causes of disability in persons 15 years and older, is common in postpartum and pregnant women, and affects not only the woman, but her child as well (7). The USPSTF found convincing evidence that screening improves the accurate identification of adult patients with depression in primary care settings, including pregnant and postpartum women. Due to these findings, the USPSTF recently released a recommendation for screening for depression in the general adult population, including pregnant and postpartum women. Furthermore, screenings should be implemented with adequate systems in place to ensure accurate diagnosis, effective treatment, and appropriate follow-up (7).

As seen in **Figure 38**, 87.6% of South Dakota mothers who delivered a baby in 2014 indicated that a doctor, nurse, or other health care worker talked to them about postpartum depression. It is not certain whether the 12.4% who responded 'No' is due to the mother not attending a postpartum care visit or due to the doctor not covering the topic. Regardless, these mothers likely did not receive resources for support.

Studies have shown that infants of mothers suffering from postpartum depression may have delayed developmental behaviors, decreased long-term growth, and increased emergency room visits (8). Depressed mothers are less likely to follow safety recommendations such as car seat use and a safe sleeping position and are more likely to cease breastfeeding early (9).

Screening for maternal postpartum depression can be conducted through a variety of screening instruments. One tool is a six-item scale developed for the CDC PRAMS, designated as the PRAMS-6. The mom answers how often she has felt or experienced six items since her new baby was born. The six questions include: 1) I felt down, depressed, or sad; 2) I felt hopeless; 3) I felt slowed down; 4) I felt panicky; 5) I felt restless; and 6) I felt fearful. A three-item subscale of the PRAMS-6 is the PRAMS-3D and includes questions 1-3 of the above. Both the PRAMS-6 and the PRAMS-3D show a moderate level of accuracy for detecting postpartum depression and are comparable to the accuracy level of the Patient Health Questionnaire-9 (PHQ-9), which has been validated in a variety of populations and languages (10).

**Table 15** gives the 2014 SD PRAMS results for women's feelings and experiences following childbirth. The 2014 SD PRAMS did not include question six, "I felt fearful", so the PRAMS-3D Index was used to assess maternal depressive status rather than the PRAMS-6. In 2014, 17.4% of South Dakota women who delivered a baby were classified as having postpartum depression according to the PRAMS-3D Index.

**Table 15. Components of Depression and Anxiety** (weighted)

| **Feelings and Experiences that women sometimes have after childbirth:** | | | | | |
|---|---|---|---|---|---|
| | **Never (1)** | **Rarely (2)** | **Sometimes (3)** | **Often (4)** | **Always (5)** |
| **I felt down, depressed or sad *** | 31.6% [28.6-34.8] | 30.9% [27.8-34.0] | 27.1% [24.1-30.0] | 9.2% [7.4-11.1] | 1.2% [0.6-1.8] |
| **I felt hopeless *** | 65.4% [62.3-68.5] | 17.5% [15.0-20.1] | 12.5% [10.4-14.7] | 3.8% [2.6-4.9] | 0.8% [0.3-1.3] |
| **I felt slowed down *** | 33.9% [30.8-37.0] | 21.6% [18.9-24.3] | 30.6% [27.5-33.6] | 12.1% [9.9-14.3] | 1.8% [1.0-2.6] |
| **I felt panicky** | 56.7% [53.5-60.0] | 19.2% [16.6-21.9] | 16.5% [14.1-19.0] | 6.5% [4.8-8.1] | 1.0% [0.5-1.6] |
| **I felt restless** | 43.6% [40.3-46.9] | 22.2% [19.4-24.9] | 21.9% [19.2-24.7] | 10.0% [8.0-11.9] | 2.3% [1.6-3.1] |
| **PRAMS-3D Index for Depression*** | 17.4% [15.0-19.9] | | | | |
| * Percent of women with depression based on sum of Likert Scales for feeling sad, hopeless and slowed down. Sum greater than or equal to 9 suggests depression. | | | | | |

Mothers who were depressed were less likely to have fed breast milk to their infant who was born in 2014 than mothers who were not depressed as shown in **Figure 39** (left side, p=0.03). Mothers who were not trying to get pregnant were more likely to have depression that mothers who were trying to get pregnant (**Figure 39** [right side], p<0.001). The percent of mothers with postpartum depression are given in **Table 16** by demographic characteristics. Depression was more common among mothers who were American Indian, unmarried mothers, and mothers who had annual household incomes <$10,000 (all, p<0.01).

**Figure 39. Percent of Mothers Who Ever Breastfed or Who Were Trying to Become Pregnant by Occurrence of Depression** (weighted)

Both significantly different at p<0.05.

**Table 16. Percent of Mothers with Depression by the PRAMS-3D by Demographic Characteristics** (weighted)

| | % with Depression (95% C.I.) |
|---|---|
| **Race** | **p<0.001** |
| White | 15.4% [12.3, 18.5] |
| American Indian | 26.5% [21.4, 31.7] |
| Other Races | 18.5% [14.8, 22.2] |
| **Ethnicity** | **not significant** |
| Hispanic | 24.3% [14.0, 34.4] |
| Non-Hispanic | 16.9% [14.4, 19.4] |
| **Age (years)** | **not significant** |
| <20 | 19.5% [10.4, 28.5] |
| 20-24 | 20.0% [14.6, 25.4] |
| 25-29 | 12.2% [8.4, 16.0] |
| 30-34 | 20.1% [15.0, 25.2] |
| ≥35 | 20.0% [15.0, 25.2] |
| **Education** | **not significant** |
| <High School | 14.7% [9.6, 19.8] |
| High School | 19.2% [13.8, 24.5] |
| >High School | 17.4% [14.2, 20.6] |
| **Region** | **not significant** |
| Central | 18.8% [11.9, 25.7] |
| Northeast | 15.0% [9.6, 20.5] |
| Rapid City MSA | 17.4% [10.9, 24.0] |
| Sioux Falls MSA | 18.5% [13.9, 23.0] |
| Southeast | 14.9% [6.9, 22.9] |
| West | 19.0% [13.2, 24.7] |
| **Marital Status** | **p<0.001** |
| Married | 13.8% [10.9, 16.8] |
| Unmarried | 23.9% [19.5, 28.2] |
| **Annual Household Income** | **p=0.009** |
| <$10,000 | 26.6% [20.9, 32.3] |
| $10,000- $24,999 | 16.1% [10.2, 22.0] |
| $25,000 - $49,999 | 15.6% [10.4, 20.7] |
| $50,000 - $74,999 | 15.5% [9.5, 21.5] |
| $75,000 or more | 15.4% [9.9, 20.9] |

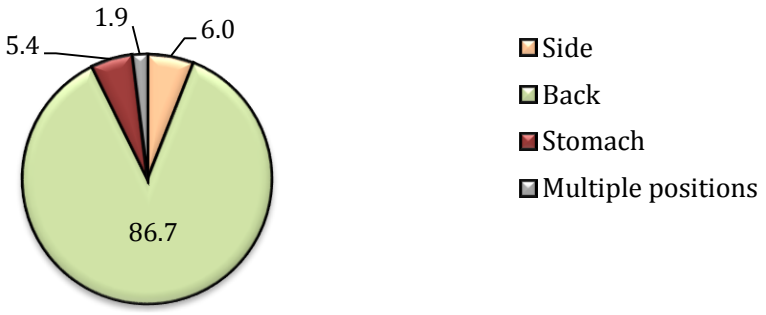
Pediatricians and family practitioners play a pivotal role in discussing postpartum depression with mothers in order to initiate treatment as soon as possible (7). Healthcare providers can be the first individuals to provide information on supportive resources in the area for mothers (such as nurse home visitation), which can impact the health of the infant. Nurse home visitation programs positively impact infant health by decreasing child neglect and abuse and improving healthy behaviors of the mother such as cessation of smoking especially in mothers who are young, single and/or low income (11).

Recall from **Figure 38** that 12.4% of women indicated that a doctor, nurse, or other health care worker did *not* talk to them about postpartum depression since the birth of their baby. The occurrence of postpartum depression did not differ between those who had a conversation with a provider and those who did not; although, 11.4% of mothers classified as having depression did not discuss postpartum depression after the birth with a healthcare provider. For South Dakota mothers who delivered in 2014, that equates to over 200 women who were considered depressed but were not talked to by a doctor, nurse, or other health care worker about postpartum depression following the birth of the infant.

### Infant Sleep Position

Infants sleeping in a prone position (on their stomach) have been identified as a major risk factor for SIDS (12). The AAP recommends that infants should be placed to sleep on their backs. Because sleep position is a major risk factor for SIDS, the public health effort in reducing SIDS has focused on promoting infants sleeping on their backs. The Healthy People 2020 goal is to increase the proportion of infants who are put to sleep on their backs to 75.9%. In 2014, 87.4% of South Dakota mothers reported that they most often placed their baby to sleep on his/her back (**Figure 40**). This differed by race, with 87.0% and 90.9% of white and American Indian mothers placing their infant on their his/her back, while only 79.9% of mothers of other races reported putting their infant on his/her back ($p<0.05$).

**Figure 40. Sleep Position of Infants as Reported by Mothers** (weighted)




### Summary

- In 2014, 95.3% of South Dakota mothers reported having their baby seen for a one-week checkup after birth.
- 17.4% of South Dakota mothers who delivered a baby in 2014 were classified as having depression by the PRAMS-3D index.
- Mothers who had depression were less likely to have been trying to become pregnant and less likely to have ever breastfed than mothers without depression.
- The risk of exhibiting depression was higher in the following populations: American Indian mothers, unmarried mothers, and mothers with an annual household income of less than $10,000.
- 12.4% of women indicated that a doctor, nurse, or other health care worker did ***not*** talk to them about postpartum depression since the birth of their baby; 11.4% of mothers classified as having depression did not discuss postpartum depression after the birth with a healthcare provider.
- In 2014, 86.7% of South Dakota mothers reported that they most often placed their baby to sleep on his/her back and this differed by race: 86.8% and 90.9% of white and American Indian mothers placed their infant on his/her back, while only 79.9% of mothers of other races reported putting their infant on his/her back.

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# Stress, Domestic Abuse, and Social Supports

**Quotes from 2014 PRAMS mothers:**

*"I've distanced myself from my family to protect myself and my own little family..."*
*"Thank you for caring."*

**Background**

Studies have suggested that *stress* during pregnancy is an important predictor of adverse obstetric outcomes such as preterm birth and low birthweight (1-4). *Domestic abuse* to women during pregnancy is another area of potential detriment to both the pregnant woman and her growing fetus. Pregnant women who experience domestic abuse not only experience significant psychological and physical impairments but also are at an increased risk of adverse birth outcomes. Maternal exposure to domestic abuse significantly increases the risk of low birthweight, preterm birth, and neonatal death and has been shown to be associated with a low breastfeeding rate (5-8).

*Social supports* can be broadly defined as "resources provided by others". The amount of social support a woman receives before, during, and after pregnancy can have lasting impacts on both the mother and baby. Research has shown that social supports buffer the associations between stressors and health (9-10). Having a social support system has been shown to modify behavioral risk factors during pregnancy and is associated with improved pregnancy outcomes (11-13). Having social supports leads to a decrease in smoking and depression, and an increase in use of prenatal care.

**Public Health Implications**

*Stressful Events Before and During Pregnancy*

Pregnancy can be an extremely stressful time for mothers. Many expectant mothers are concerned about how to eat healthy for both themselves and their growing fetus, whether they will have a healthy baby, how a new baby might fit into their busy lifestyle, or whether they will be a good parent. While these concerns are positive, as they demonstrate that the expectant mother is thoughtful about the health of her fetus, controlling stress levels during pregnancy is an equally important area for expectant moms to consider.

The influence of stress on the pregnancy depends on the severity and duration of the stress and the maternal strategies to cope with the stress. Based on the 2014 SD PRAMS, estimates for the percent of South Dakota experiencing various stressful events are shown in **Figures 41-42** and the types of stress are shown in **Figure 43**. Financial stresses were the type of stress most often reported, followed by emotional stresses.

Stress (at least one stressful event occurring during pregnancy) was associated with adverse maternal behaviors (**Figure 44**): occurrence of stressful events, especially three or more, was associated with unintended pregnancy, never breastfeeding, not beginning prenatal care in the first trimester, and more likely to smoke in the previous two years. These findings are similar to what has previously been reported (5-8).

**Figure 41. Percent of Mothers Reporting the Occurrence of Stressful Events in the 12 Months Before Delivery** (weighted; more than one response could be checked)

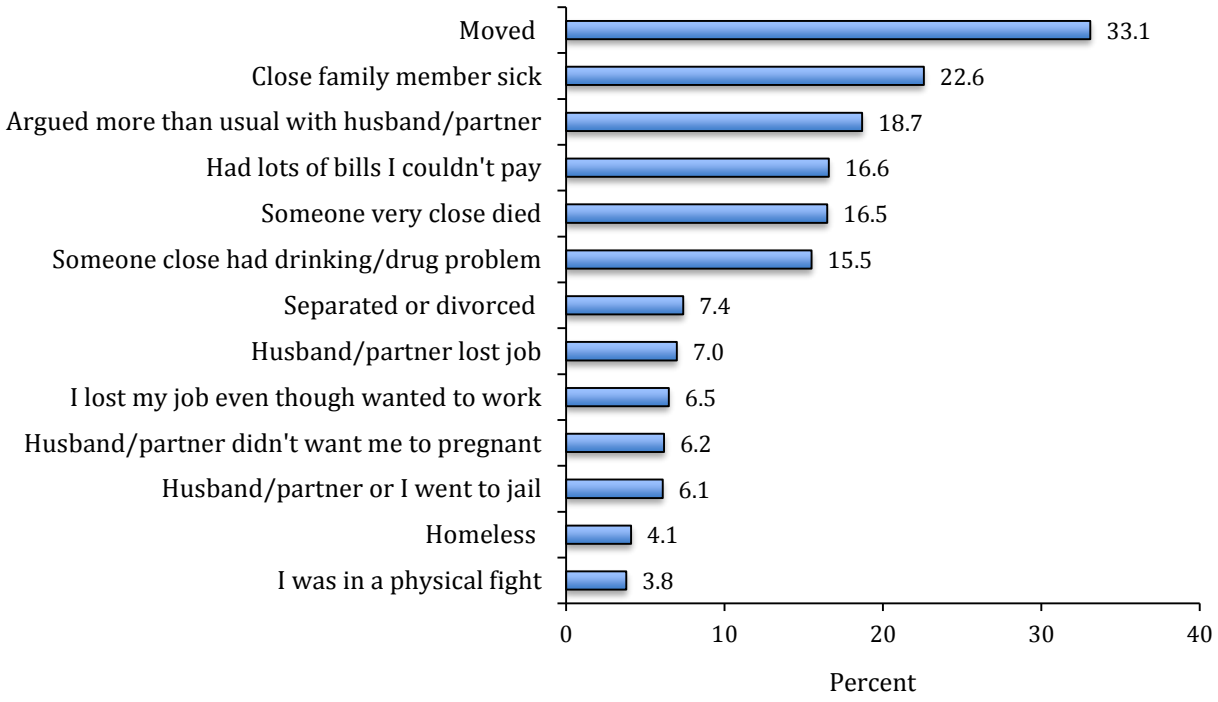
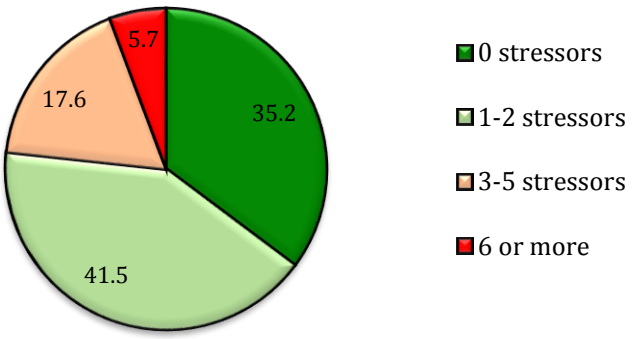
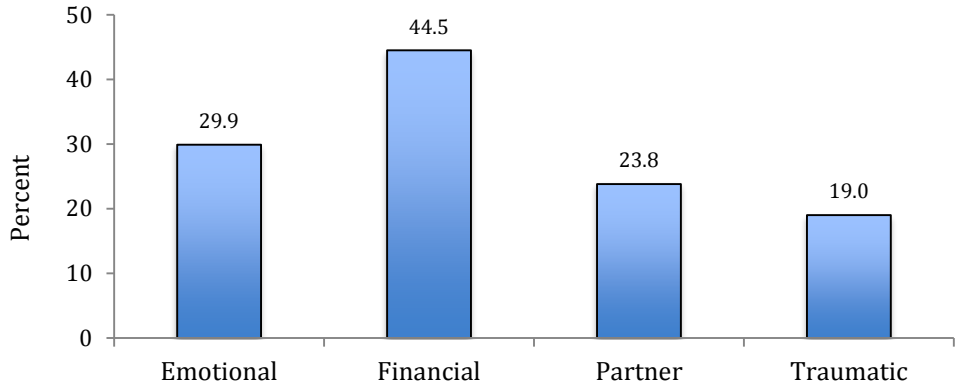



**Figure 42. Total Number of Stressful Events Occurring in the 12 Months Before Delivery[1]** (weighted)



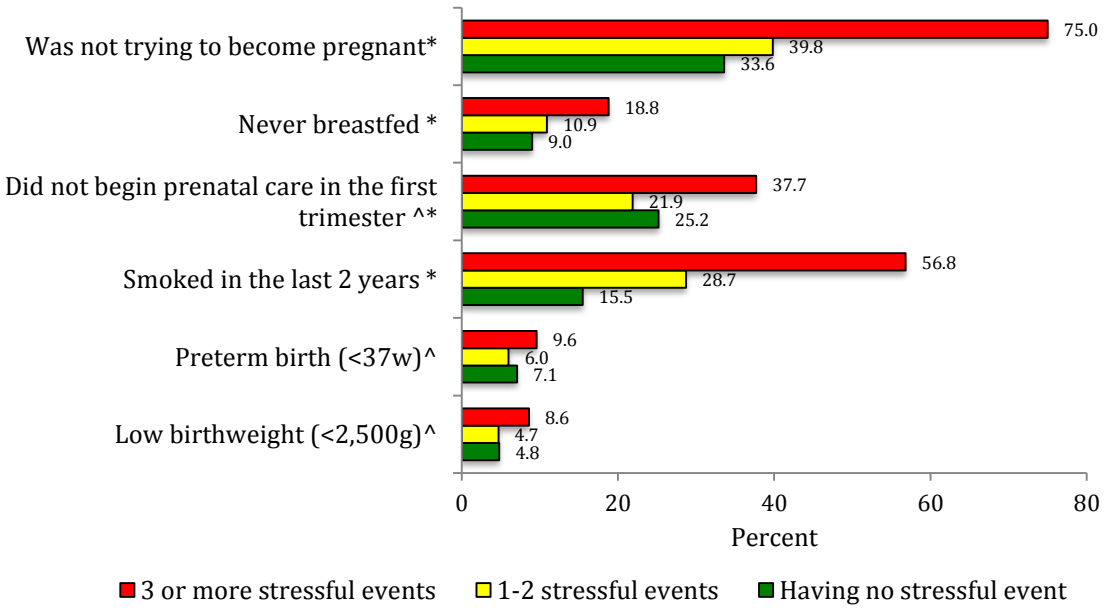

[1]See Figure 41 for the list of stressful events

**Figure 43. Percent of Mothers With Different Types of Stressful Events Occurring 12 Months Before Pregnancy[1]** (weighted)




[1] All stresses relate to the 12 months before pregnancy except partner stress, which also includes physical abuse by husband or partner during pregnancy. **Emotional Stress** included 1) a close family member who was very sick and had to go to the hospital or 2) someone very close died. **Financial Stress** included 1) moved to a new address, 2) husband or partner lost their job, 3) mother lost her job even though she wanted to go on working, or 4) had a lot of bills that could not get paid. **Partner Stress** included 1) being separated or divorced from husband or partner, 2) arguing with husband or partner more than usual, 3) husband or partner not wanting mother to be pregnant, or 4) husband or partner pushing, hitting, slapping, kicking, choking or physically hurting the mother in any other way the 12 months before pregnancy or *during* pregnancy. **Traumatic Stress** included 1) being homeless, 2) being in a physical fight, 3) husband or partner or mother going to jail, or 3) someone close to the mother having a problem with drinking or drugs. Groups based on http://healthvermont.gov/research/PRAMS/PRAMSDataBriefs.aspx

**Figure 44. Intendedness of Pregnancy, Breastfeeding, Initiation of Prenatal Care, Smoking and Pregnancy Outcomes by Number of Stressful Events Occurring the 12 Months Before Pregnancy** (weighted)

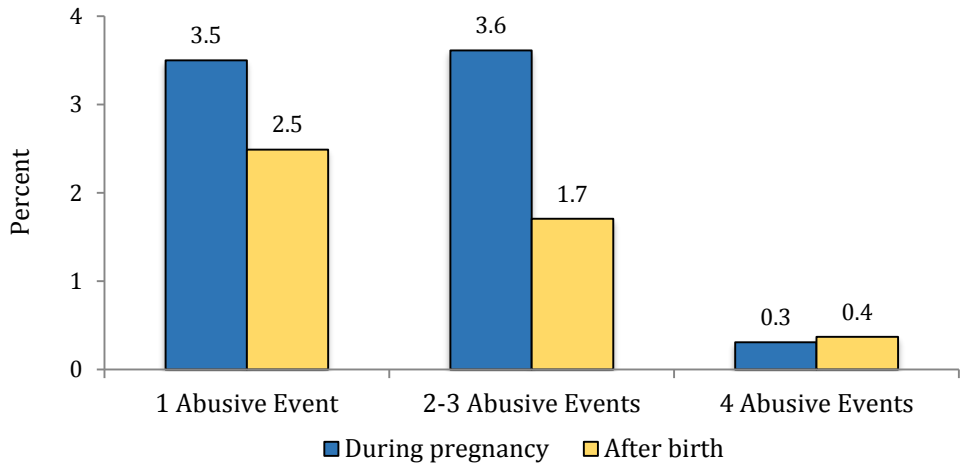



* Statistically significant at p<0.05; ^ Data from vital records

*Domestic Abuse During and After Pregnancy*

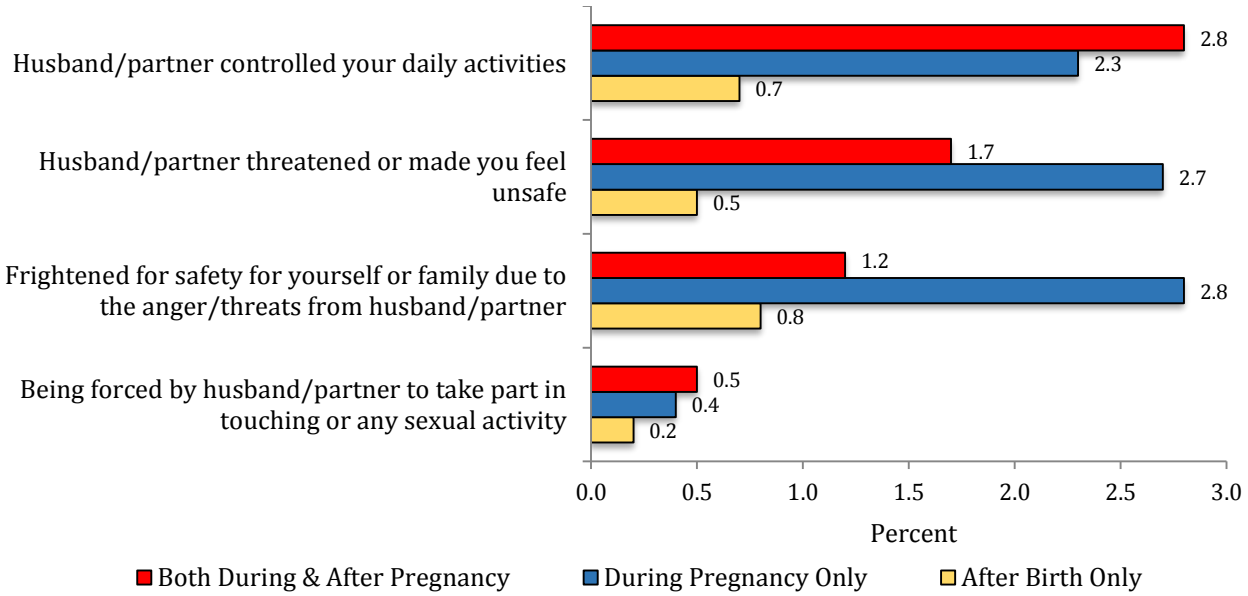
The percent of mothers experiencing domestic abuse is shown in **Figures 45** and **46**. Domestic abuse was reported more often during pregnancy and the husband or partner controlling daily activities was the most reported abusive event.

**Figure 45. Percent of Mothers Experiencing Abusive Events Either During Pregnancy or After Birth[1]** (weighted)



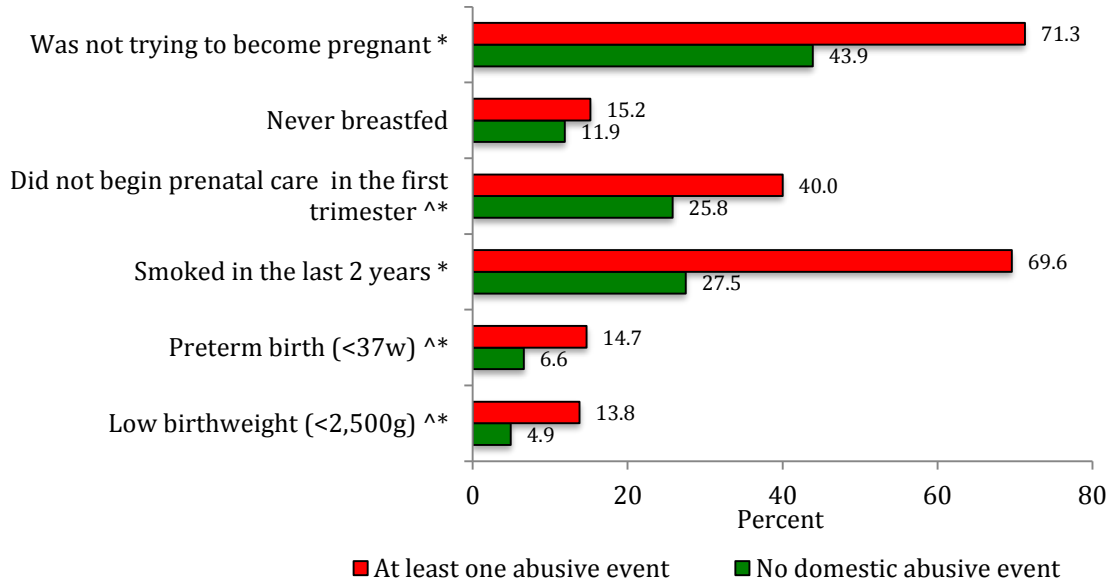

[1] Abusive events included 1) husband or partner threatening the mother or making her feel unsafe in some way, 2) the mother being frightened for the safety of herself or family because of the anger or threats of her husband or partner, 3) the husband or partner trying to control the mothers daily activities, 4) the husband or partner forcing the mother to take part in touching or any sexual activity in which she did not want to participate, 5) husband or partner pushing, hitting, kicking, choking, or physically hurting the mother in any way, or 6) anyone else physically hurting the mother in any way.

**Figure 46. Domestic Abuse Events Occurring During and After Pregnancy (%)** (weighted)



The occurrence of domestic abuse was associated with negative pregnancy behaviors and outcomes (**Figure 47**). The rates of unintended pregnancy, not beginning prenatal care in the first trimester, and smoking in the last two years were higher in mothers who experienced domestic abuse during pregnancy. In addition, the risk of a preterm birth and having a low birthweight baby were more likely among women who experienced domestic abuse during pregnancy compared to women who did not.

**Figure 47. Intendedness of Pregnancy, Breastfeeding, Initiation of Prenatal Care, Smoking and Pregnancy Outcomes by Domestic Abuse During Pregnancy** (weighted)




* Statistically significant at p<0.05; ^ Data from vital records

The percent of women having three or more stressful events during pregnancy or having at least one abusive event either during or after pregnancy are shown in **Table 17** by demographic characteristics. The occurrence of three or more stressful events or having at least one abusive event during or after pregnancy was associated with one or more of the following demographic characteristics: being American Indian, younger, less educated, not married, or having a lower household income. Additionally, there were regional differences in the occurrence of stressful events and abusive events after pregnancy with the western region of the state having the highest rates. When the above characteristics were considered together the ones that remained important predictors of having three or more stressful events during pregnancy were ***maternal age, maternal education, marital status,*** and ***annual household income***. The ones that remained important predictors of abuse during pregnancy were ***marital status*** and ***annual household income*** and only ***annual household income*** was a predictor of abuse after pregnancy.

**Table 17. The Percent of Women Having 3 or More Stressful Events During the 12 Months Before Pregnancy or Experiencing at Least One Abusive Event During or After Pregnancy by Demographic Characteristics** (weighted, 95% confidence intervals)

| | | At Least One Abusive Event: | |
|---|---|---|---|
| **Demographics** | **3+ Stressful Events** | **During Pregnancy** | **After Pregnancy** |
| **Race** | P<0.001 | P<0.001 | P<0.001 |
| White | 18.5% [15.3, 21.7] | 4.6% [2.8, 6.3] | 2.1% [0.9, 3.2] |
| American Indian | 44.5% [38.7, 50.3] | 17.7% [13.4,22.1] | 14.5% [10.5, 18.5] |
| Other Races | 27.8% [23.7, 31.9] | 12.7% [9.6, 15.8] | 8.6% [6.0, 11.3] |
| **Ethnicity** | Not significant | Not significant | Not significant |
| Hispanic | 17.7% [10.4, 24.9] | 8.1% [4.1, 12.2] | 4.3% [1.5, 7.6] |
| Non-Hispanic | 23.4% [20.7, 26.1] | 7.2% [5.6, 8.8] | 4.4% [3.3, 5.6] |
| **Age (years)** | P<0.001 | P<0.001 | P<0.001 |
| <20 | 28.4% [18.1, 38.7] | 18.6% [10.0, 27.1] | 13.7% [6.5, 21.0] |
| 20-24 | 42.4% [35.5, 49.2] | 13.2% [8.7, 17.7] | 7.8% [4.5, 11.1] |
| 25-29 | 16.7% [12.8, 20.7] | 5.3% [3.3, 7.7] | 3.0% [1.4, 4.7] |
| 30-34 | 19.5% [14.4, 24.2] | 5.0% [2.8, 7.3] | 2.6% [1.1, 4.0] |
| >35 | 16.4% [10.1, 22.6] | 4.0% [1.1, 6.9] | 3.7% [0.8, 6.6] |
| **Education** | P<0.001 | P=0.001 | P<0.001 |
| Less than High School | 29.8% [23.1, 36.6] | 12.4% [7.5,17.3] | 8.9% [4.9, 12.8] |
| High School | 31.0% [24.8, 37.2] | 11.4% [7.7, 15.1] | 7.1% [4.2, 10.1] |
| More than High School | 19.4% [16.3, 22.6] | 5.0% [3.3, 6.7] | 2.7% [1.6, 3.8] |
| **Region** | P=0.05 | Not significant | P=0.008 |
| Central | 18.7% [12.2, 25.1] | 7.8% [4.4, 11.3] | 8.2% [4.2, 12.2] |
| Northeast | 17.6% [12.1, 23.0] | 5.4% [2.7, 8.0] | 3.0% [0.9, 5.0] |
| Rapid City MSA | 30.4% [22.5, 38.2] | 7.4% [3.1, 11.7] | 4.3% [1.1, 7.4] |
| Sioux Falls MSA | 22.3% [17.6, 26.3] | 7.2% [4.3, 10.1] | 3.1% [1.3, 4.9] |
| Southeast | 19.8% [10.9, 28.6] | 6.5% [1.5, 11.6] | 3.2% [0.1, 6.3] |
| West | 35.4% [27.9, 42.9] | 12.0% [7.5, 16.6] | 9.5% [5.6, 13.4] |
| **Marital Status** | P<0.001 | P<0.001 | P<0.001 |
| Married | 12.2% [9.7, 14.9] | 3.3% [1.9, 4.8] | 1.9% [0.9, 3.0] |
| Unmarried | 43.7% [38.6, 48.7] | 14.9% [11.5, 18.2] | 9.3% [6.8, 11.7] |
| **Annual Household Income** | P<0.001 | P<0.001 | P<0.001 |
| <$10,000 | 50.7% [44.1, 57.2] | 20.9% [15.8, 26.0] | 15.4% [10.7, 19.4] |
| $10,000- $24,999 | 35.8% [27.9, 43.7] | 10.8% [5.9, 15.7] | 5.0% [1.8, 8.2] |
| $25,000 - $49,999 | 23.3% [17.5, 29.2] | 5.3% [2.5, 8.2] | 3.1% [1.1, 5.2] |
| $50,000 - $74,999 | 9.9% [5.2, 14.7] | 3.2% [0.4, 6.0] | 0.7% [0.0, 2.2] |
| $75,000 or more | 6.5% [3.0, 10.1] | 1.2% [0.0, 2.8] | 0.7% [0.0, 1.9] |

*Social Supports After Delivery*

A large percent of women had social support since the birth of their child. More than 90% of mothers reported that they felt they had different kinds of help available if they were to need it: financial, babysitting, and psychological supports (**Figure 48**). The main source of social support was the family. Of South Dakota mothers, 82.2% reported being able to get help from their husband or partner, and 79.8% of mothers reported being able to get help from their parents or in-laws if needed (**Figure 49**). A small percent (1.5%) of mothers reported having no one who could help them.

**Figure 48. Percent of Mothers Reporting the Type of Help Available Following the Birth if They Were to Need It** (weighted)

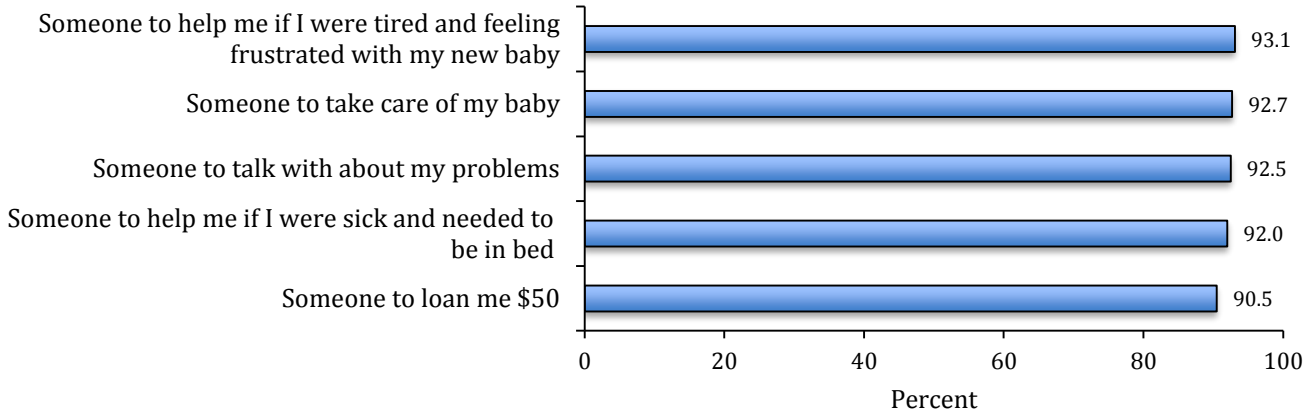
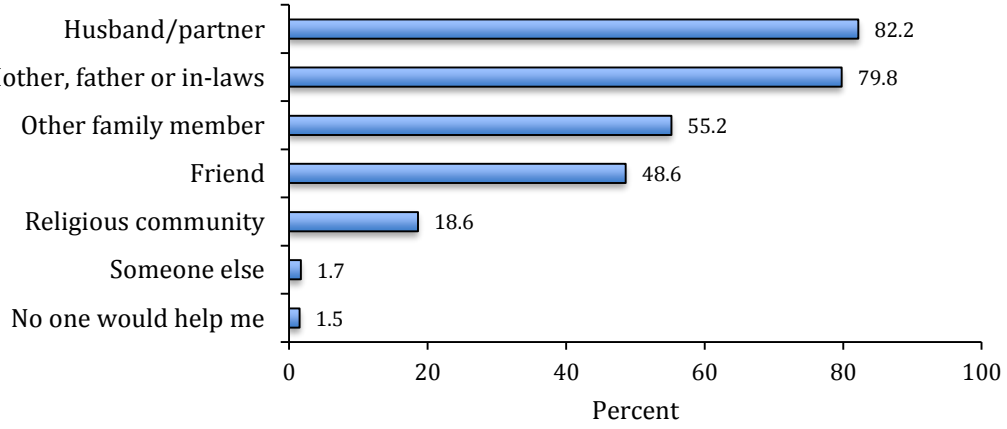



**Figure 49. Percent of Mothers Reporting a Source of Social Support**[1] (weighted, mothers could check more than one source)




[1] Question was "Since you delivered your new baby, who would help you if a problem came up?"

## Summary

*Stressful events before and during pregnancy*

- In 2014, 64.8% of mothers reported at least one stressful life event during the year prior to their most recent live birth, with 23% reporting three or more stressors.
- The most common reported single stressor was moving to a new address, reported by 33% of mothers.
- Financial stresses in the 12 months prior to giving birth were the most common type of stress (44.5%), followed by emotional stresses (29.9%).
- Unintended pregnancies were more common among mothers with three or more stressors compared to no stressors (75.0% vs. 33.6% respectively), as were never breastfeeding (18.8% vs. 9.0%), not beginning prenatal care in the first trimester (37.7% vs. 25.2%), and smoking the past two years (56.8% vs. 15.5%).
- Having three or more stressors in the 12 months prior to birth were independently associated with the following population characteristics: being American Indian, a young maternal age, less maternal education, being unmarried and having a low household income.

*Domestic abuse during and after pregnancy*

- In 2014, South Dakota mothers more often experienced domestic abuse during pregnancy (7.4%) compared with after delivery (4.6%).
- Domestic abuse events either during, after or both before and after the pregnancy included being controlled by the husband or partner (5.8%), the husband or partner making the mother feel unsafe (4.9%), the mother being frightened for her safety or her family's safety due to anger or threats from the husband or partner (4.8%), and the mother being forced to take part in touching or any sexual activity (1.1%).
- The following behaviors were higher in mothers who experienced domestic abuse during pregnancy compared to mothers who did not experience abuse: rate of unintended pregnancy (71.3% vs. 43.9%), not beginning prenatal care in the first trimester (40.0% vs. 25.8%), and smoking in the last two years (69.6% vs. 27.5%). In addition, the risk of a preterm birth and having a low birthweight baby were more likely among women who experienced domestic abuse during pregnancy compared to women who did not (14.7% vs. 6.6% for preterm birth and 13.8% vs. 4.9% for low birthweight infant).
- When all population characteristics were considered together only marital status and household income were associated with domestic abuse during pregnancy (increased risk of abuse among unmarried mothers and low income mothers).
- When all population characteristics were considered together only low household income was associated with domestic abuse after pregnancy.

*Social supports after delivery*

- More than 90% of the mothers reported having someone to: help if they were tired, take care of the baby, talk with, help if they were sick and loan them money.
- The main source of social support was the family with 82.2% of mothers reporting they could get help from their husband or partner, and 79.8% of mothers reporting being able to get help from their parents or in-laws.
- 1.5% of mothers reported having no one who could help them since the birth of their infant.

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# Adverse Childhood Experiences (ACE)

**Quote from a 2014 SD PRAMS Mother:**

*"Curious if ACE score for male would have any [effect] on health of baby…"*

**Background**

Adverse childhood experiences (ACEs) include verbal, physical, or sexual abuse along with family dysfunction and neglect (1). Examples of family dysfunction include family members who are incarcerated, mentally ill, or substance abusers, and the presence of domestic violence, and divorce or separation. There is evidence from studies that ACEs are common among adults and that having even one adverse childhood experience correlates to higher risk for other adverse experiences (1-3).

The original ACE Study was based at Kaiser Permanente's San Diego Health Appraisal Clinic and was conducted in collaboration with the Centers for Disease Control and Prevention (CDC) (1). Data were collected via the completion of a questionnaire that included both psychological and physical findings. The study was conducted to understand and describe the correlation of childhood adverse experiences, or ACEs, to adult medical and public health issues including: disease risk and incidence, quality of life, utilization of health care services, and mortality.

The standard ACE questions are introduced with the phrase, "While you were growing up during your first 18 years of life…," with a yes answer corresponding to a score of one and an ACE score is calculated as the sum of positive responses (1). There are 8-10 ACE questions that address possible adverse childhood experiences, with many of the published studies reporting on the eight questions related to abuse (physical, sexual, emotional) and household dysfunction (five questions). Positive relationships between ACE scores and adult health risk behaviors and diseases including alcoholism, drug abuse, smoking, poor self-rated health, fifty or more sexual partners, sexually transmitted diseases, physical inactivity, suicide attempt, adult depression, obesity, ischemic heart disease, cancer, chronic lung disease, skeletal fractures, and liver disease have been reported (1-3).

In the 2014 SD PRAMS, ACE scores were not available for 50 (4.3%) of the mothers: 45 elected not to answer any of the questions and an additional five mothers were missing six to nine of the 10 questions. The data from these mothers were not included in the calculation of the overall ACE score. **Table 18** shows the prevalence of mothers with ACE scores of four or greater by various demographic characteristics. The percent of mothers with ACE scores of four or greater was higher in the following populations: American Indian, Hispanic, younger, less educated, unmarried, and households with less income. The percentages of mothers who had specific adverse childhood experiences in the 2014 South Dakota PRAMS are summarized by race in **Figure 50** and a comparison of the statewide prevalence to the findings of the ACE study for women are shown in **Figure 51**.

**Table 18. Percent of Mothers with ACE Scores of 4 or Greater by Demographic Characteristics** (weighted)

| | % of Mothers with an ACE Score of 4+ (95% C.I.) |
|---|---|
| **Race** | **p<0.001** |
| White | 13.4% [10.6, 16.2] |
| American Indian | 33.4% [28.0, 38.9] |
| Other Races | 25.0% [20.9, 29.0] |
| **Ethnicity** | **p<0.001** |
| Hispanic | 34.4% [23.5, 45.4] |
| Non-Hispanic | 16.4% [14.1, 18.8] |
| **Age (years)** | **p=0.002** |
| <20 | 24.5% [14.5, 34.5] |
| 20-24 | 26.1% [20.3, 31.9] |
| 25-29 | 16.3% [12.2, 20.4] |
| 30-34 | 12.4% [8.5, 16.2] |
| ≥35 | 15.1% [8.9, 21.3] |
| **Education** | **p<0.001** |
| <High School | 22.7% [16.6, 28.9] |
| High School | 27.3% [21.4, 33.2] |
| >High School | 13.5% [10.8, 16.2] |
| **Region** | **p=0.02** |
| Central | 13.7% [8.3, 19.0] |
| Northeast | 12.4% [7.7, 17.2] |
| Rapid City MSA | 25.3% [17.8, 32.8] |
| Sioux Falls MSA | 16.8% [12.7, 20.8] |
| Southeast | 16.6% [8.6, 24.7] |
| West | 24.3% [17.5, 31.2] |
| **Marital Status** | **p<0.001** |
| Married | 10.5% [8.0, 13.0] |
| Unmarried | 30.7% [26.1, 35.3] |
| **Health Insurance Status the MONTH BEFORE pregnancy [1]** | **p<0.001** |
| Private (direct purchase) | 4.5% [0.3, 8.6] |
| Job-based | 11.0% [8.2, 13.8] |
| Medicaid | 35.6% [27.8, 43.4] |
| Medicare | 26.3% [8.8, 43.8] |
| Other | 21.3% [7.2, 35.5] |
| Uninsured | 31.5% [25.0, 37.9] |
| **Annual Household Income** | **p<0.001** |
| <$10,000 | 33.7% [27.5, 39.8] |
| $10,000- $24,999 | 28.0% [20.7, 35.3] |
| $25,000 - $49,999 | 18.1% [12.8, 23.3] |
| $50,000 - $74,999 | 11.1% [6.1, 16.1] |
| $75,000 or more | 4.9% [1.9, 8.0] |

[1] If more than one type of insurance was selected, a hierarchy was established to report the individual's insurance status. The hierarchy, in order, was: Private; Job-based (includes self or as a dependent); Other (includes military, VA, Champus & TriCare or Other); Medicaid; Medicare; Uninsured (includes IHS). For example, if an individual selected both 'Private' and 'Medicaid', the individual's insurance status was reported as 'Private'.

**Figure 50. Percentages of 2014 SD PRAMS Mothers Experiencing Specific Adverse Childhood Experiences by Race and Statewide Estimates** (weighted; all individual ACE scores differed significantly by race, p<0.01)

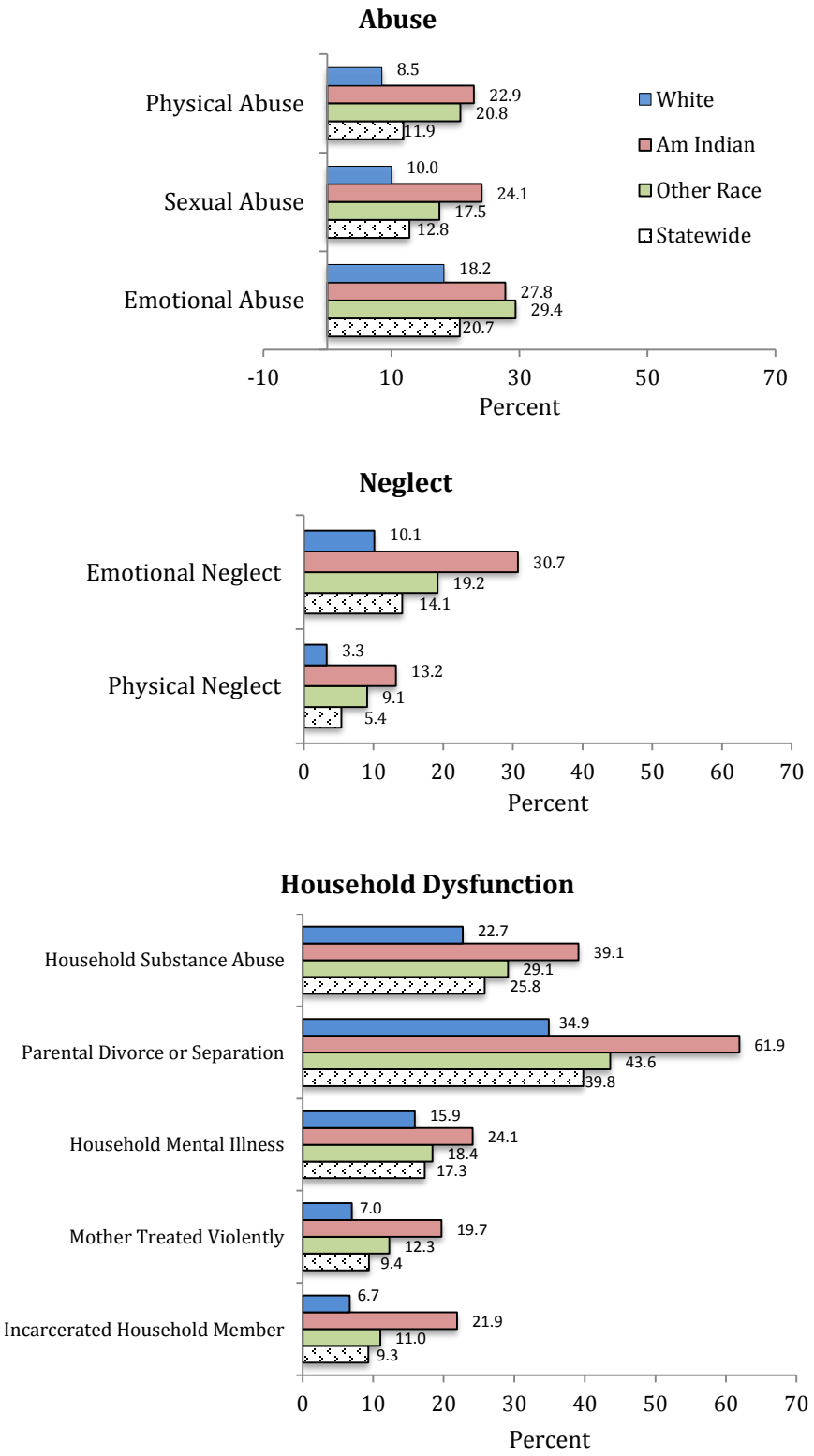
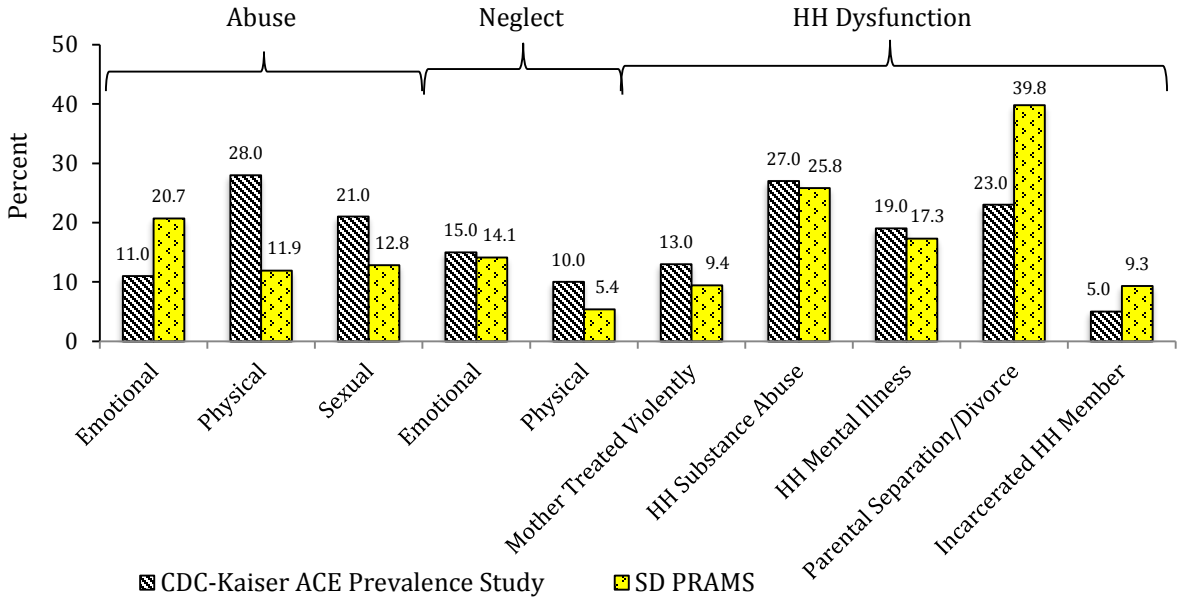


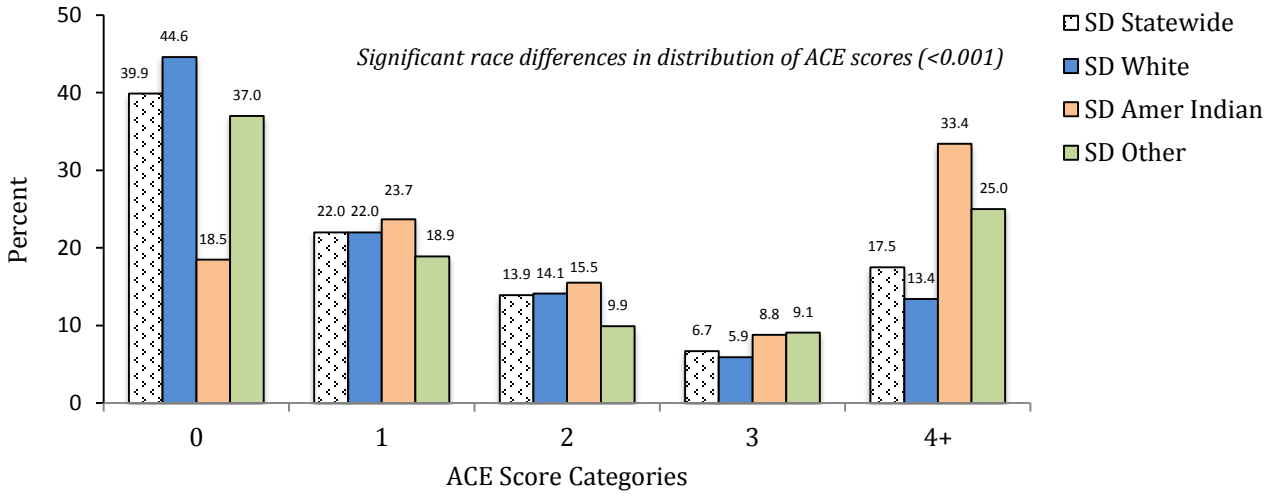
**Figure 51. Comparison of 2014 SD PRAMS Statewide ACE Prevalence Rates to the CDC-Kaiser ACE Prevalence Study** [2] (SD data are weighted)




HH = household

Statewide estimates for ACE score categories are shown in **Figure 52** along with the population percentages by race. There were significant differences in the distribution of ACE scores by race with a higher percentage of American Indian and other race mothers in the 4+ ACE category compared to white mothers.

**Figure 52. Percentages in ACE Score Categories by Race** (weighted).




[2] ACE Study data from CDC-Kaiser Prevalence of ACES at http://www.cdc.gov/violenceprevention/acestudy/ace_graphics.html

**Public Health Implications**

The psychological and social consequences of adverse childhood experiences may impact maternal and newborn well-being. High ACE scores have been shown to be associated with increased teen pregnancy rates and high risk sexual behaviors, including pregnancy at a young age, early onset of intercourse, and high numbers of sexual partners (4). In addition, teenage pregnancy has known associations with adverse birth outcomes including fetal death, prematurity, and low birthweight (4).

Both maternal age and gestational age were found to be lower as the ACE score category increased (both, $p<0.001$; **Figures 53 & 54**). The relationship between maternal age and ACE score categories remained significant when race was included in the analysis ($p=0.009$), and the relationship between gestational age and ACE score categories remained significant when race or maternal age or both were included in the analysis (both, $p<0.05$). Birthweight or prevalence of low birthweight did not vary by ACE score with or without controlling for race and maternal age.

**Figure 53. Average Maternal Age by ACE Score Categories** (weighted)

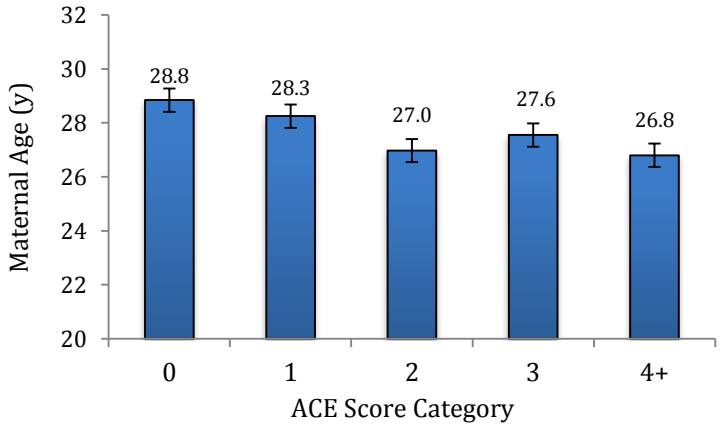
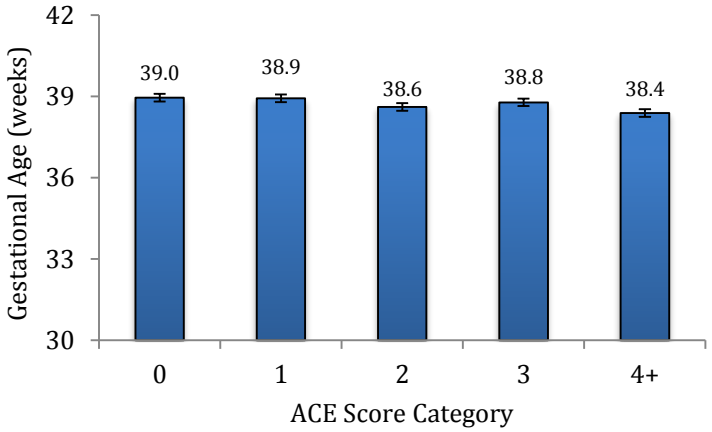
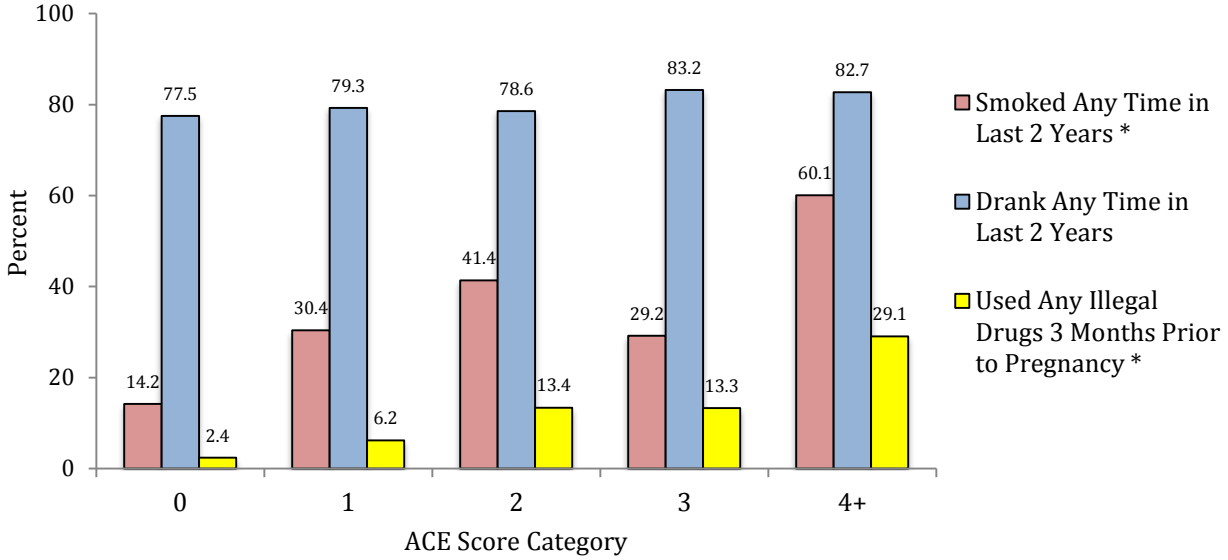



**Figure 54. Average Gestational Age by ACE Score Categories** (weighted)



Increased risky behaviors including smoking, alcohol use, and drug use have been shown to be associated with high ACE scores (5). A similar pattern of increased risky behaviors among mothers with higher ACE scores was seen with the 2014 SD PRAMS **(Figure 55)**. Mothers with high ACE scores were more likely to have smoked in the last two years and to have used illegal drugs in the three months prior to pregnancy (both, p<0.001), but high ACE scores were not associated with drinking in the last two years.

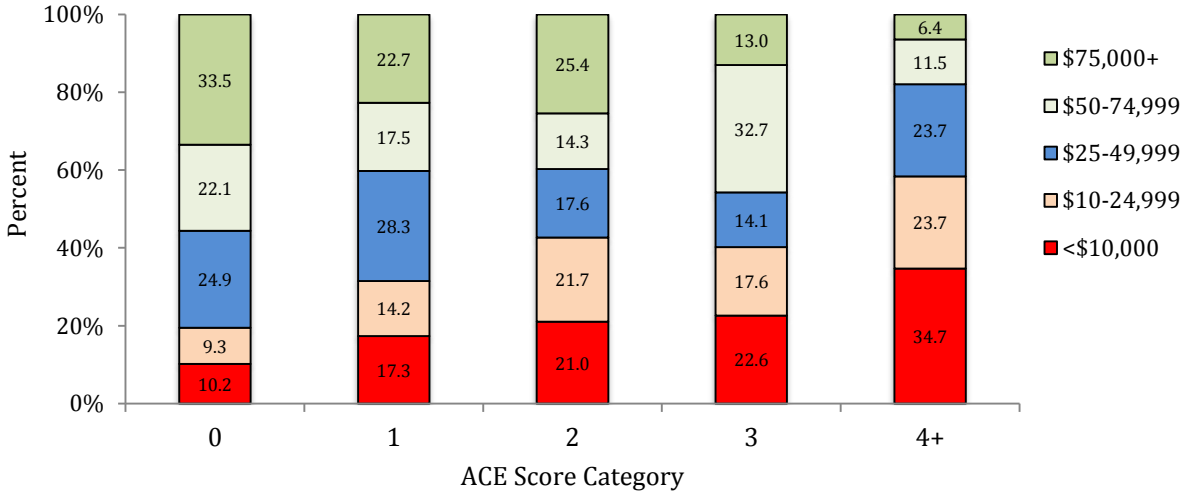
**Figure 55. Percent of 2014 SD PRAMS Mothers Who Smoked or Drank in the Last Two Years or Used Any Illegal Drugs in the Three Months Prior to Pregnancy by ACE Score Categories** (weighted)




* Significantly associated with ACE Score category

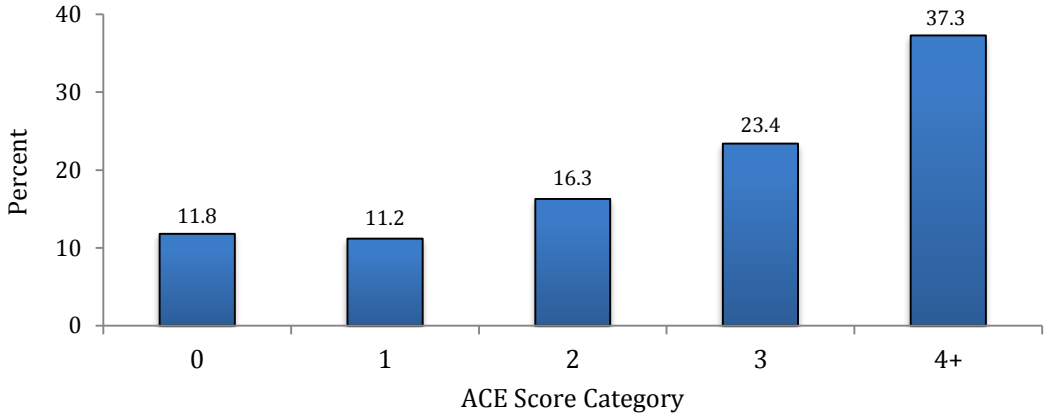
Annual household income also was associated with the ACE score categories. Mother's in the high ACE score categories were more likely to have lower household incomes than mothers in the lower ACE score categories (**Figure 56**).

**Figure 56. Distribution of Household Income by ACE Score Categories** (weighted)



Depressive disorders are two to three times more likely to be reported in women who have had childhood abuse, indicating that ACEs can increase the risk of depression decades after their occurrence (3). Depression is linked to adverse outcomes in pregnancy and childhood. The previously validated PRAMS 3-D Index for postpartum depression (6) was used to determine the relationship between ACE score and postpartum depression. **Figure 57** shows the prevalence of postpartum depression for each ACE score category. As expected based on previous literature (3), postpartum depression was significantly associated with ACE scores even controlling for race and household income ($p<0.001$).

**Figure 57. Prevalence of Postpartum Depression by ACE Score Categories** (weighted)




**Summary**

- The most frequent ACE was parental divorce or separation with 39.8% of mothers experiencing this as a child, followed by household substance abuse (25.8%).
- 17.5% of 2014 South Dakota mothers experienced four or more adverse childhood experiences (ACEs)
- The percent of mothers with ACE scores of four or greater was higher in the following populations: American Indian mothers, Hispanic mothers, younger mothers, less educated mothers, unmarried mothers, and mothers in households with less income.
- Mothers with higher ACE scores were more likely to have shorter gestation than mothers with low ACE scores.
- The percent of mothers who smoked in the previous two years increased with increasing ACE Scores: 14.2% of mothers with no ACEs smoked versus 60.1% of mothers with ACE Scores of four or greater.
- The percent of mothers who used illicit drugs the three months prior to pregnancy increased with increasing ACE scores: 2.4% of mothers with no ACEs used illicit drugs versus 29.1% of mothers with ACE Scores of four or greater.
- Household income decreased with increasing ACE Scores: 19.5% of mothers with no ACEs had household incomes of less than $25,000/year versus 58.4% of mothers with ACE scores of four or greater.
- Prevalence of postpartum depression increased with increasing ACE scores, ranging from 11.8% among mothers with no ACEs to 37.3% among mothers with ACE scores of four or greater.

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# Technical Appendix

Page

A. Methods for Weighting..... 74

## South Dakota 2014 PRAMS: Methods for Weighting

### Sampling Fractions and Response Rates

| | Strata | | | |
|---|---|---|---|---|
| | **White** | **American Indian** | **Other Races*** | **Statewide** |
| **Actual Eligible Births** | 8,715 | 1,746 | 1,174 | 11,625 |
| Not Included Due to Programming Error | 134 | 28 | 16 | 1.5% (178) |
| Not Included-Birth Certified >4 Months | 2 | 1 | 0 | 0.03% (3) |
| **Total Eligible Births** | 8,581 | 1,718 | 1,148 | 11,447 |
| **% of Eligible Births Sampled** (N) | 8.2% (707) | 31.0% (533) | 50.0% (574) | N=1,814 |
| **Contact Rate** [a] (contacted/sample) | 90.4% (639/707) | 72.6% (387/533) | 78.9% (453/574) | N=1,479 |
| **Participation Rate** [a] (response/contacted) | 87.5% (559/639) | 66.9% (259/387) | 76.8% (348/453) | N=1,166 |
| **Response Rate** [c] (response/sample) | 79.1% (559/707) | 48.6% (259/533) | 60.6% (348/574) | Weighted: 71.3% |

* 'Other Races' (number sampled, response rate) included Asian (110, 69.1%), Black (146, 50.0%), Mixed Race (175, 60.6%), Pacific Islanders (6, 66.7%), and Unknown (137, 65.0%).

[a] Percentage of mothers who were contacted or of mothers, friends, or family members who spoke to SDPRAMS personnel on the telephone, regardless of whether or not the mother responded.

[b] Percentage of contacted mothers who responded.

[c] Percentage of mothers in the total sample who responded to at least one question.

**NOTE:** bth_mram on the final birth file differed from bth_mram on the monthly files. The sample was originally based on bth_mram from the monthly files, but the mother's race (bth_mram) on the final birth file was what was used in all analyses. The changes in race distribution were less than 1%.

***Did the sample have similar demographic characteristics as eligible births?***

**Population Distribution (N) of Mothers Sampled and Not Sampled by Race** (columns total 100%)

| | **White** (n=8581) | | **American Indian** (n=1718) | | **Other** (n=1148) | |
|---|---|---|---|---|---|---|
| | **Sampled** (n=707) | **Not Sampled** (n=7874) | **Sampled** (n=533) | **Not Sampled** (n=1185) | **Sampled** (n=574) | **Not Sampled** (n=574) |
| **Maternal Age (y)** | | | | | | |
| < 25 | 20.7% (146) | 23.3% (1834) | 50.1% (267) | 49.8% (590) | 37.5% (215) | 39.9% (229) |
| 25+ | 79.4% (561) | 76.7% (6040) | 49.9% (266) | 50.2% (595) | 62.5% (359) | 60.1% (345) |
| Significance | P=0.11 | | P=0.92 | | P=0.43 | |
| **Maternal Education** | | | | | | |
| Less than High School or Unk | 9.2% (65) | 8.0% (629) | 39.8% (212) | 39.6% (469) | 34.3% (197) | 32.9% (189) |
| High School | 15.4% (109) | 17.7% (1397) | 28.7% (153) | 28.7% (340) | 30.7% (176) | 27.2% (156) |
| > High School | 75.4% (533) | 74.3% (5848) | 31.5% (168) | 31.7% (376) | 35.0% (201) | 39.9% (229) |
| Significance | P=0.19 | | P=0.93 | | p=0.20 | |
| **Marital Status** | | | | | | |
| Married | 76.5% (541) | 72.9% (5739) | 13.1% (70) | 16.9% (200) | 51.7% (297) | 50.7% (291) |
| Other | 23.5% (166) | 27.1% (2135) | 86.9% (463) | 83.1% (985) | 48.3% (277) | 49.3% (283) |
| Significance | P=0.04 | | P=0.05 | | P=0.72 | |
| **Trimester Prenatal Care Began** | | | | | | |
| First | 77.4% (547) | 78.2% (6159) | 48.6% (259) | 49.0% (580) | 53.0% (304) | 57.8% (332) |
| Other | 22.6% (160) | 21.8% (1715) | 51.4% (274) | 51.1% (605) | 47.0% (270) | 42.2% (242) |
| Significance | P=0.60 | | P=0.89 | | P=0.10 | |
| **Parity** | | | | | | |
| 0 | 31.8% (225) | 37.2% (2925) | 27.0% (144) | 25.4% (301) | 32.8% (188) | 36.4% (209) |
| Other | 68.2% (482) | 62.9% (4949) | 73.0% (389) | 74.6% (884) | 67.3% (386) | 63.6% (365) |
| Significance | P=0.005 | | P=0.48 | | P=0.19 | |
| **Hispanic** | | | | | | |
| Other | 95.3% (674) | 97.1% (7642) | 95.9% (511) | 96.8% (1147) | 77.2% (443) | 79.3% (455) |
| Yes | 4.7% (33) | 3.0% (232) | 4.1% (22) | 3.2% (38) | 22.8% (131) | 20.7% (119) |
| Significance | P=0.01 | | P=0.34 | | P=0.39 | |
| **Region of the State** | | | | | | |
| Central | 10.0% (71) | 9.7% (763) | 23.1% (123) | 23.0% (272) | 4.5% (26) | 4.2% (24) |
| Northeast | 22.1% (156) | 21.4% (1688) | 6.8% (36) | 10.6% (126) | 19.5% (112) | 20.0% (115) |
| RC MSA | 13.7% (97) | 15.8% (1244) | 16.9% (90) | 15.7% (186) | 13.8% (79) | 17.3% (99) |
| SF MSA | 38.6% (273) | 35.0% (2752) | 7.7% (41) | 7.4% (88) | 52.1% (299) | 47.0% (270) |
| Southeast | 10.5% (74) | 12.2% (959) | 3.6% (19) | 3.8% (45) | 5.2% (30) | 5.2% (30) |
| West | 5.1% (36) | 5.9% (468) | 42.0% (224) | 39.5% (468) | 4.9% (28) | 6.3% (36) |
| Significance | P=0.49 | | P=0.30 | | P=0.92 | |

***Were there any demographic characteristics that were associated with response rates?***

**Response Rates (N) in Different Demographic Populations by Race** (columns total 100%)

| | White | | American Indian | | Other | |
|---|---|---|---|---|---|---|
| | **Completed** | **No Response** | **Completed** | **No Response** | **Completed** | **No Response** |
| **Maternal Age (y)** | | | | | | |
| < 25 | 18.4% (103) | 29.1% (43) | 47.5% (123) | 52.6% (144) | 36.2% (126) | 39.4% (89) |
| 25+ | 81.6% (456) | 71.0% (105) | 52.5% (136) | 47.4% (130) | 63.8% (222) | 60.6% (137) |
| Significance | P=0.005 | | P=0.24 | | P=0.44 | |
| **Maternal Education** | | | | | | |
| Less than High School or Unk | 7.2% (40) | 16.9% (25) | 32.4% (84) (3 unk) | 46.7% (128) (6 unk) | 32.2% (112) | 37.6% (85) |
| High School | 15.6% (87) | 14.9% (22) | 32.1% (83) | 25.6% (70) | 30.5% (106) | 31.0% (70) |
| > High School | 77.3% (432) | 68.2% (101) | 35.5% (92) | 27.7% (76) | 37.4% (130) | 31.4% (71) |
| Significance | P=0.002 | | P=0.003 | | p=0.11 | |
| **Marital Status** | | | | | | |
| Married | 79.4% (444) | 65.5% (97) | 16.6% (43) | 9.9% (27) | 58.1% (202) | 42.0% (95) |
| Other | 20.6% (115) | 34.5% (51) | 83.4% (216) | 90.2% (247) | 41.9% (146) | 58.0% (131) |
| Significance | P<0.001 | | P=0.02 | | P<0.001 | |
| **Trimester Prenatal Care Began** | | | | | | |
| First | 78.7% (440) | 72.3% (107) | 53.3% (138) | 44.2% (121) | 55.8% (194) | 48.7% (110) |
| Other | 21.3% (119) | 27.7% (41) | 46.7% (121) | 55.8% (153) | 44.3% (154) | 51.3% (116) |
| Significance | P=0.10 | | P=0.04 | | P=0.10 | |
| **Parity** | | | | | | |
| 0 | 31.0% (173) | 35.1% (52) | 30.5% (79) | 23.7% (65) | 36.2% (126) | 27.4% (62) |
| Other | 69.0% (386) | 64.9% (96) | 69.5% (180) | 76.3% (209) | 63.8% (222) | 72.6% (164) |
| Significance | P=0.33 | | P=0.08 | | P=0.03 | |
| **Hispanic** | | | | | | |
| Other | 96.1% (537) | 92.6% (137) | 96.1% (249) | 95.6% (262) | 75.0% (261) | 80.5% (182) |
| Yes | 3.9% (22) | 7.4% (11) | 3.9% (10) | 4.4% (12) | 25.0% (87) | 19.5% (44) |
| Significance | P=0.07 | | P=0.79 | | P=0.12 | |
| **Region of the State** | | | | | | |
| Central | 10.9% (61) | 6.8% (10) | 24.3% (63) | 21.9% (60) | 3.5% (12) | 6.2% (14) |
| Northeast | 22.5% (124) | 21.6% (32) | 8.1% (21) | 5.5% (15) | 19.8% (69) | 19.0% (43) |
| RC MSA | 13.4% (75) | 14.9% (22) | 12.7% (33) | 20.8% (57) | 14.9% (52) | 12.0% (27) |
| SF MSA | 37.2% (208) | 43.9% (65) | 7.3% (19) | 8.0% (22) | 51.4% (179) | 53.1% (120) |
| Southeast | 11.3% (63) | 7.4% (11) | 3.1% (8) | 4.0% (11) | 4.9% (17) | 5.8% (13) |
| West | 5.0% (28) | 5.4% (8) | 44.4% (115) | 39.8% (109) | 5.5% (19) | 4.0% (9) |
| Significance | P=0.46 | | P=0.83 | | P=0.56 | |

**VARIABLES TO WEIGHT BASED ON RESPONSE RATES:**

**Whites**: Logistic regression was performed with response/non-response as outcome and maternal age, education and marital status as predictors. Both marital status and education (3 levels) were significant (p=0.003 & p=0.009 respectively), maternal age was not (p=0.19). However, cell frequencies were lower than the limit recommended by CDC (7 of 12 were n<25) so maternal education was redefined as 'high school and less or unknown' vs. 'greater than high school'. The following distribution was found for whites:

| | Completed | No Response |
|---|---|---|
| **Maternal Education** | | |
| High School & Less or Unk | 22.7% (127) | 31.8% (47) |
| > High School | 77.3% (432) | 68.2% (101) |
| Significance | P=0.02 | |

Logistic regression was repeated with maternal age (p=0.18), maternal education (2 levels; p=0.30), and marital status (p=0.02). Including maternal age & maternal education individually to models containing marital status did not result in significance of maternal age or maternal education (p=0.13 and p=0.21 respectively). In both cases marital status became more significant when either of these other potential covariates were included (p<0.01, both). Use **MARITAL STATUS.**

| Strata of White Mothers: Response Rates | |
|---|---|
| **Marital Status** | **Response Rate (responded/total)** |
| Married | 82.1% (444/541) |
| Other‡ | 69.3% (115/166) |

**American Indians**: Logistic regression was performed with response/non-response as outcome, and with marital status (P=0.05), trimester prenatal care began (P=0.09), and maternal education (3 groups, P=0.01) as predictors. Trimester prenatal care began (p=0.07) was no longer significant if just education was included (p=0.006) and marital status was borderline significant (p=0.04) when included with maternal education (p=0.006). There were small numbers when response was categorized according to both marital status and maternal education (6 of 12 had n<25). Use **MATERNAL EDUCATION (3 LEVELS)**.

| Strata of American Indian Mothers: Response Rates | |
|---|---|
| **Maternal Education** | **Response Rate (responded/total)** |
| Less than High School/Unknown | 39.6% (84/212) |
| High School | 54.2% (83/153) |
| Greater than High School | 54.8% (92/168) |

**Other Races**: Logistic regression was performed with response/non-response as outcome, and with marital status and parity as predictors. Both remained significant with p<0.001 and p=0.004 respectively. Use **MARITAL STATUS** and **PARITY**.

| Strata of Mothers of Other Races: Response Rates | | |
|---|---|---|
| **Parity** | **Marital Status** | **Response Rate (responded/total)** |
| Nulliparous (n=0) | Married | 77.3% (58/75) |
| | Other | 60.2% (68/113) |
| Other | Married | 64.9% (144/222) |
| | Other | 47.6% (78/164) |

‡ Other for parity and marital status includes all other categories than the one listed, including missing data

**VARIABLES TO WEIGHT DUE TO OMISSIONS IN SAMPLING FRAME, OR NON-COVERAGE RATE:**

The one group that was excluded was births to mothers aged <14 years. There was only one 12 year old, so this was not weighted in the final weight. In order to be included in the sampling frame, the birth had to be registered with the Department of Health Office of Vital Records within four months of occurrence. There were 421 births that would have been eligible to be included but were not registered. The race distribution of the births included in the sampling frame and these 421 births did not differ (p=0.36) so no adjustment was made for omission in the sampling frame. The 421 births are not included in the number of eligible births.

## CALCULATION OF FINAL WEIGHTS

The final weights included the sampling weight (Ws[i]) and the response weights (Wr[ij]) and the calculation of these are given below.

**SAMPLING WEIGHT: Ws[i]=N[i]/n[i]**

| Race | sampled (n[i]) | eligible (N[i]) | Ws[i] |
|---|---|---|---|
| White | 707 | 8581 | 12.137 |
| Amer Indian | 533 | 1718 | 3.223 |
| Other | 574 | 1148 | 2.000 |
| totals | 1814 | 11447 | |

Where N = number of eligible births and n= number of sampled births. The sampling weight can be interpreted as every white mother represents 12 White mothers in the state, whereas every American Indian mother represents 3.2 American Indian mothers in the state.

**NONRESPONSE WEIGHT: Wn[ij]=n[ij]/r[ij]**

| Race | Married/ Educ | Parity | responded (r[ij]) | sampled (n[ij]) | Wn[i] |
|---|---|---|---|---|---|
| White | married | | 444 | 541 | 1.2185 |
| White | other | | 115 | 166 | 1.4435 |
| Amer Indian | <HS/Unk | | 84 | 212 | 2.5238 |
| Amer Indian | High School | | 83 | 153 | 1.8434 |
| Amer Indian | >HS | | 92 | 168 | 1.8261 |
| Other | married | 0 | 58 | 75 | 1.2931 |
| Other | married | 1+ | 144 | 222 | 1.5417 |
| Other | other | 0 | 68 | 113 | 1.6618 |
| Other | other | 1+ | 78 | 164 | 2.1026 |
| | | | 1166 | 1814 | |

Where n= number of sampled births and r = number of mothers responding.

The sampling and response weights are combined to determine the final weight that is applied to the analysis of the data:

**Calculation of Weights:**

| | | | | | FINAL WEIGHT | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Race** | **Married/Educ** | **Parity** | **Ws[i]** | **Wn[ij]** | **Ws[i]*Wn[ij]** | **responded (n)** | **sampled (N)** | **Ws[i]*N** | **Ws[i]* Wn[ij]*n** |
| White | Married | | 12.1372 | 1.2185 | 14.7888 | 444 | 541 | 6566.2 | 6566.2 |
| White | Other | | 12.1372 | 1.4435 | 17.5198 | 115 | 166 | 2014.8 | 2014.8 |
| Amer Indian | <HS & Unk | | 3.2233 | 2.5238 | 8.1349 | 84 | 212 | 683.3 | 683.3 |
| Amer Indian | High School | | 3.2233 | 1.8434 | 5.9417 | 83 | 153 | 493.2 | 493.2 |
| Amer Indian | >HS | | 3.2233 | 1.8261 | 5.8860 | 92 | 168 | 541.5 | 541.5 |
| Other | Married | 0 | 2.0000 | 1.2931 | 2.5862 | 58 | 75 | 150.0 | 150.0 |
| Other | Married | 1+ | 2.0000 | 1.5417 | 3.0833 | 144 | 222 | 444.0 | 444.0 |
| Other | Other | 0 | 2.0000 | 1.6618 | 3.3235 | 68 | 113 | 226.0 | 226.0 |
| Other | Other | 1+ | 2.0000 | 2.1026 | 4.2051 | 78 | 164 | 328.0 | 328.0 |
| Total eligible is 11,447 | | | | | | | Totals: | 11447 | 11447 |

## Finite Population Correction Factor

Finite population correction (fpc) factor is used for both the standard error of the mean and the standard error the proportion. The standard errors of the mean and of the proportion are based on the assumption that participants are selected with equal probability. This is nearly the case when the sample size is small relative to the population size (generally less than 5%). This is not the case with the SD PRAMS. In the SD 2014 PRAMS all three strata (White, American Indian, Other) were sampled at >5% and the sampling rate varied by strata.

In both SAS and Stata these fractions (# responded/# eligible) are entered within the appropriate procedure (i.e, proc surveyfreq) and the fpc is taken into account in the calculation of the standard errors, confidence intervals, significance testing, etc.

| | N | n | Fraction |
|---|---|---|---|
| White | 8,581 | 559 | 0.0651 |
| American Indian | 1,718 | 259 | 0.1508 |
| Other | 1,148 | 348 | 0.3031 |