Infant Mortality Data Summary Report For North Dakota

July 2014

NORTH DAKOTA
DEPARTMENT *of* HEALTH

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INTRODUCTION

This summary report provides data analysis and trends of infant health status and mortality by assessing risk factors, access to care, and outcomes. The data is critical for program planning and development and enables the state to target services and monitor the effectiveness of interventions that support infant health, safety and well-being.

DATA TRENDS

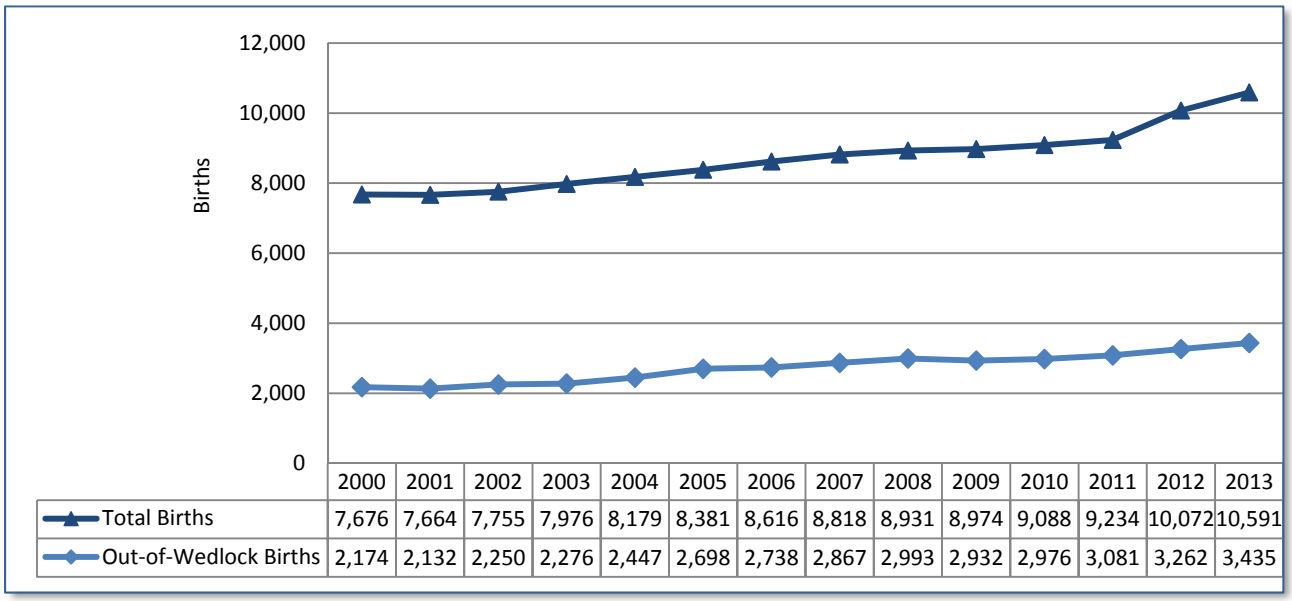
Trends in Births

Total Births and Births to Unwed Mothers

The number of births in North Dakota fell consistently during the 1980s and 1990s due to a persistent outmigration of young adults. In 1982, there were 12,655 births reported in the state. Following 1982, the number of births in North Dakota dropped annually. In 1994, there were 8,585 births and the number continued to decline into the new millennium, reaching 7,676 births in 2000 (see Figure 1). The state's robust economy, due largely to a recent increase in energy development activity, has contributed to a reversal of the long-standing downward trend in births. The number of births in the state has since been on a rebound, reaching 10,591 in 2013.

Out-of-wedlock births to unwed mothers have risen sharply with the increase in annual statewide births. While remaining relatively stable in the 1990s, the number of births to unwed mothers rose sharply beginning in 2002 (see Figure 1). In 2013, 3,435 out-of-wedlock births to unwed mothers were reported, which accounted for more than one in three total births in the state. This is up from 3,081 births in 2011.

Figure 1. Total Births and Out-of-Wedlock Births in North Dakota, 2000-2013



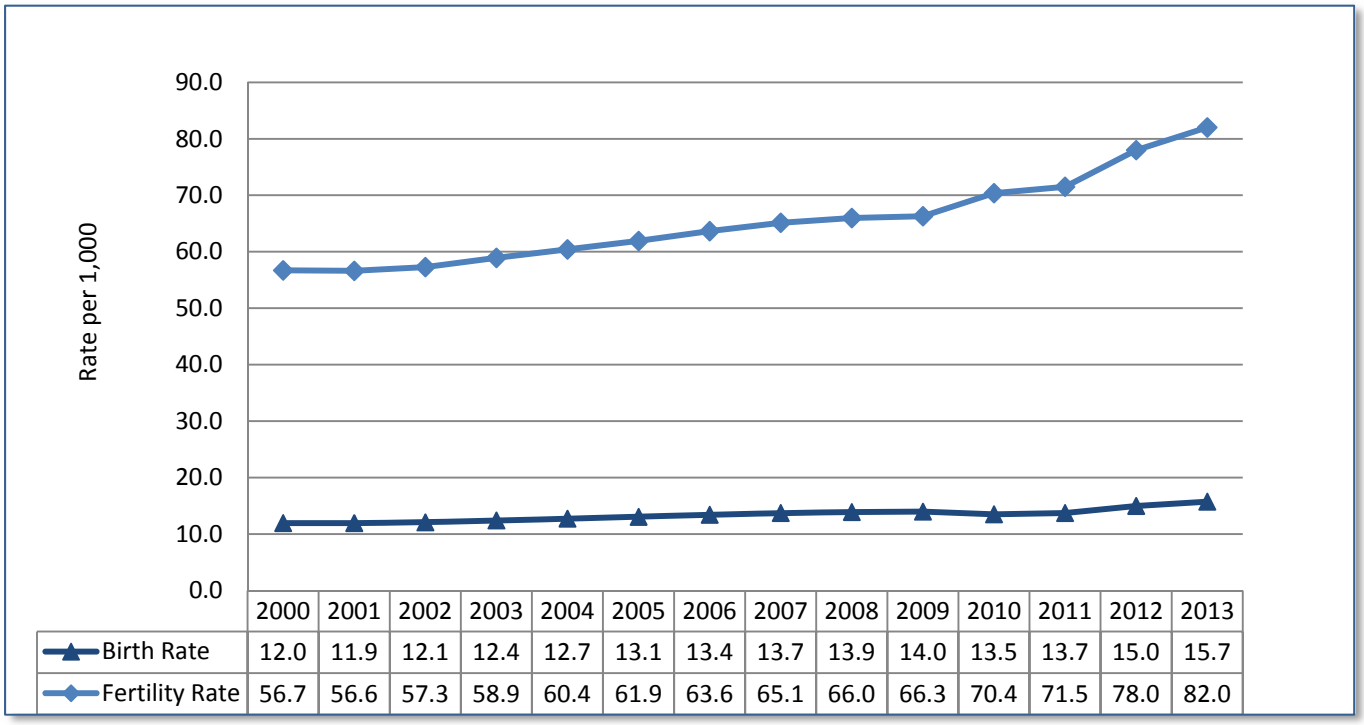
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total Births	7,676	7,664	7,755	7,976	8,179	8,381	8,616	8,818	8,931	8,974	9,088	9,234	10,072	10,591
Out-of-Wedlock Births	2,174	2,132	2,250	2,276	2,447	2,698	2,738	2,867	2,993	2,932	2,976	3,081	3,262	3,435

Source: North Dakota Department of Health, Division of Vital Records

Birth and Fertility Rates

Birth rates reflect the rebound in births in North Dakota; there were 13.5 births per 1,000 population in 2010, which is up from 12.0 births in 2000 (see Figure 2). The 2013 birth rate has increased to 15.7 per 1,000 population. The fertility rate, which represents the number of births per 1,000 women of childbearing age in North Dakota, also is increasing; there were 70.4 births per 1,000 women ages 15 to 44 in 2010, which is up from 56.7 births in 2000. In 2013, the fertility rate increased to 82.0 per 1,000 population.

Figure 2. Birth and Fertility Rates in North Dakota: Birth Rate per 1,000 Population and Fertility Rate per 1,000 Women Ages 15 to 44, 2000-2013



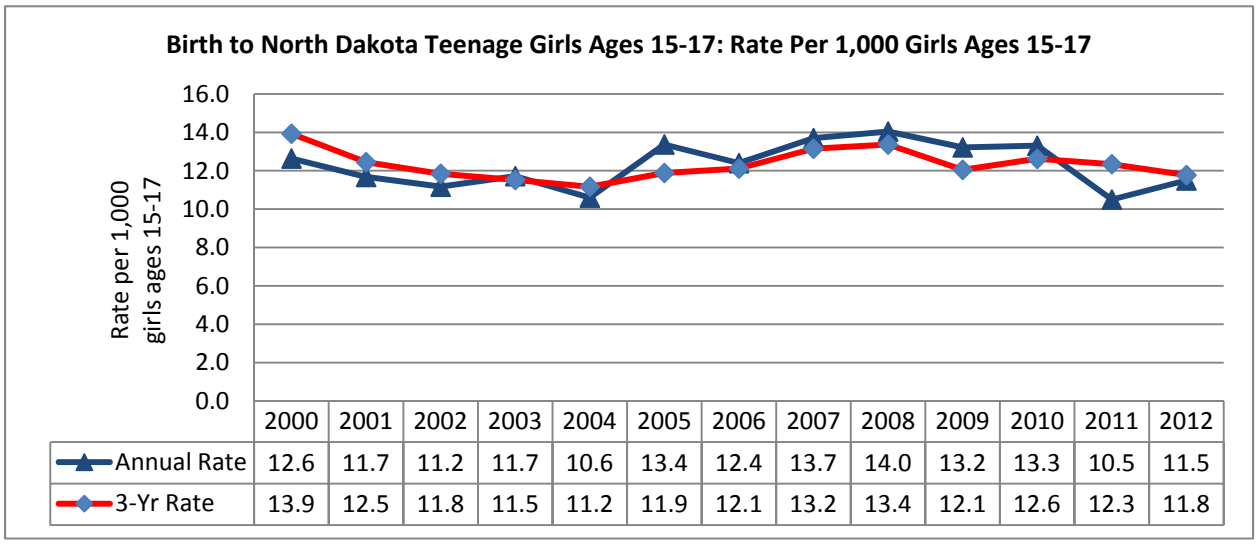
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Birth Rate	12.0	11.9	12.1	12.4	12.7	13.1	13.4	13.7	13.9	14.0	13.5	13.7	15.0	15.7
Fertility Rate	56.7	56.6	57.3	58.9	60.4	61.9	63.6	65.1	66.0	66.3	70.4	71.5	78.0	82.0

Source: North Dakota Department of Health, Division of Vital Records

Births to Young Teens

Annual birth rates to younger mothers (ages 15 through 17) have fluctuated through the decade, reaching a low of 10.5 in 2011 and reaching the highest of 14.0 in 2008. Similar patterns have been observed in the three-year rates (see Figure 3). Births in North Dakota occur predominately to white women ages 20 to 34 (see Figure 5). However, a higher proportion of teenage births were to American Indians (see Figure 6). In 2010, 84 percent of all resident births in North Dakota were to mothers in that age category.

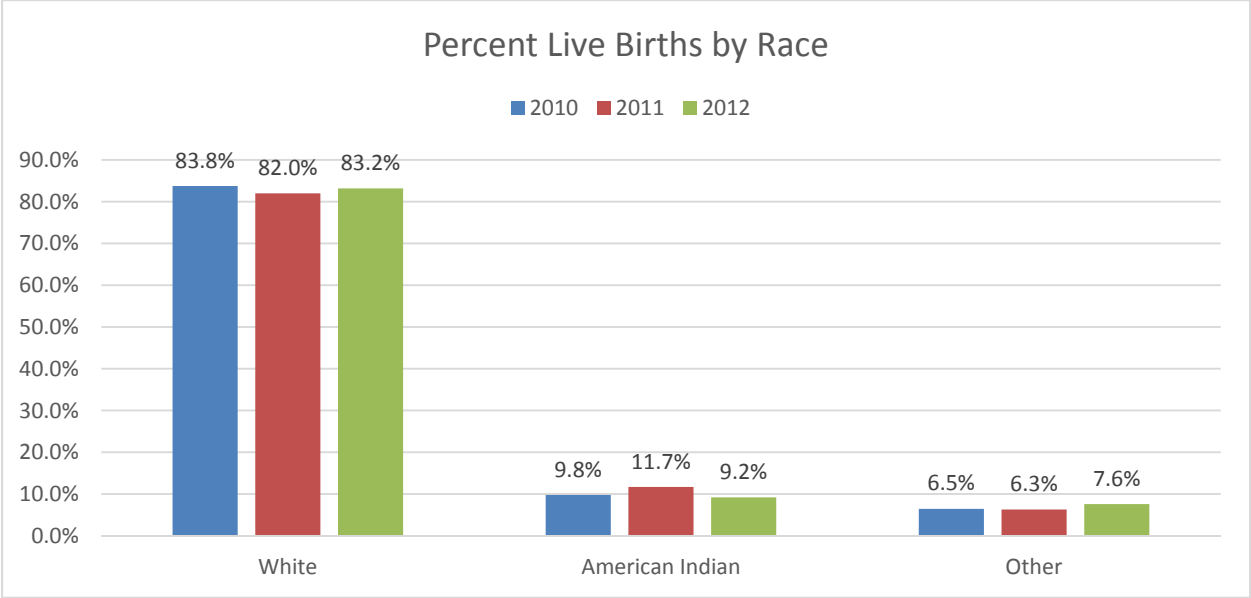
Figure 3. Births to Teens Ages 15 to 17 in North Dakota: Rate per 1,000 Girls Ages 15 to 17, 2000-2012



	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Annual Rate	12.6	11.7	11.2	11.7	10.6	13.4	12.4	13.7	14.0	13.2	13.3	10.5	11.5
3-Yr Rate	13.9	12.5	11.8	11.5	11.2	11.9	12.1	13.2	13.4	12.1	12.6	12.3	11.8

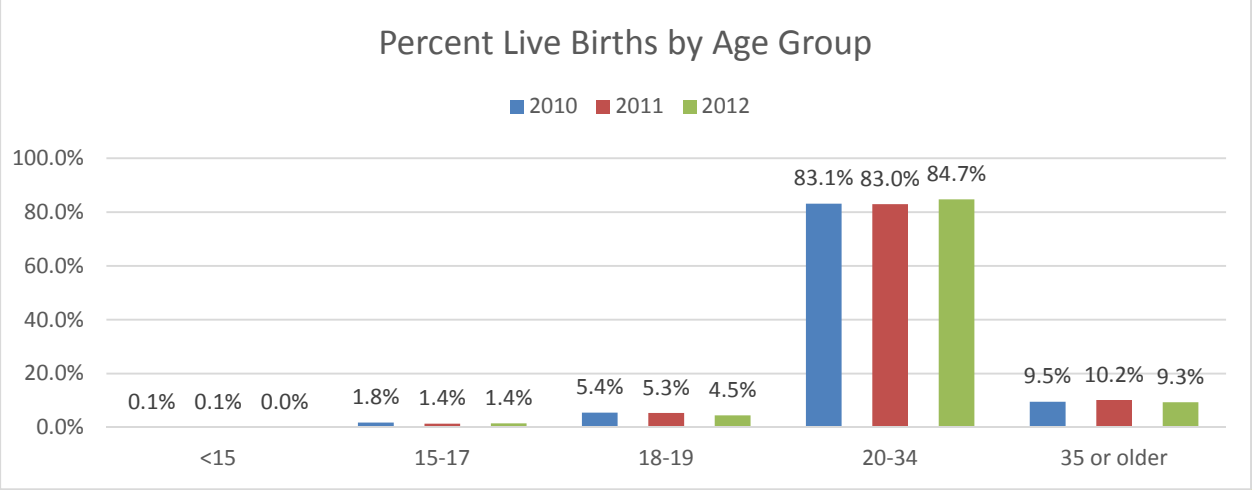
Source: North Dakota Department of Health, Division of Vital Records, and population estimates from the U.S. Census Bureau, Population Division; Federal Performance, Measure #8

Figure 4. Percent Live North Dakota Births by Race, 2010-2012



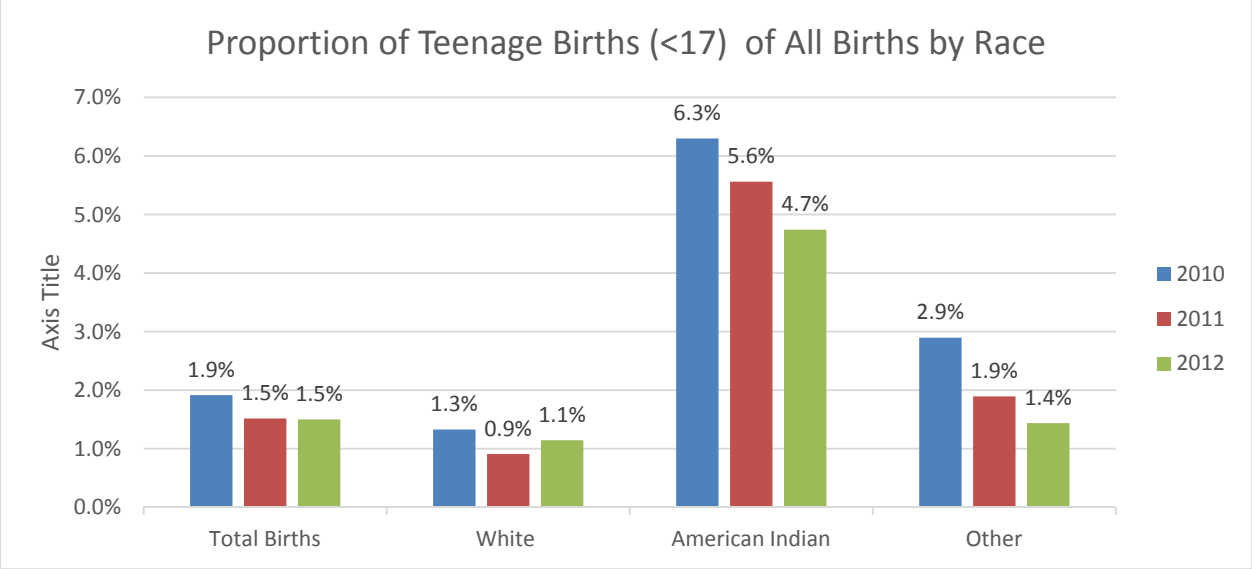
Source: North Dakota Department of Health, Division of Vital Records.

Figure 5. Percent Live North Dakota Births by Age, 2010-2012



Source: North Dakota Department of Health, Division of Vital Records

Figure 6. Percent Live North Dakota Births by Race, 2010-2012



Source: North Dakota Department of Health, Division of Vital Records

Birth Outcomes

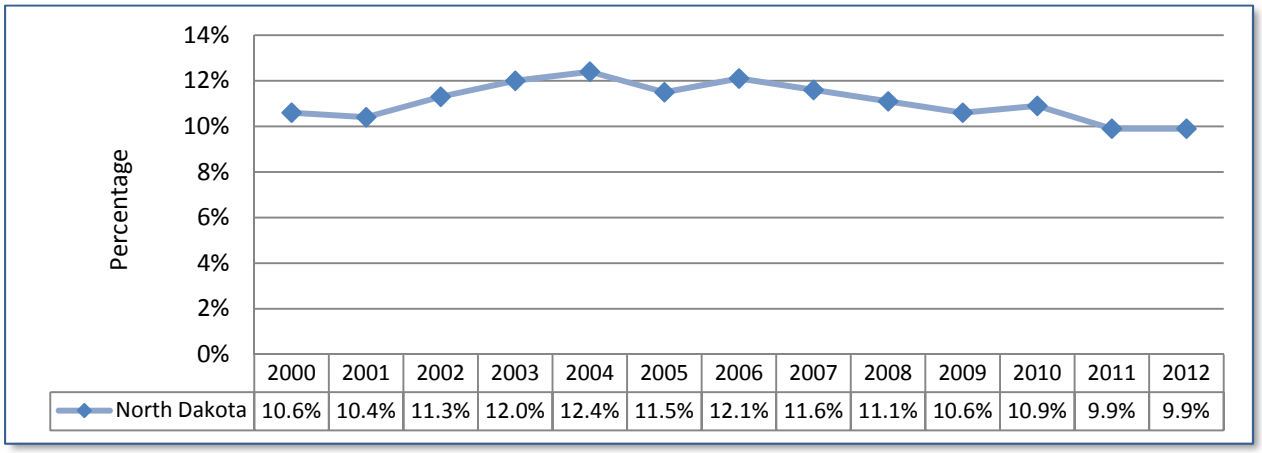
The birth data presented in this summary report refers to live births. Live births are distinguished from stillbirths (i.e., the birth of a fetus that has died in the uterus, during labor or during delivery). Stillbirths can occur at full term (37 weeks of gestation or more). Live births also are distinguished from miscarriages (i.e., when a pregnancy ends spontaneously prior to when the fetus is capable of surviving [20 weeks of gestation]). Miscarriages, also referred to as spontaneous abortions, are distinguished from induced terminations of pregnancy.

Preterm Births

Preterm births are infants born at fewer than 37 weeks of gestation. Preterm babies often are broken into two categories: late preterm (34 to 36 weeks gestation) and early preterm (fewer than 34 weeks gestation).

In 2012, nearly one in 10 live births (9.9%) in North Dakota were preterm, down from 12.4 percent in 2004 (see Figure 7). Preterm infants have greater risk of disabilities and early death compared to infants born at 37 weeks or greater gestation. Babies who are born early often are born smaller. The causes of being born early and being born at a low birthweight can differ, but there is a great deal of overlap within these two populations of babies.

Figure 7. Total Live Births in North Dakota: Percent Who Are Preterm, 2000-2012

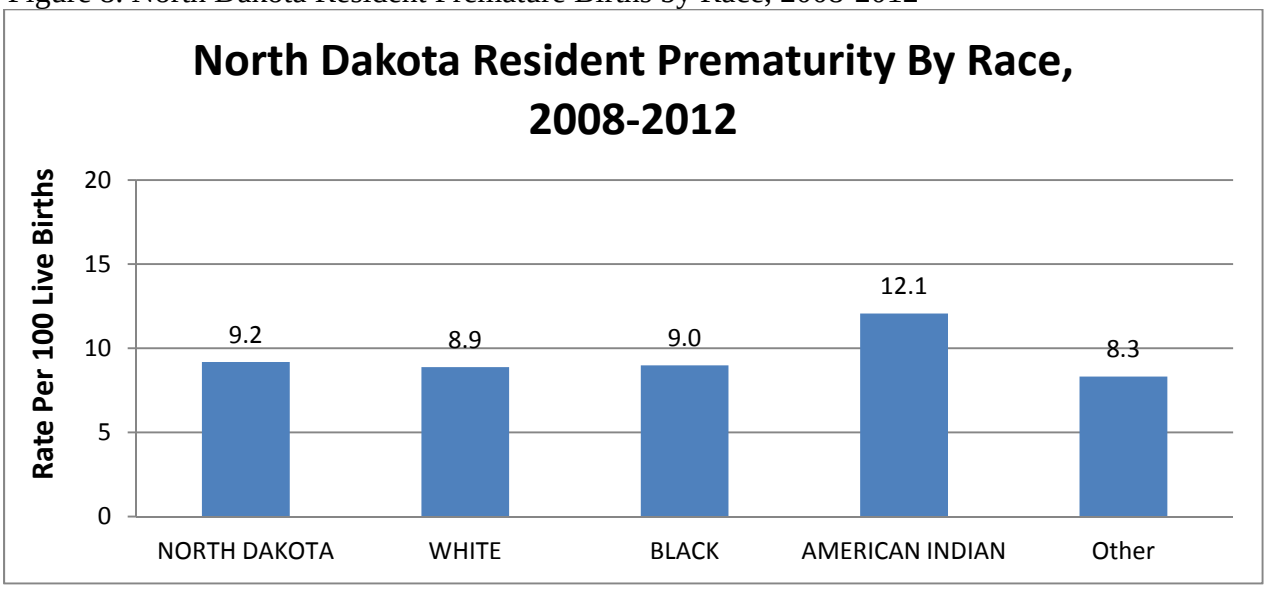


	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
North Dakota	10.6%	10.4%	11.3%	12.0%	12.4%	11.5%	12.1%	11.6%	11.1%	10.6%	10.9%	9.9%	9.9%

Source: U.S. Centers for Disease Control and Prevention, National Center for Health Statistics, National Vital Statistics System

Nationally, for the period 2008-2010, 12.2 percent of live births were premature, defined as less than 37 weeks gestation. During this period, the percentage of North Dakota births considered premature was slightly lower (10.8%). For the 2008-2012 five-year aggregate, 9.2 percent of total births were considered premature. However, premature births are not equally distributed across demographic and geographic barriers in the state (see Figures 8 and 9). Minority populations exhibit premature birth rates higher than their white counterparts; American Indians during this time period exhibited the highest disparity (12.1 per 100 live births), compared with Black or African Americans (9.0) and whites (8.9). Region 3 (12.0 per 100 live births), Region 4 (9.8 per 100 live births), and Region 7 (9.8 per 100 live births) had the highest premature birth rates for the state and are each higher than the state rate (9.2). Late preterm births are categorized as birth within week 34-36 of gestation. The state rate for 2008-2012 based on aggregated data was 6.8 per 100 live births. The American Indian rate (8.6) was higher than both white (6.6) and Black or African American (5.9).

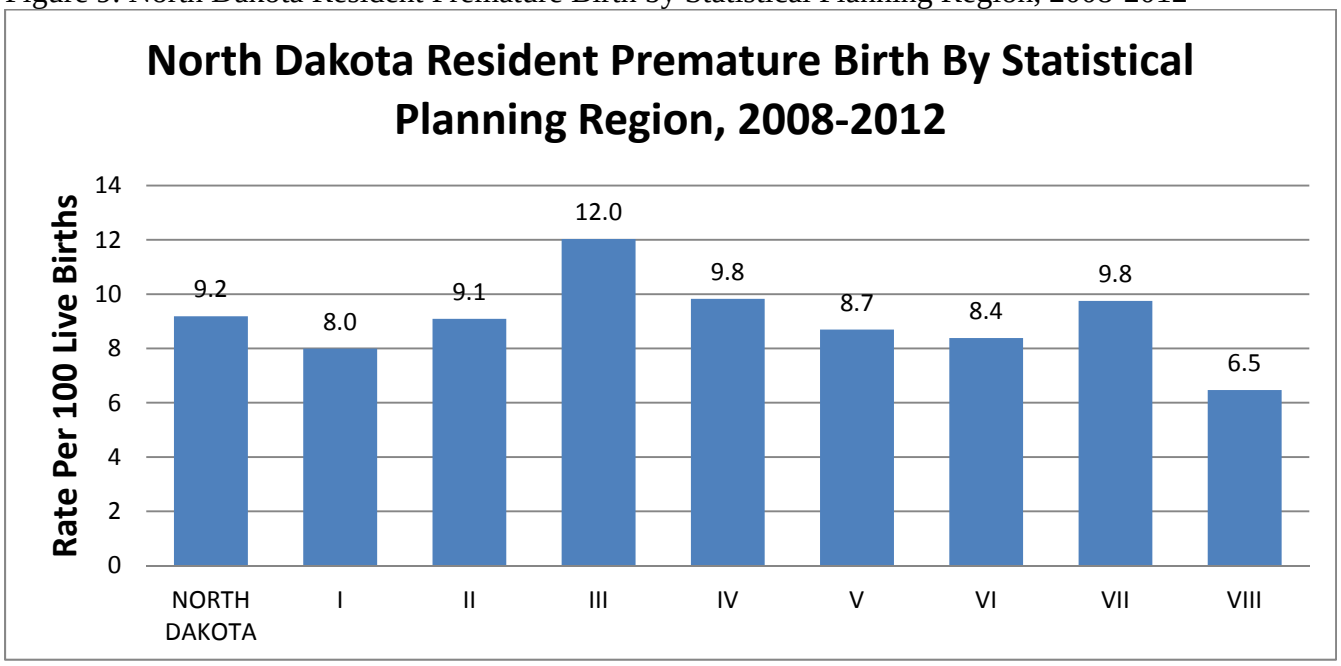
Figure 8. North Dakota Resident Premature Births by Race, 2008-2012



Source: North Dakota Department of Health, Division of Vital Records

Region 3 (12.0 per 100 live births), Region 4 (9.8 per 100 live births), and Region 7 (9.8 per 100 live births) had the highest premature birth rates for the state and are each higher than the state rate (9.2). American Indians had rates higher than state rates in every region other than Region 5 and 8. The greatest disparity among the American Indian race is in Region 4 with the American Indian premature birth rate of 13.1 per 100 live births compared to a rate of 9.2 statewide. However, the greatest regional disparity statewide for this period was among residents of a combined "other race" category, including several minority populations; in Region 3, the rate of premature births was 25.6 per 100 live births.

Figure 9. North Dakota Resident Premature Birth by Statistical Planning Region, 2008-2012



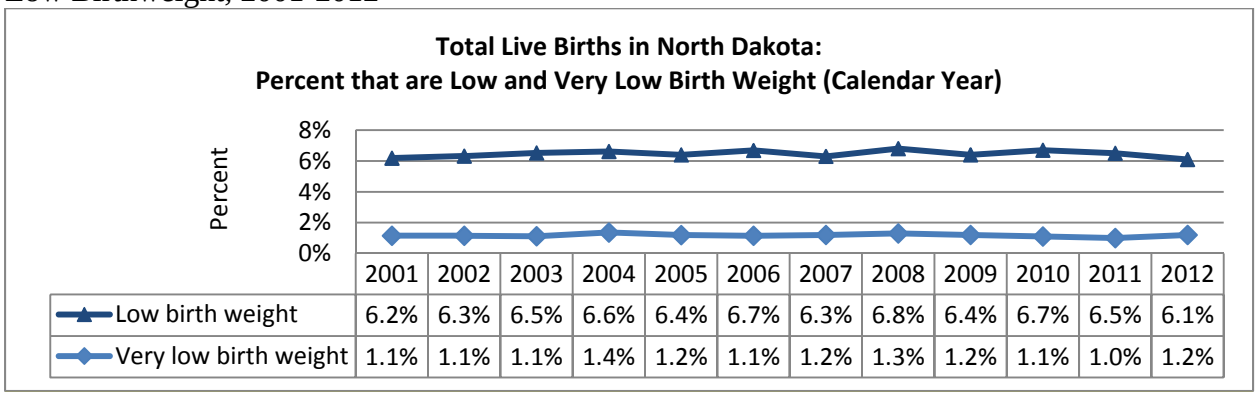
Source: North Dakota Department of Health, Division of Vital Records

Late preterm births are categorized as birth within week 34-36 of gestation. The state rate for 2008-2012 based on aggregated data was 6.8 per 100 live births. The American Indian rate (8.6) was higher than both white (6.6) and Black or African American (5.9). Late preterm birth rates are higher than the state rate in regions 3 (8.6), 4 (7.3), and 7 (7.1). Region 3 (9.4) and 4 (7.3) also had the highest rates among mothers that report being of Hispanic or other subcategory ethnicity. Late preterm birth is related to caesarean birth. In 2012, 27.5 percent of all births were completed using the caesarean delivery route; 33.9 percent of American Indian births used the caesarean section method, compared with 27.2 percent of whites.

Low-Birthweight and Very Low-Birthweight Births

The percent of low-birthweight births (i.e., less than 2,500 grams or 5 pounds, 8 ounces) is relatively stable, with minor fluctuation from 6.2 percent in 2001 to 6.8 in 2008, then decreasing again to 6.1 in 2012. The overall number of births also increased over this time period, so the proportion of low-birthweight births in North Dakota in the last decade has remained relatively stable (see Figure 10). In addition, there has been relatively little change in the proportion of very low-birthweight births (i.e., less than 1,500 grams or 3 pounds, 5 ounces) over the time period.

Figure 10. Total Live Births in North Dakota: Percentage Who Are Low Birthweight and Very Low Birthweight, 2001-2012



	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Low birth weight	6.2%	6.3%	6.5%	6.6%	6.4%	6.7%	6.3%	6.8%	6.4%	6.7%	6.5%	6.1%
Very low birth weight	1.1%	1.1%	1.1%	1.4%	1.2%	1.1%	1.2%	1.3%	1.2%	1.1%	1.0%	1.2%

Note: Low birthweight is defined as less than 2,500 grams (5 pounds, 8 ounces). Very low birthweight is defined as less than 1,500 grams (3 pounds, 5 ounces).
Source: North Dakota Department of Health, Division of Vital Records; Health Status Indicator #1A and #2A

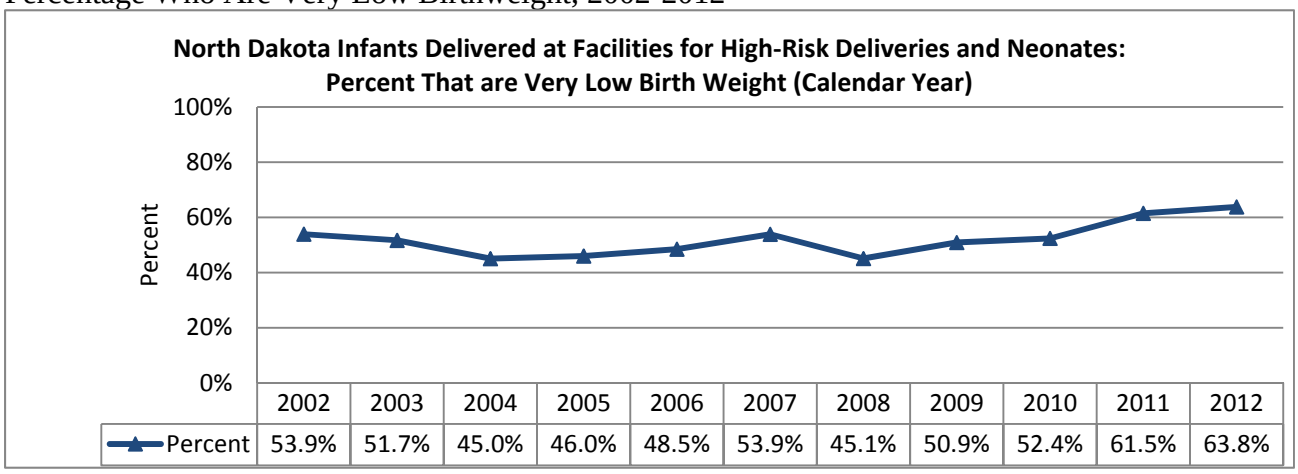
Very Low-Birthweight Births at High-Risk Facilities

According to the report entitled *An Environmental Scan of Health and Health Care in North Dakota*, there are 45 acute-care hospitals in North Dakota. Twelve of these hospitals deliver babies, and half of these are in the state's four largest cities (Fargo, Bismarck, Grand Forks and Minot).

North Dakota has four Level 3 facilities for high-risk deliveries and neonates; these facilities are located in the three largest cities within the state (Fargo, Bismarck and Grand Forks). Because of the recent increase in births statewide, there are more births to mothers who do not live near a Level 3 facility, such as mothers in the western third of the state. Infants born in non-Level 3 facilities may be transferred to and cared for at Level 3 facilities in North Dakota or elsewhere.

The delivery of very low-birthweight babies in North Dakota is increasingly occurring at facilities other than one of North Dakota's four high-risk Level 3 facilities (see Figure 11). In 2002, 53.9 percent of the very low-birthweight births in North Dakota were delivered at a Level 3 facility. By 2008, the percent had dropped to 45 percent. The trend may reflect a greater level of confidence among mothers and health-care providers to deliver high-risk babies at non-Level 3 facilities. In 2012, the percent has increased to 63.8.

Figure 11. North Dakota Infants Delivered at Facilities for High-Risk Deliveries and Neonates: Percentage Who Are Very Low Birthweight, 2002-2012



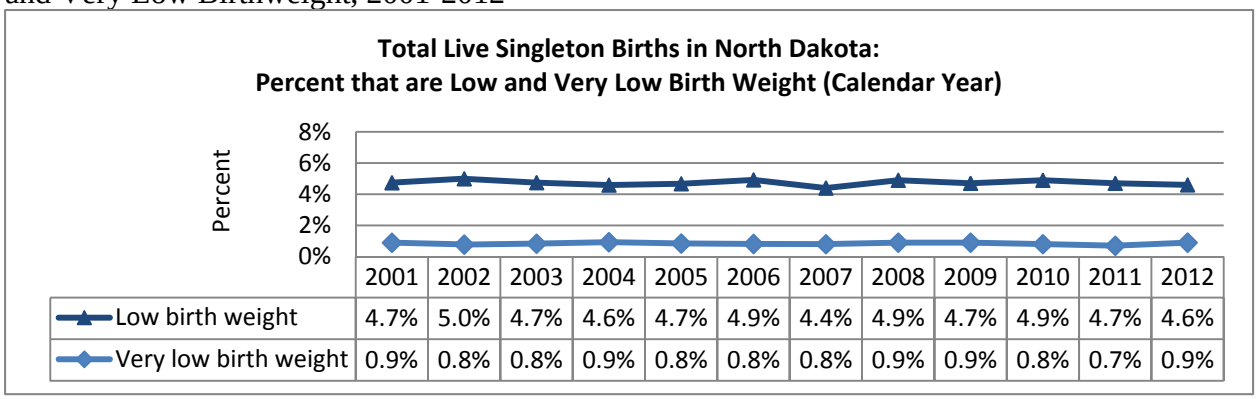
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Percent	53.9%	51.7%	45.0%	46.0%	48.5%	53.9%	45.1%	50.9%	52.4%	61.5%	63.8%

Note: Very low birthweight is defined as less than 1,500 grams (3 pounds, 5 ounces). The Level 3 facilities in the state, based on self-report, are Sanford in Fargo, St. Alexius in Bismarck, Sanford in Bismarck and Altru in Grand Forks.
Source: North Dakota Department of Health, Division of Vital Records; Federal Performance Measure #17

Low-Birthweight and Very Low-Birthweight Singleton Births

Most births are singleton births (i.e., a child born singly). In North Dakota, the proportion of singleton births that were less than 2,500 grams (5 pounds, 8 ounces) was relatively stable over the last decade, fluctuating between 4.4 percent and 5.0 percent (see Figure 12). Similarly, the proportion of singleton births that were less than 1,500 grams (3 pounds, 5 ounces) remained relatively constant at slightly less than 1 percent of all live singleton births.

Figure 12. Total Live Singleton Births in North Dakota: Percentage Who Are Low Birthweight and Very Low Birthweight, 2001-2012



	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Low birth weight	4.7%	5.0%	4.7%	4.6%	4.7%	4.9%	4.4%	4.9%	4.7%	4.9%	4.7%	4.6%
Very low birth weight	0.9%	0.8%	0.8%	0.9%	0.8%	0.8%	0.8%	0.9%	0.9%	0.8%	0.7%	0.9%

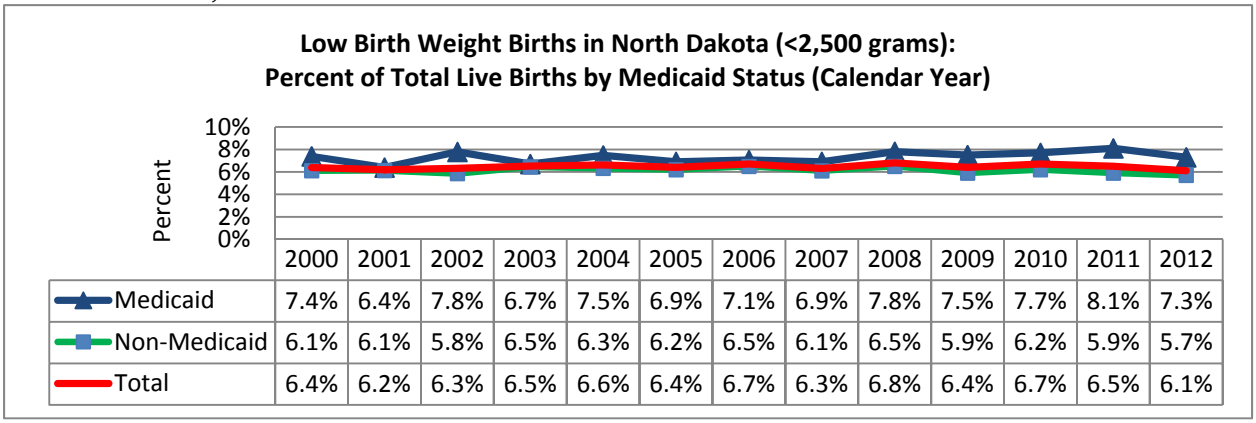
Note: Low birthweight is defined as less than 2,500 grams (5 pounds, 8 ounces). Very low birthweight is defined as less than 1,500 grams (3 pounds, 5 ounces).
Source: North Dakota Department of Health, Division of Vital Records; Health Status Indicator #1B and #2B

Low-Birthweight Births by Medicaid Status

The Medicaid program covers medical care and services to people whose resources are insufficient to meet the costs. For eligible pregnant women, Medicaid may pay for expenses such as prenatal care services or the birth of the child. Through 2012, North Dakota pregnant women were eligible for Medicaid at 133 percent of poverty. In 2014, the percent of poverty level increased to 138 percent of poverty.

The proportion of low-birthweight births among Medicaid mothers has fluctuated slightly over the past decade between 6.4 percent and 7.8 percent, but has been consistently higher than the proportion of low-birthweight births among non-Medicaid mothers (see Figure 13). In 2012, 7.3 percent of births to Medicaid mothers were low birthweight, compared to 5.7 percent of births to non-Medicaid mothers.

Figure 13. Total Live Births in North Dakota: Percentage Who Are Low Birth Weight by Medicaid Status, 2000-2012



	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Medicaid	7.4%	6.4%	7.8%	6.7%	7.5%	6.9%	7.1%	6.9%	7.8%	7.5%	7.7%	8.1%	7.3%
Non-Medicaid	6.1%	6.1%	5.8%	6.5%	6.3%	6.2%	6.5%	6.1%	6.5%	5.9%	6.2%	5.9%	5.7%
Total	6.4%	6.2%	6.3%	6.5%	6.6%	6.4%	6.7%	6.3%	6.8%	6.4%	6.7%	6.5%	6.1%

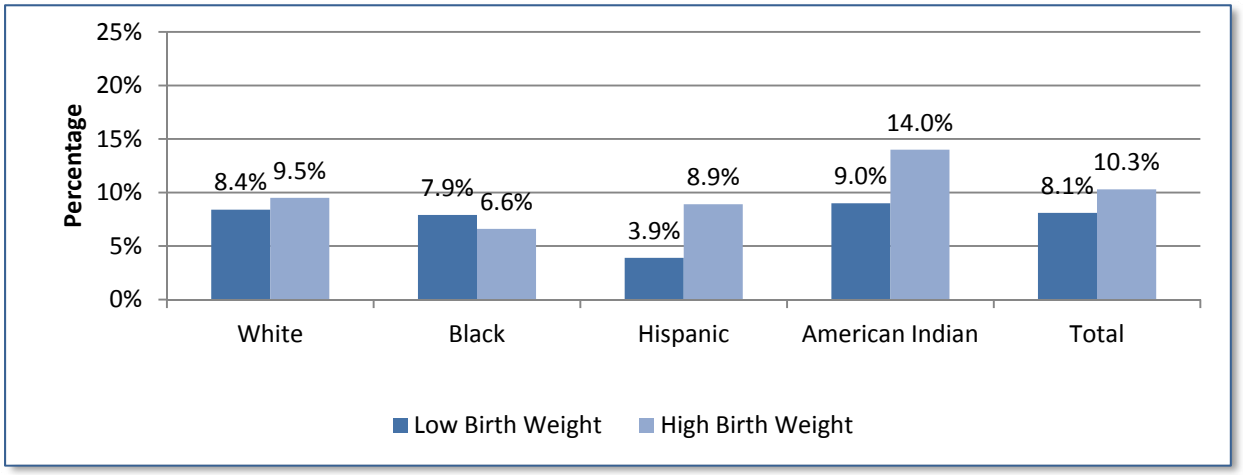
Note: Low birthweight is defined as less than 2,500 grams.
Source: North Dakota Department of Health, Division of Vital Records; Health Systems Capacity Indicator #5

Low-Birthweight Births to Low-Income Women by Race

The Pediatric Nutrition Surveillance System (PedNSS) is a child-based public health surveillance system that monitors the nutritional status of low-income children in federally funded maternal and child health programs. In North Dakota, all of the children monitored by PedNSS are participants in the Special Supplemental Nutrition Program for Women, Infants and Children (WIC). The WIC program provides supplemental foods, health-care referrals, and nutrition education to low-income pregnant, breastfeeding, and non-breastfeeding postpartum women, as well as infants and children to age 5 who are determined to be at nutritional risk.

In 2011, 15,092 North Dakota children younger than 5 were monitored by PedNSS. Among children monitored by PedNSS in 2011, 8.1 percent of births in North Dakota were low birthweight, which was the same as the national rate (see Figure 14). The distribution of low-birthweight births in North Dakota among the low-income children monitored by PedNSS show some slight differences by race/ethnicity. In 2011, the rate was higher among American Indians (9.0 percent) than among whites (8.4%).

Figure 14. PedNSS-Monitored Live Births in North Dakota and the United States: Percentage Who Are Low and High Birthweight by Race and Ethnicity, 2011



Note: Low birthweight is defined as less than 2,500 grams (5 pounds, 8 ounces) and high birthweight is defined as greater than 4,000 grams (8 pounds, 13 ounces).
Source: 2011 Pediatric Nutrition Surveillance System (PedNSS)

Infant Mortality

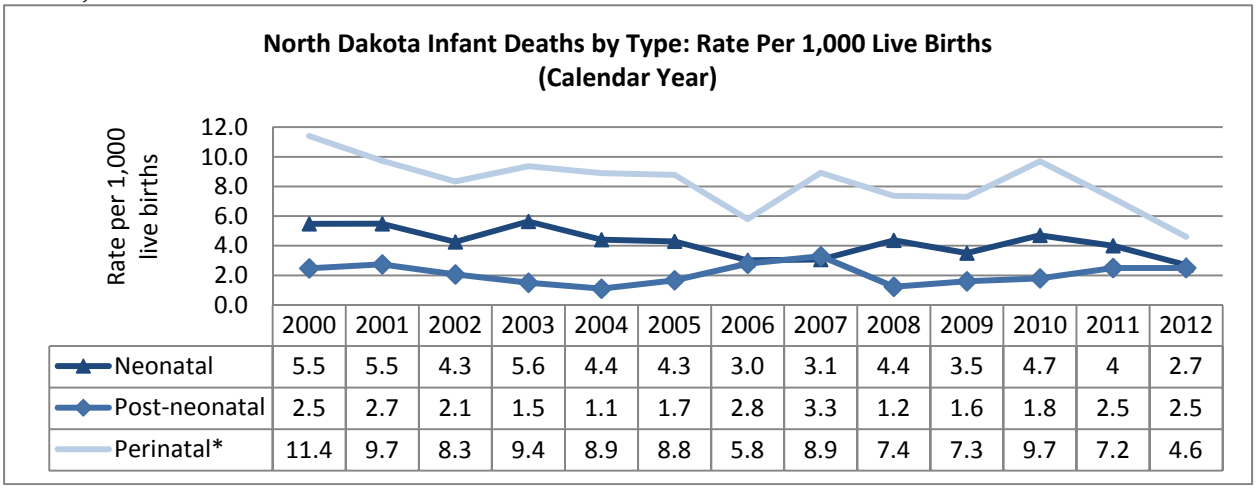
Annual Neonatal, Post-Neonatal, Perinatal Mortality Rates

Neonatal deaths, which are deaths among infants younger than 29 days old, showed an overall decline since the beginning of the last decade (see Figure 15). In 2012, there were 2.7 neonatal deaths per 1,000 live births in North Dakota, compared to 5.5 in 2000.

Post-neonatal deaths, which are deaths among infants from the end of their first month to a year after their birth, declined through the middle part of the last decade but then began to increase. There were 2.5 post-neonatal deaths per 1,000 live births in North Dakota in 2000, decreasing to a rate of 1.2 post-neonatal deaths per 1,000 live births. In 2012, the rate increased to 2.5 per 1,000 live births.

Perinatal deaths, which include fetal deaths occurring at less than 20 weeks of gestation, as well as neonatal deaths among infants younger than seven days old, showed an overall decline since the beginning of the last decade. The rate of perinatal deaths is calculated per 1,000 live births and fetal deaths combined. In 2012, there were 4.6 perinatal deaths, which is down from 11.4 in 2000.

Figure 15. Neonatal, Post-neonatal, and Perinatal Deaths in North Dakota: Rate per 1,000 Live Births, 2000 to 2012



	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Neonatal	5.5	5.5	4.3	5.6	4.4	4.3	3.0	3.1	4.4	3.5	4.7	4	2.7
Post-neonatal	2.5	2.7	2.1	1.5	1.1	1.7	2.8	3.3	1.2	1.6	1.8	2.5	2.5
Perinatal*	11.4	9.7	8.3	9.4	8.9	8.8	5.8	8.9	7.4	7.3	9.7	7.2	4.6

Note: A *neonatal* death occurs at younger than 29 days. A *post-neonatal* death occurs from the end of the first month to a year after birth. *Perinatal* deaths are fetal deaths occurring at less than 20 weeks of gestation, plus neonatal deaths occurring at younger than seven days.
*The rate for perinatal deaths is per 1,000 live births and fetal deaths combined.
Source: North Dakota Department of Health, Division of Vital Records; Federal Outcome Measure #3, 4, and 5

North Dakota infant mortality rates (per 1,000 live births) have followed a generally declining trend over the past 10 years, remaining fairly close to (although fluctuating above or below) the national rate, although American Indian rates have followed a trend of increasing rates. Aggregate 2008-2012 data indicates that infant mortality is not equally distributed across demographic and geographic areas in the state. A majority of counties with rates higher than the state (5.94 per 1,000) were areas with American Indian reservation subregions. Region 3 had the highest infant mortality rate for the time period reviewed. Infant mortality rates among American Indian infants (15.96) were over three times higher than among whites (4.88). The American Indian neonatal mortality rate was over four times higher than among white infants (13.47 and 3.37, respectively). Postneonatal mortality rates were also higher for American Indian infants than for white infants (2.49 and 1.51, respectively). The American Indian perinatal mortality rate was substantially higher (23.45) than the Black or African American (14.36) or white (9.84) rates.

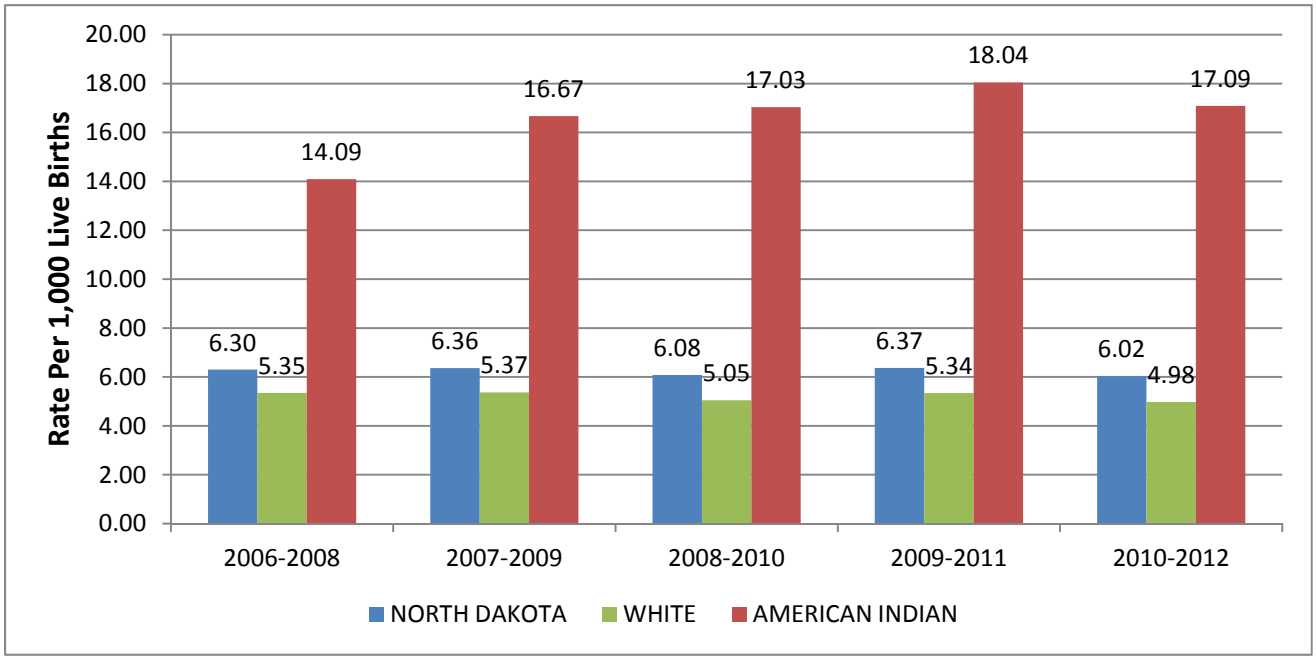
In 2010, the North Dakota state infant mortality rate (6.49 per 1,000 live births) was ranked 27th lowest in the nation. Although still higher than the national rate (6.15), it was lower than two of the three other states within HRSA Region 8- South Dakota (6.94) and Wyoming (6.75).

Aggregate data for years 2008-2012 indicates that North Dakota's infant mortality rate was 5.94 infant deaths per 1,000 live births. Infant mortality rates among American Indian infants (15.96) were over three times higher than whites (4.88). Rates among any Hispanic ethnicity were similar (6.39) than non-Hispanic counterparts (5.86).

The infant mortality three-year moving average method for years 2006-2012 indicates a general increasing trend among American Indian infants and general decreasing trend among whites and all state residents (see Figure 16). The North Dakota 2010-2012 rate calculated to be 6.02 per 1,000 live births, the lowest three-year average rate since 2006. This moving average rate

indicated that the American Indian infant mortality rate (17.09) was higher than among whites (4.98) or Black or African Americans (7.65).

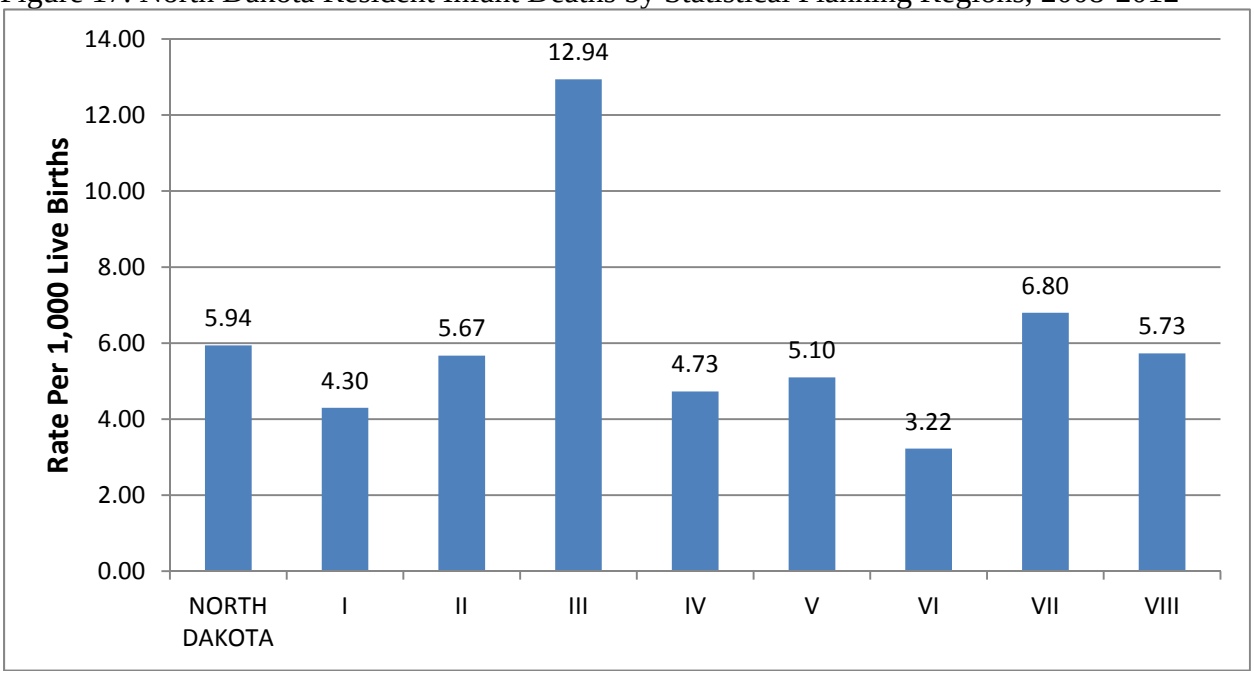
Figure 16. North Dakota Resident Three-Year Moving Average Rate of Infant Deaths, 2006-2012



Source: North Dakota Department of Health, Division of Vital Records

Infant mortality is not equally distributed across the state. Based on 2008-2012 aggregate data, statistical regions with infant mortality rates higher than the state rate (5.94) were Region 3 (12.94) - with an American Indian rate of 17.80, and Region 7 (6.80) - with an American Indian rate of 15.03. American Indian infant mortality rates in Region 1 (29.27) and Region 5 (20.34) were very high.

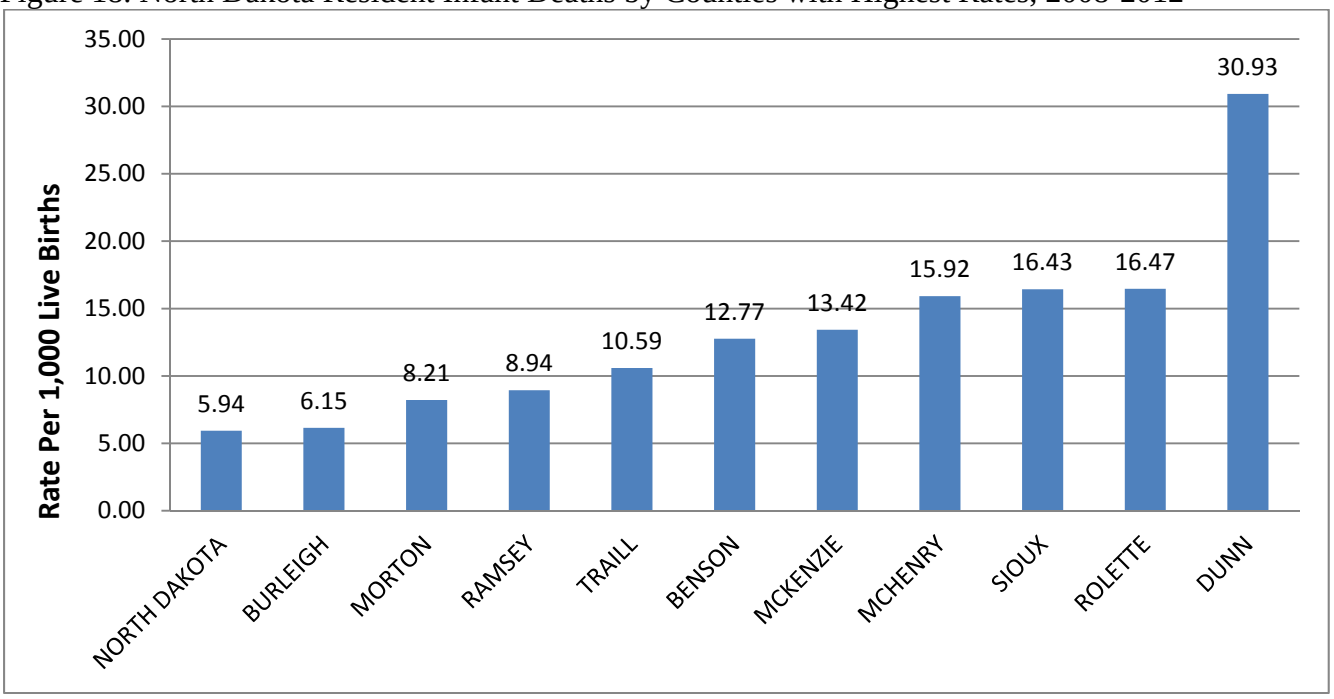
Figure 17. North Dakota Resident Infant Deaths by Statistical Planning Regions, 2008-2012



Source: North Dakota Department of Health, Division of Vital Records

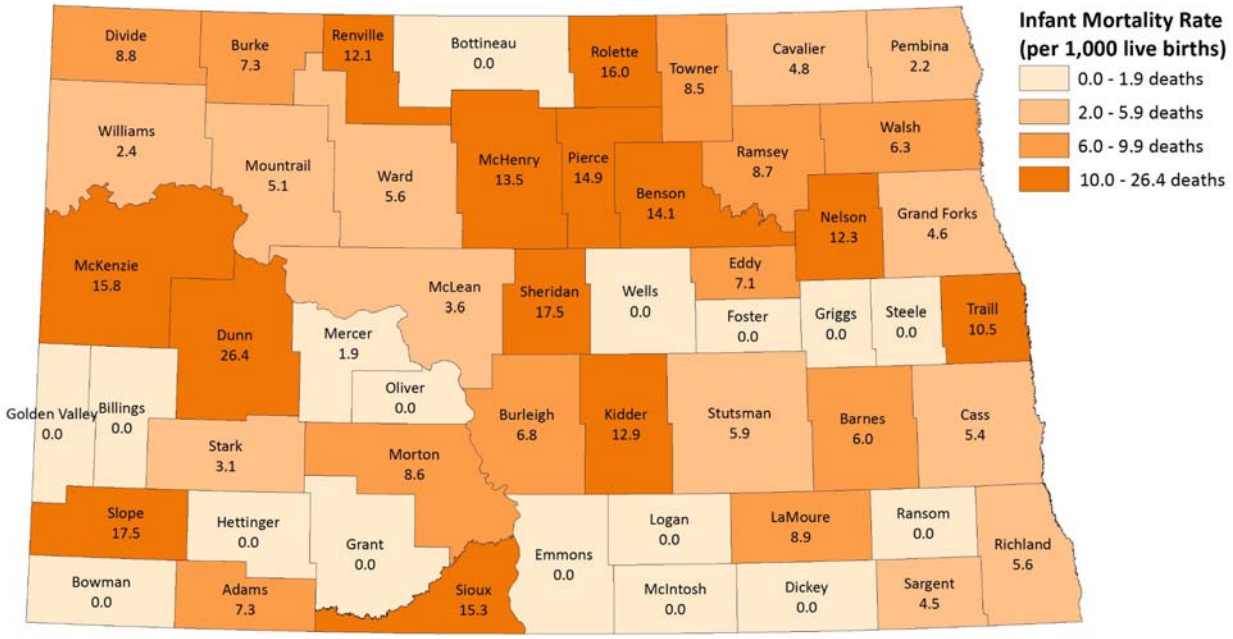
Ten out of the 53 counties had infant mortality rates higher than the state rate (5.94) and had numbers large enough for data release (18.9%). Six out of these 10 are counties that create American Indian reservation subregions (see Figures 18 and 19).

Figure 18. North Dakota Resident Infant Deaths by Counties with Highest Rates, 2008-2012



Source: North Dakota Department of Health, Division of Vital Records

Figure 19. Infant Mortality Rate by County of Residence, North Dakota: 2007-2012



Aggregated data for 2008-2012 indicated that the rate of North Dakota neonatal mortality, which is defined as the number of deaths among infants less than 28 days old per 1,000 live births, was 4.38. The American Indian neonatal mortality rate was over four times higher than among white infants (13.47 and 3.37, respectively). Post-neonatal death, which is defined as deaths among infants from the end of their first month to a year after their birth, for this same period was 1.56 statewide per 1,000 live births. The rate was also higher for American Indian infants than for white infants in this aggregate (2.49 and 1.51, respectively). Perinatal deaths are defined as fetal deaths more than 20 weeks old plus neonatal deaths among infants less than 7 days old. According to this aggregated data for 2008 through 2012, North Dakota reported a rate of 11.45 perinatal deaths per 1,000 live births + fetal deaths. The American Indian perinatal mortality rate was substantially higher (23.45) than the Black or African American (14.36) or white (9.84) rate. Region 3 had the highest perinatal mortality rate for this time period (17.85).

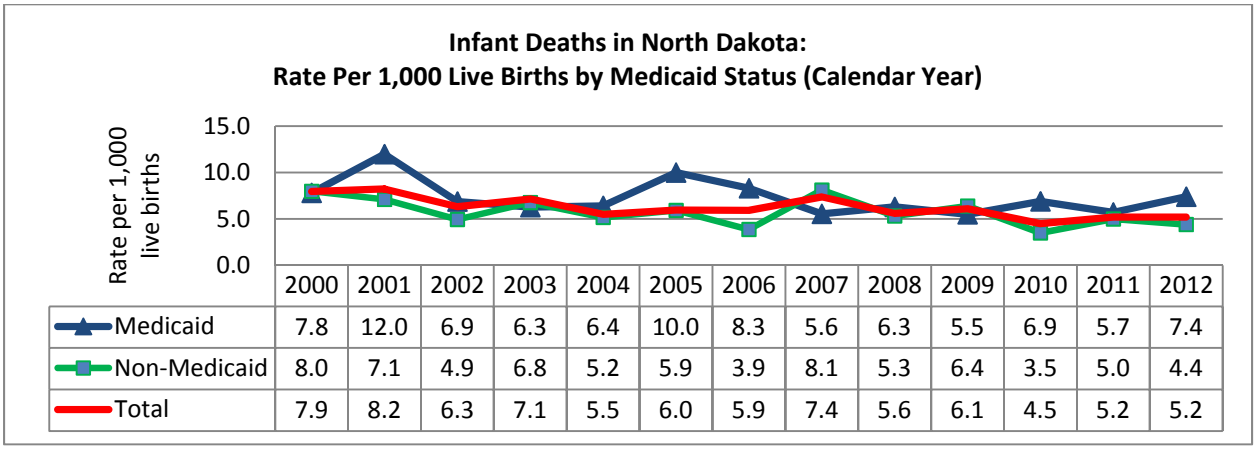
Infant Mortality Rate by Medicaid Status

The Medicaid program covers medical care and services to people whose resources are insufficient to meet the costs. For eligible pregnant women, Medicaid may pay for expenses such as prenatal care services or the birth of the child. Through 2012, pregnant women and children younger than age 6 were eligible at 133 percent of poverty. In 2014, eligibility increased to 138 percent of poverty.

The infant mortality rate among infants born to mothers who received Medicaid has fluctuated widely over the past decade, with a high of 12.0 infant deaths per 1,000 live births among North Dakota mothers who were Medicaid recipients in 2001 to a low of 5.5 deaths in 2009 (see Figure 14). In 2012, the infant mortality rate among Medicaid mothers was 7.4 deaths. While the infant mortality rate for infants born to non-Medicaid mothers has sometimes been higher than the rate for Medicaid mothers, overall, the rate for non-Medicaid mothers did not reach as high a level as it did for Medicaid mothers and reached lows that were not seen among Medicaid mothers. The

rate of infant deaths per 1,000 live births to non-Medicaid mothers was at its lowest in 2010 at 3.5 deaths, but reached its highest level in 2007 (8.1 deaths). In 2012, the infant mortality rate among non-Medicaid mothers was 4.4 deaths, which was lower than the Medicaid rate of 7.4 deaths.

Figure 20. Infant Deaths in North Dakota: Rate per 1,000 Live Births by Medicaid Status, 2000-2012



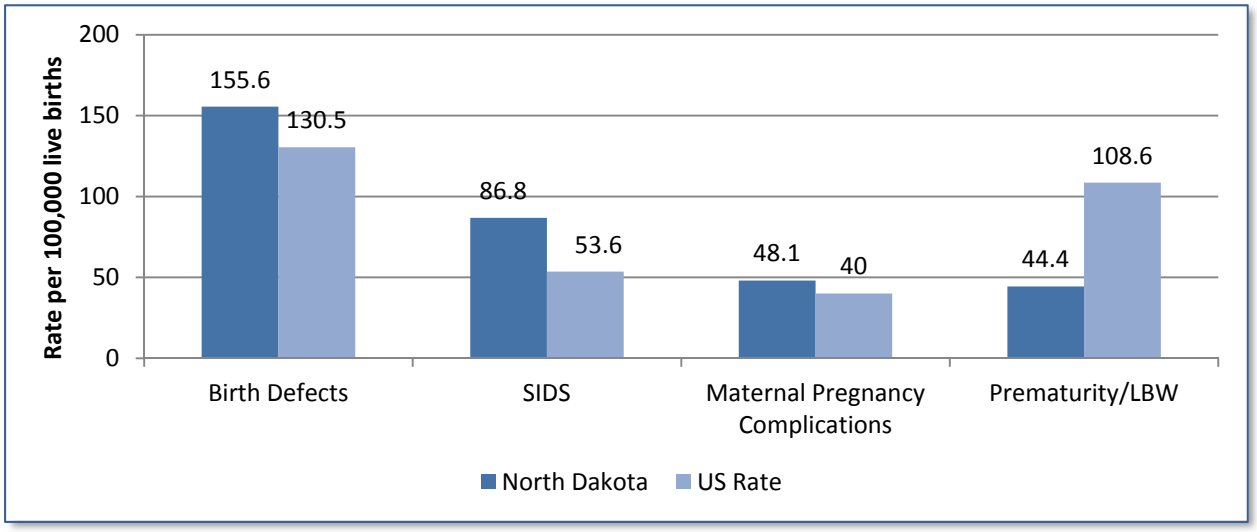
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Medicaid	7.8	12.0	6.9	6.3	6.4	10.0	8.3	5.6	6.3	5.5	6.9	5.7	7.4
Non-Medicaid	8.0	7.1	4.9	6.8	5.2	5.9	3.9	8.1	5.3	6.4	3.5	5.0	4.4
Total	7.9	8.2	6.3	7.1	5.5	6.0	5.9	7.4	5.6	6.1	4.5	5.2	5.2

Source: North Dakota Department of Health, Division of Vital Records; Federal Outcome Measure #1 and Health Systems Capacity Indicator #5

Causes of Infant Deaths

Birth defects and prematurity/low birthweight are two significant causes of infant deaths. Sudden infant death syndrome (SIDS), respiratory distress syndrome (RDS) and maternal pregnancy complications are other common causes of infant deaths. Maternal pregnancy complications occur during the gestation of the infant and include issues like an incompetent cervix, premature rupture of membranes, an ectopic pregnancy, a multiple pregnancy, or maternal death. According to the CDC, the leading causes of infant mortality in the United States in 2010 were congenital birth defects; prematurity and low birthweight; SIDS; maternal complications of pregnancy; unintentional injuries; complications of placenta, cord and membranes; bacterial sepsis; RDS; neonatal hemorrhage; and diseases of the circulatory system. Rates of deaths from birth defects, SIDS and maternal pregnancy complications are higher in North Dakota than the national average (see Figure 21).

Figure 21. Infant Deaths in North Dakota and the United States: Rate per 100,000 Live Births by Cause, 2008-2010 Average



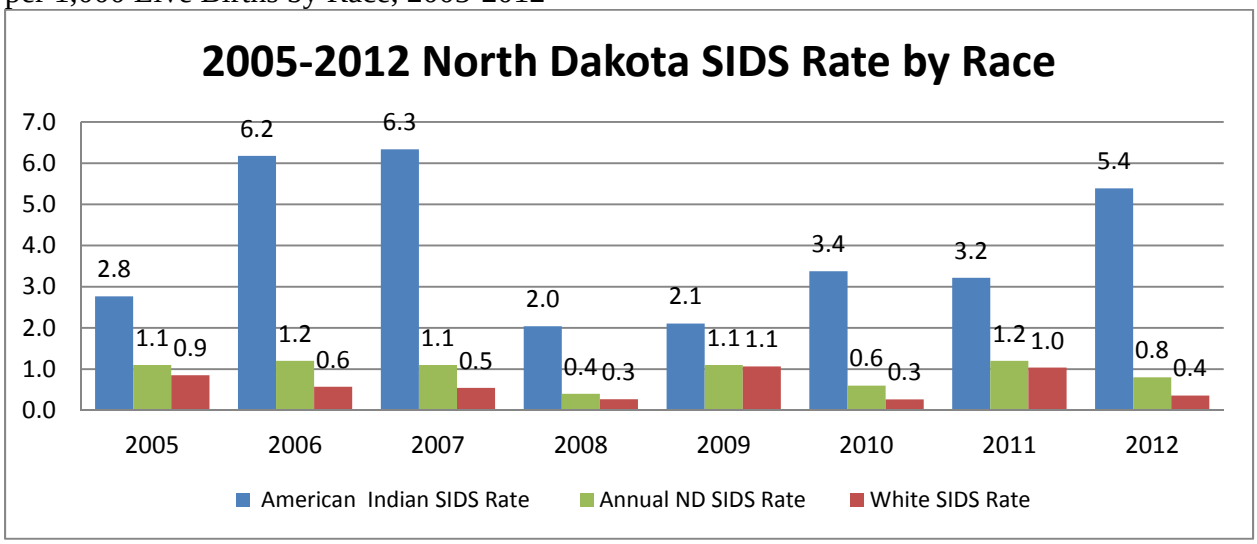
Note: SIDS stands for sudden infant death syndrome and RDS stands for infant respiratory distress syndrome.
Source: March of Dimes Foundation using data from the National Center for Health Statistics

Sudden Infant Death Syndrome (SIDS)

SIDS was one of the leading causes of infant mortality in the nation in 2010. In North Dakota, there was an average of 48.9 deaths due to SIDS per 100,000 live births in the state in 2012 (see Figure 22).

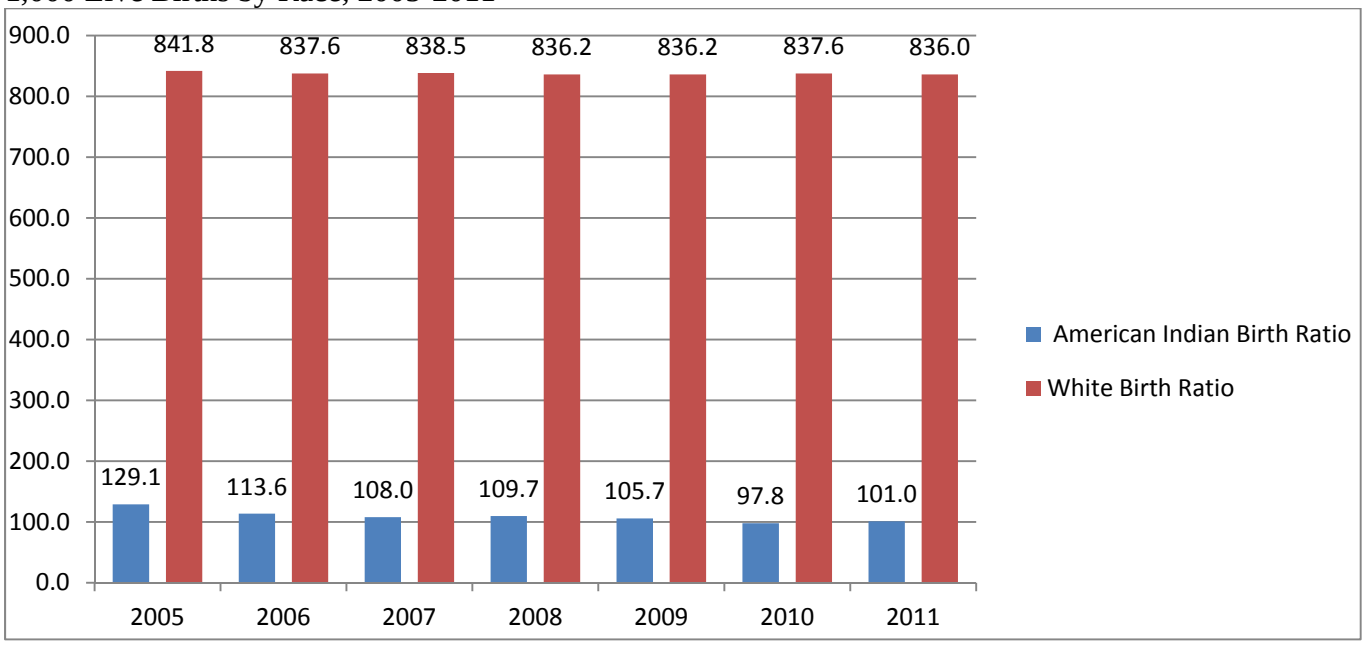
From 2005 through 2012, there are significant racial differences in the rate of SIDS. The rate of infant deaths per 1,000 live births among white infants in North Dakota has consistently been at or less than 1.0 (0.8 in 2012). The rate of SIDS among American Indian infants is much higher; although the rate was 2.0 infant deaths per 1,000 live births among American Indian infants in 2008, the rate was as high as 6.3 in 2007. The SIDS birth ratio per 1,000 population is much higher among American Indian infants (see Figure 23).

Figure 22. Infant Deaths in North Dakota Due to Sudden Infant Death Syndrome (SIDS): Rate per 1,000 Live Births by Race, 2005-2012



Source: North Dakota Department of Health, Division of Vital Records

Figure 23. Infant Death Ratio in North Dakota Due to Sudden Infant Death Syndrome (SIDS) per 1,000 Live Births by Race, 2005-2011



Source: North Dakota Department of Health, Division of Vital Records

Prenatal Care

Early Prenatal Care

Prenatal care is care that a woman receives during her pregnancy. The goal of prenatal care is to monitor the pregnancy and identify potential problems for the mother and baby, as well as educate the mother about issues such as nutrition, physical activity, the birth process and caring for a newborn. Visits typically become more frequent as the due date gets closer. Women who receive adequate prenatal care typically have healthier babies, are less likely to deliver prematurely and are less likely to have other serious pregnancy-related problems. Beginning prenatal care early – in the first trimester of the pregnancy – is an important aspect of receiving adequate prenatal care.

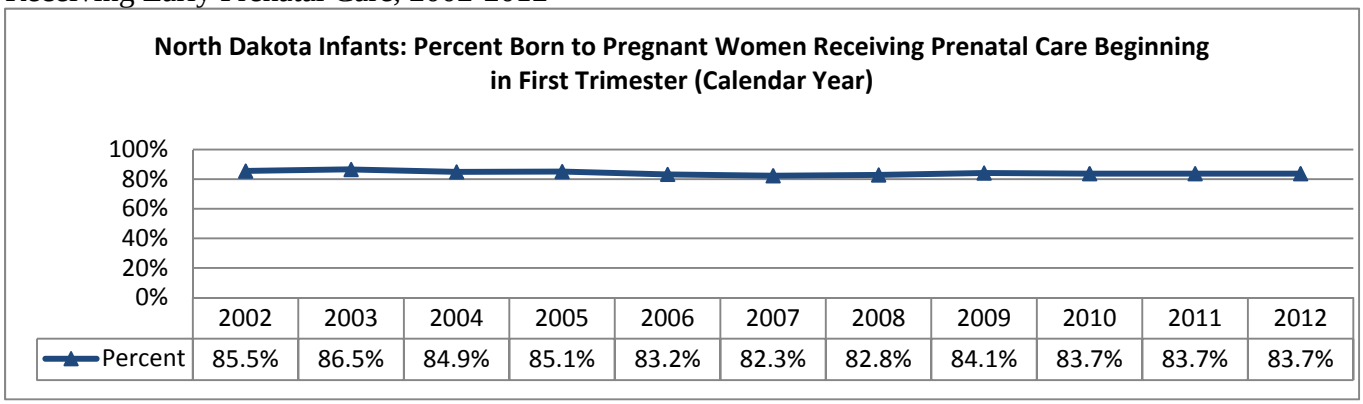
The proportion of infants who were born to a woman receiving prenatal care beginning in the first trimester decreased slightly in the last decade. In 2012, 83.7 percent of infants were born to a woman receiving early prenatal care (see Figure 24). This is down from a peak of 86.5 percent in 2003.

The CDC runs the Pregnancy Risk Assessment Monitoring System (PRAMS) that collects trend data about a woman's experiences before, during and after pregnancy from several participating states. The PRAMS survey was conducted as a point-in-time collection of data in North Dakota in 2002. According to the 2002 PRAMS data, one in five North Dakota mothers said they did not receive prenatal care in the first trimester. Young women (ages 15 to 19), women with less than a high school degree, unmarried women, American Indian women and women who were Medicaid recipients were more likely not to start prenatal care in the first trimester.

The 2002 PRAMS data show that most mothers (81 percent) received prenatal care as early as they wanted. Reasons for not getting prenatal care as early as they wanted included not knowing they were pregnant (38 percent), not being able to get an appointment earlier (27 percent), doctor

or health plan not starting prenatal care earlier (22 percent) and not having enough money or insurance to pay for prenatal care (12 percent).

Figure 24. Total Births in North Dakota: Percentage of Infants Born to Pregnant Women Receiving Early Prenatal Care, 2002-2012



	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Percent	85.5%	86.5%	84.9%	85.1%	83.2%	82.3%	82.8%	84.1%	83.7%	83.7%	83.7%

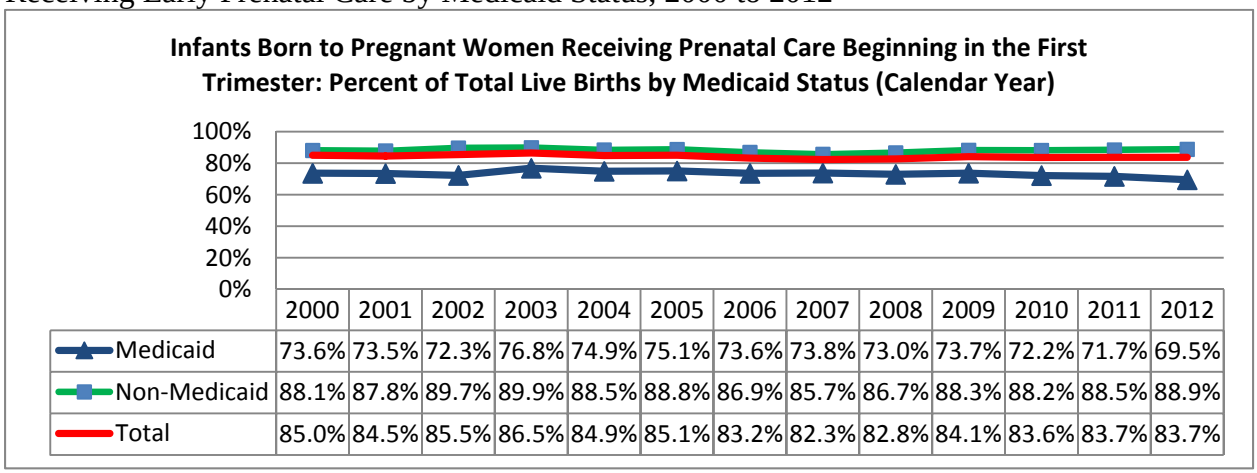
Note: Early prenatal care is care beginning in the first trimester (i.e., first three months of gestation).
Source: North Dakota Department of Health, Division of Vital Records; Federal Performance Measure #18

Early Prenatal Care by Medicaid Status

The Medicaid program covers medical care and services to people whose resources are insufficient to meet the costs. For eligible pregnant women, Medicaid may pay for expenses such as prenatal care services or the birth of the child. In North Dakota, pregnant women are eligible at 138 percent of poverty. Beginning prenatal care early – in the first trimester of the pregnancy – is an important aspect of receiving adequate prenatal care.

The proportion of infants who were born to a Medicaid recipient receiving early prenatal care has changed little over the past decade, averaging about three-fourths of mothers. The rate of early prenatal care for infants born to Medicaid recipients has remained consistently lower than the rate for infants born to non-Medicaid recipients (see Figure 25). In 2012, 69.5 percent of infants born to a Medicaid recipient were born to a pregnant woman who received early prenatal care, compared to 88.9 percent of infants born to a non-Medicaid recipient who received early prenatal care.

Figure 25. Total Births in North Dakota: Percentage of Infants Born to Pregnant Women Receiving Early Prenatal Care by Medicaid Status, 2000 to 2012



	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Medicaid	73.6%	73.5%	72.3%	76.8%	74.9%	75.1%	73.6%	73.8%	73.0%	73.7%	72.2%	71.7%	69.5%
Non-Medicaid	88.1%	87.8%	89.7%	89.9%	88.5%	88.8%	86.9%	85.7%	86.7%	88.3%	88.2%	88.5%	88.9%
Total	85.0%	84.5%	85.5%	86.5%	84.9%	85.1%	83.2%	82.3%	82.8%	84.1%	83.6%	83.7%	83.7%

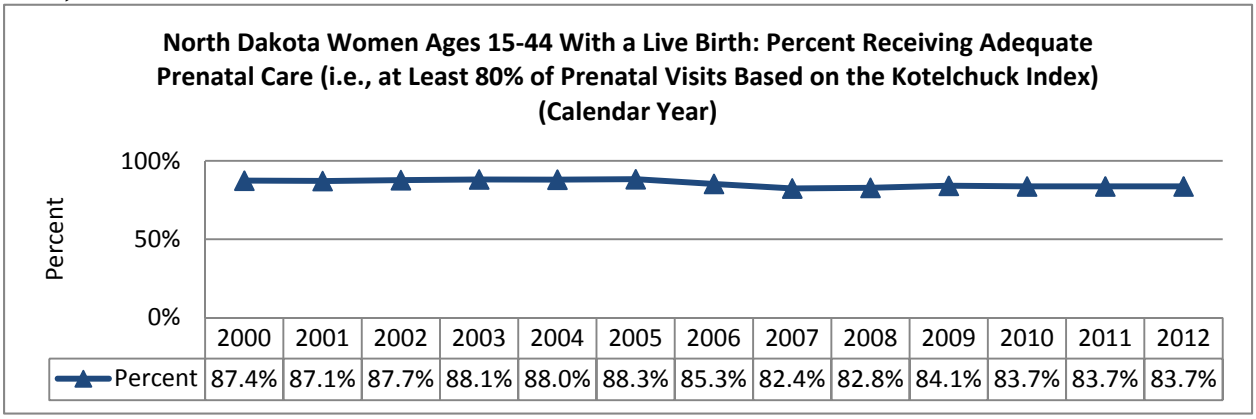
Note: Early prenatal care is care beginning in the first trimester (i.e., first three months of gestation).
Source: North Dakota Department of Health, Division of Vital Records; Health Systems Capacity Indicator #5

Adequacy of Prenatal Care

The Kotelchuk Index is a measurement of the adequacy of prenatal care that a pregnant woman receives. The index is a calculation based on the number of women ages 15 through 44 who had a live birth during the reporting year whose observed-to-expected number of prenatal visits is greater than 80 percent. Women receiving adequate amounts of prenatal care include women who began their prenatal care in the first trimester and, given the age of gestation at birth, made at least 80 percent of the recommended physician or clinic visits prior to delivery.

The proportion of women ages 15 through 44 who received adequate prenatal care was relatively stable at 87 to 88 percent for the first half of the last decade (see Figure 26). The proportion began to decrease in 2006 and, in 2012, 83.7 percent of pregnant women received adequate prenatal care.

Figure 26. North Dakota Women Ages 15 through 44: Percentage Receiving Adequate Prenatal Care, 2000-2012



	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Percent	87.4%	87.1%	87.7%	88.1%	88.0%	88.3%	85.3%	82.4%	82.8%	84.1%	83.7%	83.7%	83.7%

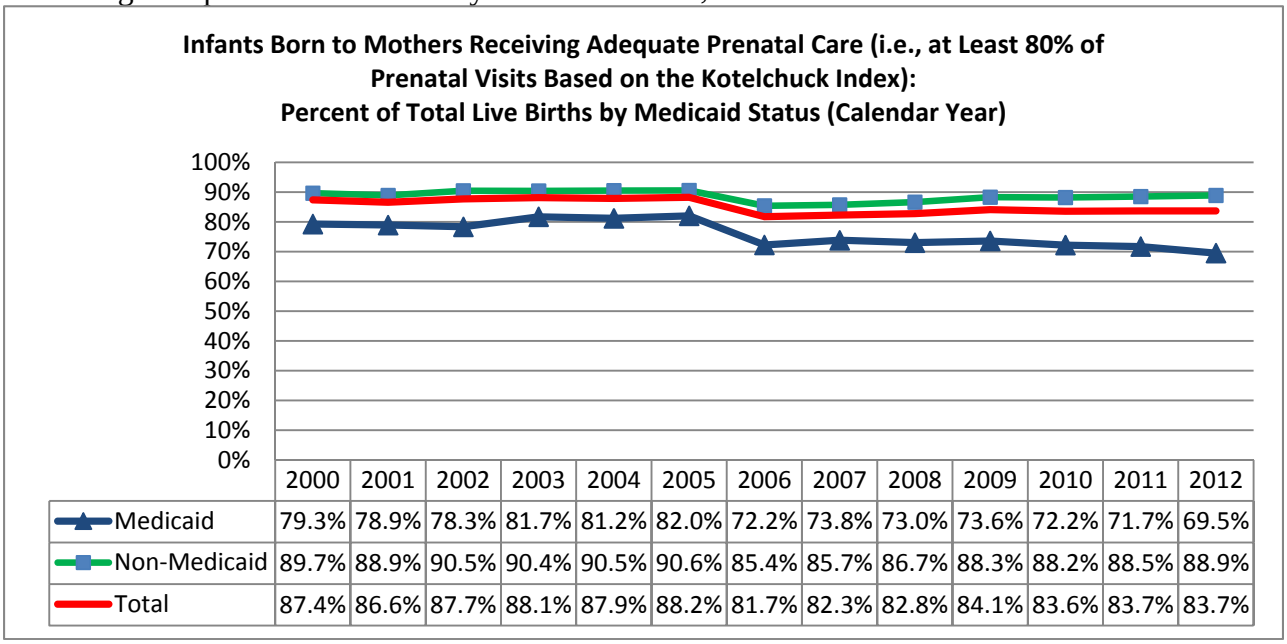
Note: Adequate prenatal care is defined as at least 80 percent of expected prenatal visits (using Kotelchuk index).
Source: North Dakota Department of Health, Division of Vital Records; Health Systems Capacity Indicator #4

Adequacy of Prenatal Care by Medicaid Status

The Medicaid program covers medical care and services to people whose resources are insufficient to meet the costs. For eligible pregnant women, Medicaid may pay for expenses such as prenatal care services or the birth of the child. Currently, North Dakota pregnant women are eligible at 138 percent of poverty. According to the Kotelchuk index, women receiving adequate amounts of prenatal care include women who began their prenatal care in the first trimester and, given the age of gestation at birth, made at least 80 percent of the recommended physician or clinic visits prior to delivery.

The proportion of infants who were born to a Medicaid recipient receiving adequate prenatal care has decreased over the last decade. In 2012, 69.5 percent of infants born to a Medicaid recipient were born to women receiving adequate prenatal care, down from a peak of 82.0 percent in 2005 (see Figure 27). The proportion of infants born to a Medicaid recipient receiving adequate prenatal care has been consistently lower than the proportion of infants who were born to a non-Medicaid woman receiving adequate prenatal care.

Figure 27. Total Births in North Dakota: Percentage of Infants Born to Pregnant Women Receiving Adequate Prenatal Care by Medicaid Status, 2000-2012



	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Medicaid	79.3%	78.9%	78.3%	81.7%	81.2%	82.0%	72.2%	73.8%	73.0%	73.6%	72.2%	71.7%	69.5%
Non-Medicaid	89.7%	88.9%	90.5%	90.4%	90.5%	90.6%	85.4%	85.7%	86.7%	88.3%	88.2%	88.5%	88.9%
Total	87.4%	86.6%	87.7%	88.1%	87.9%	88.2%	81.7%	82.3%	82.8%	84.1%	83.6%	83.7%	83.7%

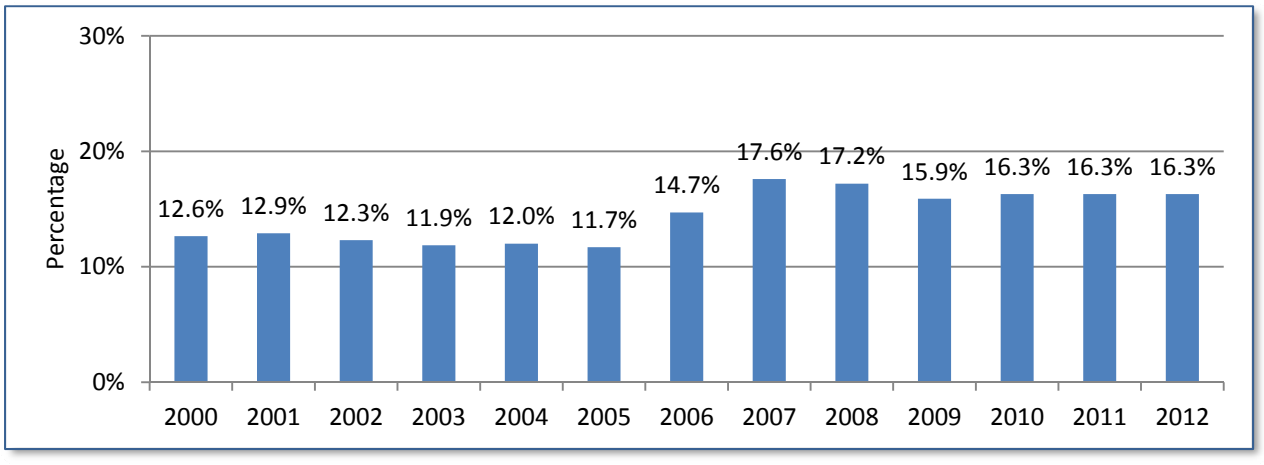
Note: Adequate prenatal care is defined as at least 80 percent of expected prenatal visits (using Kotelchuk index).
Source: North Dakota Department of Health, Division of Vital Records; Health Systems Capacity Indicator #5

Inadequate Prenatal Care

According to the Kotelchuk index, women receiving adequate amounts of prenatal care include women who began their prenatal care in the first trimester and, given the age of gestation at birth, made at least 80 percent of the recommended physician or clinic visits prior to delivery.

A mother's race is an important predictor of whether or not an infant is born to a mother receiving inadequate prenatal care. Approximately one in six percent of infants were born to a mother receiving inadequate prenatal care (see Figure 28).

Figure 28. Total Births in North Dakota: Percentage of Infants Born to Pregnant Women Receiving Inadequate Prenatal Care, 2000-2012



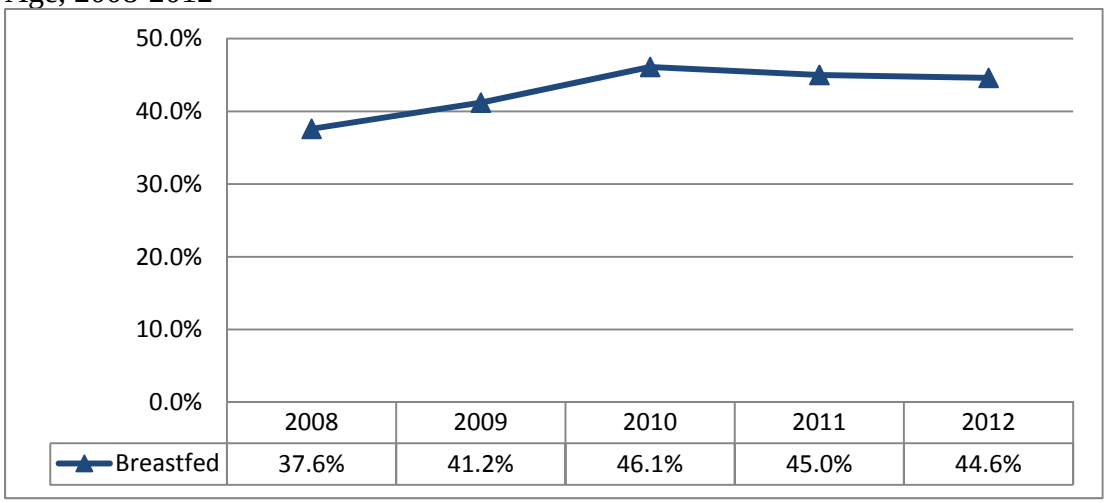
Note: Adequate prenatal care is defined as at least 80 percent of expected prenatal visits (using Kotelchuk index).
Source: North Dakota Department of Health, Division of Vital Records

Duration of Breastfeeding

Breastfeeding is linked to a lower risk of a variety of health issues among infants, including ear infections, stomach viruses and respiratory infections, and a lower risk of issues for mothers such as Type 2 diabetes, breast or ovarian cancer, and postpartum depression. The U.S. Surgeon General recommends that an infant be fed only breast milk for the first six months of his or her life, and even longer if possible. *Healthy People 2010* set objectives for breastfeeding initiation, duration and exclusivity.

With regards to duration, in 2012, 44.6 percent of North Dakota mothers were still breastfeeding their infant at 6 months of age (see Figure 29), although not necessarily exclusively breast milk.

Figure 29. Percentage of North Dakota Mothers Who Breastfed Their Infants at 6 Months of Age, 2008-2012



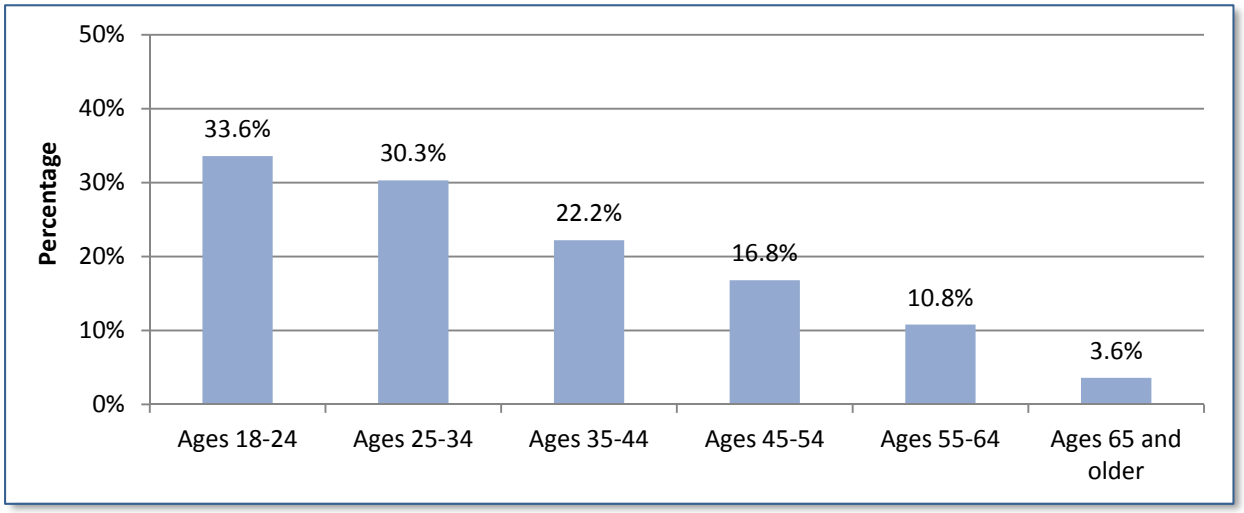
Source: U.S. Centers for Disease Control and Prevention, National Immunization Survey (NIS); Federal Performance Measure #11

Use of Alcohol Immediately Before and During Pregnancy

In order to eliminate the chance of giving birth to a baby with any of the harmful effects of fetal alcohol spectrum disorders (FASD), the U.S. Surgeon General recommends that pregnant women and women who may become pregnant do not consume alcohol. Babies can be affected by alcohol consumption in the first weeks after conception, when a woman often does not know she is pregnant, which is why the Surgeon General extends the caution to women who may become pregnant. According to current research, no amount of alcohol consumption can be considered safe during pregnancy. FASD birth defects are caused by alcohol exposure during a fetus' development. The spectrum ranges from milder changes such as a slight learning disability or physical abnormality to full-blown fetal alcohol syndrome which can include severe learning disabilities, physical abnormalities and central nervous system disorders.

The Behavioral Risk Factor Surveillance System (BRFSS) online dataset for 2012 survey data allowed special queries for age and gender. BRFSS defines binge drinking as four or more drinks on one occasion for females and five or more drinks on one occasion for males. According to this dataset, the rate of binge drinking decreases with age. The rate was highest among North Dakota women ages 18 to 24 (33.6%) followed by women ages 25 to 34 (30.3%).

Figure 30. Women Ages 18 and Older in North Dakota and the United States: Percentage Who Binge Drink by Age Group, 2012



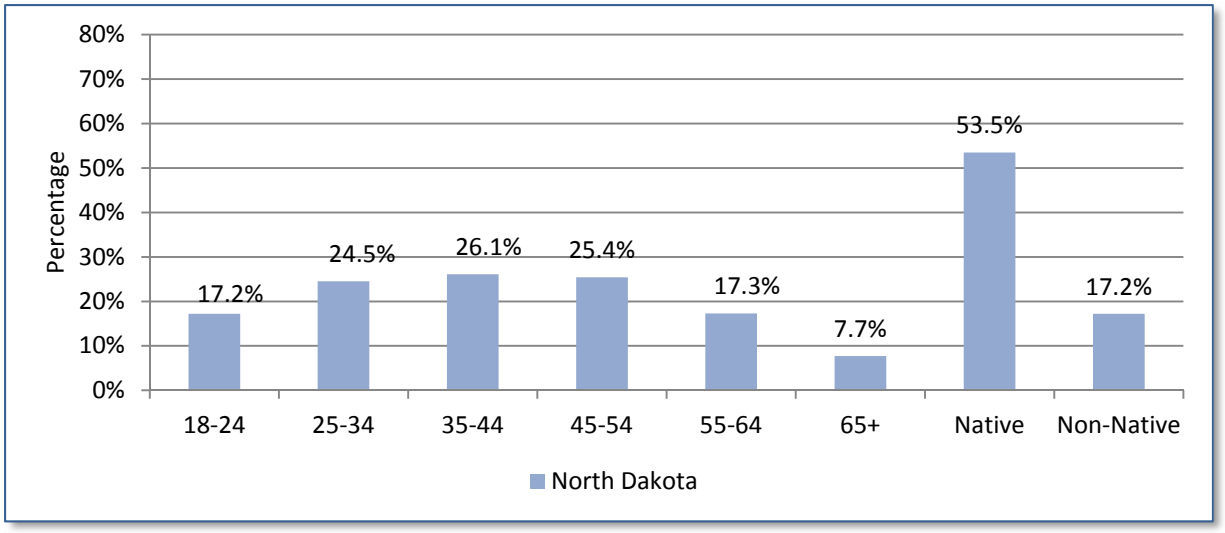
Note: Binge drinking is defined as four or more drinks on one occasion for females and five or more drinks on one occasion for males.

Source: 2012 Behavioral Risk Factor Surveillance System (BRFSS)

Smoking Immediately Before and During Pregnancy

The Behavioral Risk Factor Surveillance System (BRFSS) online dataset for 2012 survey data allowed special queries for age and gender. According to this dataset, the rate of smoking decreases with age. The rate was highest among North Dakota women ages 35-44 (26.1 percent) and lowest among women ages 65 and older (8 percent) - (see Figure 31).

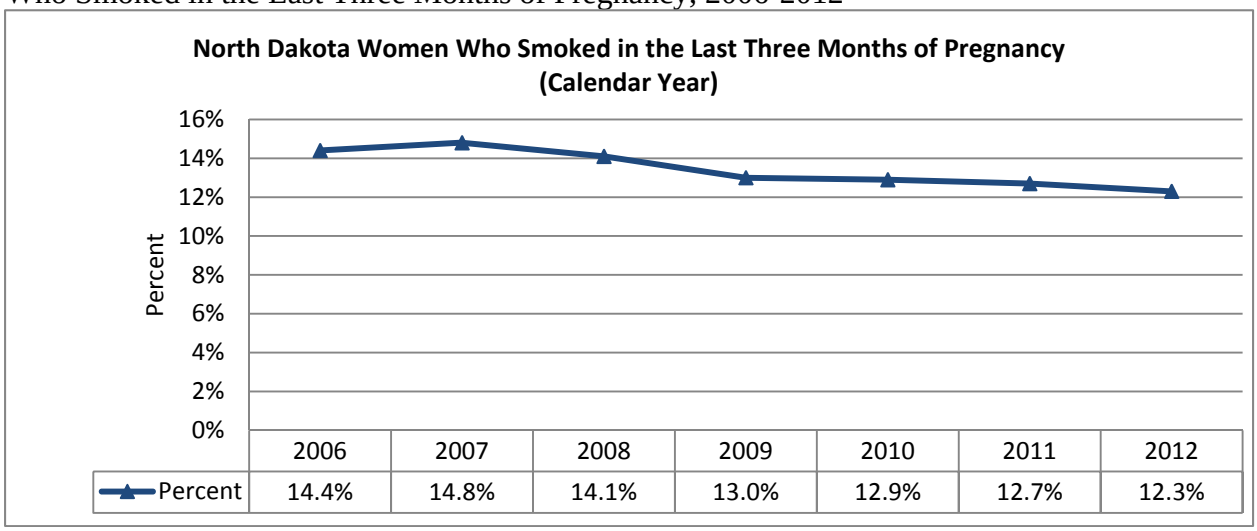
Figure 31. Women Ages 18 and Older in North Dakota: Percentage Who Smoke by Age Group and Nativity, 2012



Note: Smoking is defined as having ever smoked 100 cigarettes in a lifetime and currently smoking every day or some days.
Source: 2012 Behavioral Risk Factor Surveillance System (BRFSS)

Smoking by a pregnant woman poses many risks to the developing fetus, including being born at a low birthweight. The risk of having a low-birthweight baby increases with the amount a woman smokes. Recent research suggests that smoking in the month before pregnancy and during the first trimester can increase the risk of having a baby with birth defects, particularly congenital heart defects, and this risk also increases with the amount the woman smokes. Smoking can also increase the risk of pregnancy complications such as premature rupture of the membranes. Over one in 10 (12.3%) North Dakota women smoked during the last three months of pregnancy in 2012, which is a rate slightly lower than 2006 (see Figure 32).

Figure 32. Total Births in North Dakota: Percentage of Infants Born to Pregnant Women Who Smoked in the Last Three Months of Pregnancy, 2006-2012



Source: North Dakota Department of Health, Division of Vital Records; Federal Performance Measure #15

According to Pregnancy Risk Assessment Monitoring System (PRAMS) data collected in 2002, almost one-fifth of North Dakota mothers who gave birth that year smoked an average of 10 or more cigarettes per day in the three months before pregnancy (see Figure 32). Six percent of mothers smoked at least 10 cigarettes a day during the last three months of their pregnancy. There were 7,755 births in 2002, which translates to 465 infants who were born to mothers who were relatively heavy smokers during the third trimester.

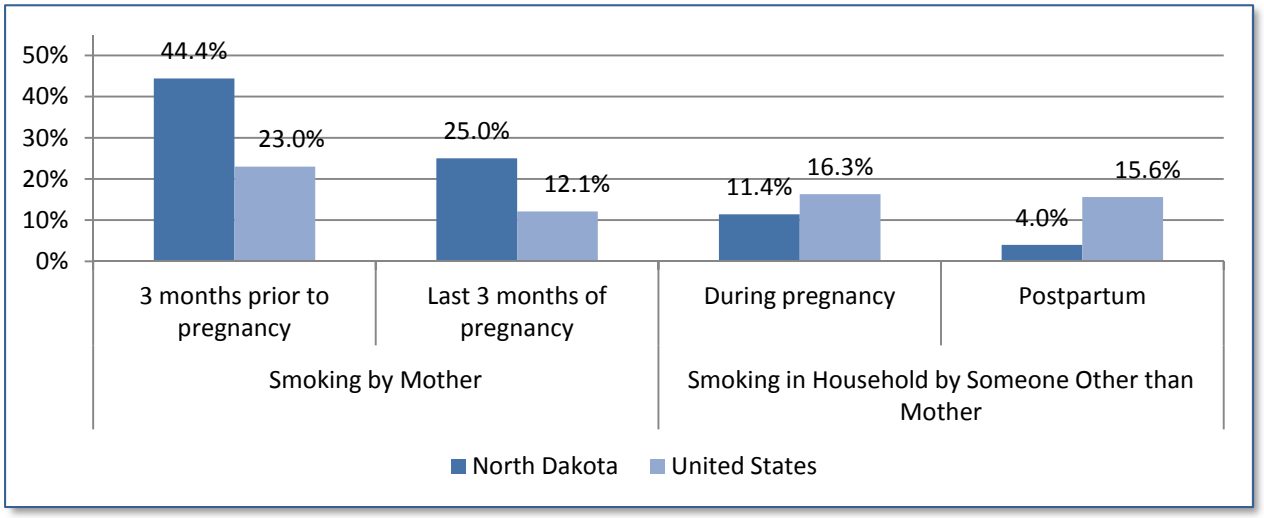
Smoking Immediately Before and During Pregnancy among Low-Income Women

The Pregnancy Nutrition Surveillance System (PNSS) is a public health surveillance system that monitors the prevalence of nutrition problems, behavioral risk factors and birth outcomes among low-income women who are enrolled in public health programs. In North Dakota, all of the pregnant women monitored by PNSS are participants in the WIC program. The WIC program provides supplemental foods, health-care referrals and nutrition education to low-income pregnant, breastfeeding and non-breastfeeding postpartum women, as well as infants and children to age 5 who are determined to be at nutritional risk. In 2011, 4,201 women were monitored by PNSS.

Among North Dakota women monitored by PNSS in 2011, 44.4 percent smoked in the three months prior to pregnancy (see Figure 33). This rate dropped to 25 percent of North Dakota women during the last three months of pregnancy in 2011. The rates of smoking among women monitored by PNSS are higher in North Dakota than the national averages.

Among the low-income women in North Dakota monitored by PNSS, smoking during the woman's pregnancy by other members of the household was similar to the national trend. This is a measure of the exposure to tobacco-contaminated air at home and assesses whether anyone in the household other than the pregnant woman smoked. In 2011, slightly more than one in 10 women were in a household where someone other than herself smoked during her pregnancy.

Figure 33. Prevalence of Smoking by Mother and Smoking in Household by Pregnancy Status among PNSS-Monitored Women in North Dakota and the United States, 2011



Source: 2011 Pregnancy Nutrition Surveillance System (PNSS)

Health Disparities among American Indians*

American Indians (AI) are North Dakota's largest minority population. In 2012, 5.5 percent of the population (8.8 percent of children 0-17) was AI "of one race only." From 2007-2012 in North Dakota, due to severe health disparities, the average age at death of a white person (77.4 years) was 20 years older than that of an American Indian (57.4 years). Nationally, AI health disparities include infant mortality, injuries, alcohol and tobacco use, chronic disease, and mental health.

Health disparities are caused by an assortment of factors. Individual behavior is very important, but the social determinants of health framework recognizes that our social and physical environments also profoundly impact our ability to experience good health. The federal Healthy People 2020 initiative for improving population health examines social determinants of health in five key areas: economic stability, education, social and community context, health and health care, and neighborhood and built environment.

Traumatic events during infancy and childhood, termed adverse childhood experiences, also contribute to health problems as an adult. Additionally, inter-generational impacts of historical trauma and disruption of cultural practices significantly influence the health of American Indians. While disparities can occur at every stage of the life course, health disparities for many American Indians begin prenatally and, among the vast majority of infants who live past their first year, can have long-lasting implications.

Several risk factors have been identified which can increase the chances of infant mortality, including birth defects, preterm births, low birth weight, maternal complications during pregnancy, and injuries. Risk factors associated with poor birth outcomes include inadequate prenatal care; being a young mother; smoking, alcohol, and drug use during pregnancy; and gestational diabetes.

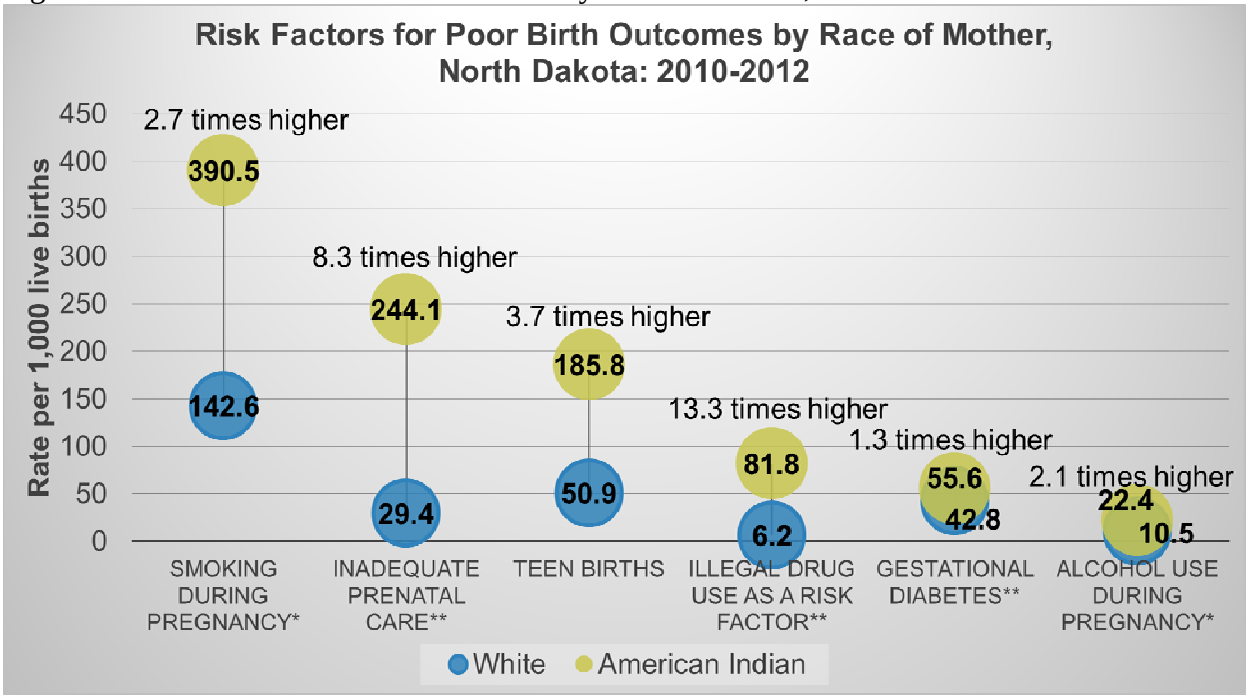
From 2010-2012, there were 28,394 births in North Dakota, of which10.2 percent were to AI mothers of one or more races (2,896 births). Infants born to AI mothers in North Dakota are at much higher risk of experiencing poor birth outcomes than infants born to white mothers. Compared to infants born to white mothers, infants born to AI mothers are:

- 8.3 times more likely to be born to a mother who had inadequate prenatal care – one in four births to American Indian mothers compared to 1 in 33 births to white mothers.
- 3.7 times more likely to be born to a mother who was a teenager.
- 2.7 times more likely to be born to a mother who smoked during pregnancy.
- 2.1 times more likely to be born to a mother who reported drinking alcohol during pregnancy and 13.2 times more likely to be born to a mother with illegal drug use identified as a risk factor on the Medical Certifier's Worksheet at time of birth.
- 1.3 times more likely to be born to a mother who had gestational diabetes.
- 1.4 times more likely more likely to be born preterm (less than 37 weeks gestation).
- 1.3 times more likely to be born at a low birth weight (less than 5.5 pounds).
- 3.5 times more likely to die in the first year of life – 17.6 infant deaths per 1,000 live births to AI mothers compared to 5.1 deaths to white mothers.
- 2.0 times more likely to die neonatally (less than 8 days), 1.7 times more likely to die perinatally (8 to 28 days), and 7.9 times more likely to die postnatally (29 days to 1 year).
- 7.6 times more likely to succumb to Sudden Infant Death Syndrome (SIDS).
- 6.1 times more likely to die of deaths due to injuries (from 2007-2012, 1.2 per 1,000 live births to AI mothers compared to 0.2 to white mothers).

The majority of deaths among infants born to AI mothers occurred postnatally (62.7 percent). The majority of deaths among infants born to white mothers occurred neonatally (57.4 percent). Neonatal deaths are more commonly attributable to issues like prematurity and birth defects, while Sudden Infant Death Syndrome (SIDS) and injuries are common contributors to postnatal-period deaths.

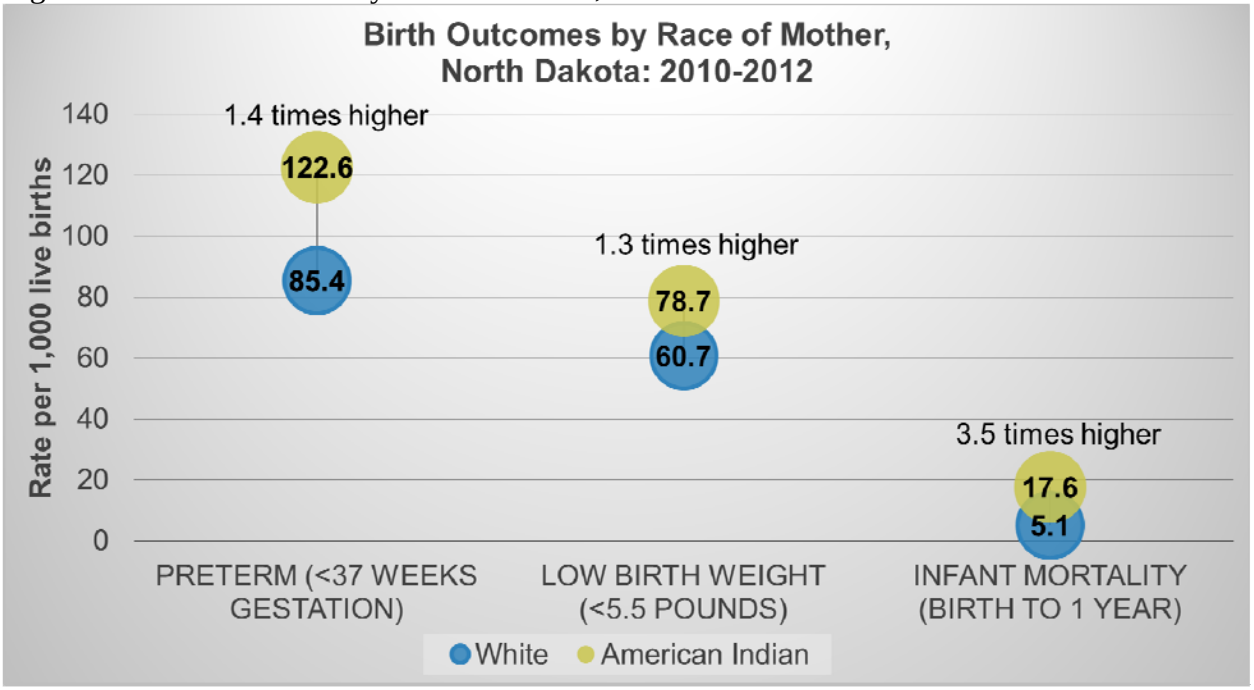
North Dakota's overall infant mortality rate was 6.2 from 2007-2012; 13 of 53 counties had rates of 10.0 or higher, many of which have an AI reservation within county limits.

Figure 34. Risk Factors for Poor Outcomes by Race of Mother, North Dakota: 2010-2012



Maternal, infant, and child health today impacts the outcomes seen in future generations and the public health challenges that citizens of North Dakota will face. Implementing multifaceted projects and programs aimed at reducing poor birth outcomes continues to be a strong focus of public health efforts. Prevention of poor birth outcomes involves addressing several maternal factors including good preconception health, receiving adequate prenatal care, good nutrition and maintaining a healthy weight during pregnancy, quitting tobacco use, and abstaining from use of alcohol and illegal use of drugs. Prevention of infant mortality also includes protective factors such as parent education on safe sleeping environments and normal infant development as well as assisting families to have healthier and more responsive relationships with their children in order to promote bonding and attachment.

Figure 35. Birth Outcomes by Race of Mother, North Dakota: 2010-2012



Many programs and projects available to North Dakota families seek to impact health disparities, including poor birth outcomes, often by addressing underlying social determinants of health. These include income assistance (TANF), support for working families (EITC, child care assistance), nutrition programs (WIC, SNAP), affordable health care (Medicaid), home visiting services (Healthy Families, Parents as Teachers), parent education (NDSU Extension Parent Resource Centers), tobacco cessation assistance (NDQuits), family planning services, mental health and substance abuse services, county social services, foster care services, early childhood tracking, and programs that create awareness of normal child development (Prevent Child Abuse ND's Period of PURPLE Crying). Innovative projects seeking to address American Indian health need to strive to be culturally sensitive (1,000 Grandmothers Program).

Table 1. Death Rates by Type, North Dakota: 2010-2012

Deaths by Type	Ratio AI to White	Deaths per 1,000 live births		
		American Indian (AI)	White	Overall
Fetal deaths (20 or more weeks gestation)	1.5x higher	9.0	5.8	6.6
Infant mortality (birth to 1 year)	3.5x higher	17.6	5.1	6.1
Neonatal (less than 8 days)	2.0x higher	5.5	2.8	3.2
Perinatal (8 to 28 days)	1.7x higher	1.0	0.6	0.6
Postnatal (29 days to 1 year)	7.9x higher	11.0	1.4	2.3
Infant mortality due to Sudden Infant Death Syndrome (SIDS)	7.6x higher	3.8	0.5	0.8

* Health Disparities among American Indians is comprised of data/text used with permission from a poster presentation referenced at: http://www.ndsu.edu/fileadmin/publichealth/files/AIHealthDisparities-Poster-FINAL.pdf