

*I once again extend my greeting to you as I comment on the annual state of South Dakota's child report. This is the 20th report Dr. Wilson has written for the journal. It is daunting to realize that the infants born in the year of her first report are now interviewing for admission to our medical school and many have already become parents of a new generation. Our state is seeing changing patterns of where new babies are now living with the growth of population centers in the east and west ends of the state. Our state's population is also now more heterogeneous, but nevertheless, ethnic disparities in survival within and beyond the first year of life persist. This report describes how the four counties in the country with the highest rates of household poverty for those under five years of age are all in South Dakota. These four counties also have a rate of infant mortality that surpasses that of the state as a whole. Health reflects our general welfare. We must be mindful of this reality as we forge ahead in providing care for our patients whose health so often reflects more than we can see during their interaction with us as health care professionals.*

*My best wishes to you and your families as our new year begins.*

*Rodney Parry, MD, Vice President and Dean, Sanford School of Medicine of The University of South Dakota*

## The State of South Dakota's Child: 2007

By Ann L. Wilson, PhD

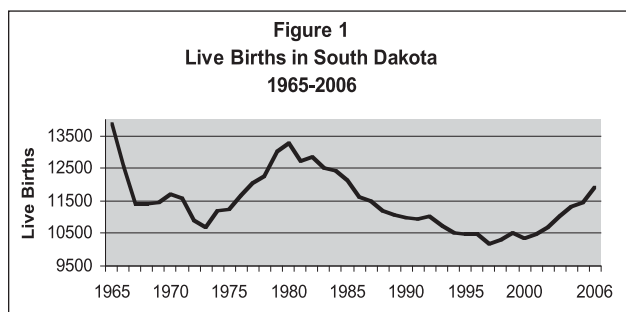
### **Abstract:**

The year 2006 brought a 4 percent increase in births to the state that was almost entirely attributed to an increase in white newborns. The rate of low birth weight births decreased for newborns weighing less than 1,500 grams but increased for those weighing 1,500 to 2,500 grams. The state's rate of low birth weight, however, remained less than the persistently climbing U.S. rate. The incidence of prenatal care beginning in the last trimester of pregnancy, or no prenatal care, increased and is of concern in light of recent findings from a South Dakota report that shows how failure to receive this care is related to infant mortality. The state's overall infant mortality rate decreased from its 2005 rate. This decrease is attributable to a decrease in the rate of neonatal deaths for the state's white population. Rates of neonatal death increased for the minority population and post-neonatal mortality increased for both the white and minority population. How these findings are related to social and economic disparities is discussed.

Over the past three decades, the largest annual number of new babies to become residents of South Dakota occurred in 1980, which also marked the end of a five-year trend of steep annual increases in numbers of births in the state.<sup>1</sup> For the subsequent 20 years, decreasing numbers of babies were born in the state. As the century turned, so did the downward trend in annual births. Since 1999, annual births in the state have been steadily increasing, with 2006 showing nearly a 4 percent increase in births from the previous year.<sup>2</sup> This increase of 488 newborns from the previous year is also notable as it reflects primarily growth in the white population with essentially no increase in the number of

births to American Indians in South Dakota. American Indian births have dominated recent growth in annual births. Figure 1 presents data illustrating how the current increase in births mirrors what was observed in the 1970s. Whether it will reach the 1980 peak is yet to be determined, but this is unlikely as the state's current birth rate is 15.2 compared to its rate of 19.2 per 1,000 in population in 1980.<sup>3</sup>

Currently, two-thirds of the state's new babies reside east of the Missouri River. Of these East River babies, 42 percent reside in Minnehaha and Lincoln counties.<sup>3</sup> In 2006, over



one in four newborns in the state became a resident of one of these two neighboring counties that include the city of Sioux Falls. West of the Missouri River, neighboring Pennington and Lawrence counties are home to 21 percent of the state's newborns, an increase from 17 percent noted a decade ago.<sup>3</sup> These four counties in South Dakota currently are home for over half of the babies born annually.<sup>2</sup>

Between 1996 and 1998 and the last three years (2004-2006), just over half of the state's 66 counties had a decline in births to their residents.<sup>2,3</sup> Further, in 2006 residents of 44 of the state's counties contributed to less than 1 percent of the state's annual births. The diminishing size of birth cohorts for the state's frontier and rural counties has significant implications for the delivery of maternal and child health care and other social and educational services important to the welfare of families who live in these vast yet increasingly sparsely populated areas of the state.

While there has been a shift in the distribution of residence for the newborns in the state, there has also been increasing diversity among annual cohorts of new babies. Since 1996, the percentage of Euro-American births in the state has decreased from 83 percent to 79 percent, as American Indian births increased from 15 to 18 percent of all births.<sup>2,4</sup> Since 2004, 21 percent of South Dakota's population represents minority ethnicities, a percent identical to what is observed nationally. Similarly, since 2004 approximately 86 percent of the state's minority population of newborns is American Indian.<sup>2</sup>

Important predictors of health and survival beyond infancy are birth weight and length of gestation.<sup>5</sup> Nationally, a concerning observation has been made that the percentage of low birth weight (LBW) newborns (weight less than 2,500 grams at birth) has recently been increasing annually since its historical low of 6.7 percent of all births in 1984.<sup>6</sup> Data from South Dakota have mirrored this trend, though the state's percentage of LBW has consistently been lower than what has been observed nationally. These observations are apparent in Figure 2. The LBW data presented in this

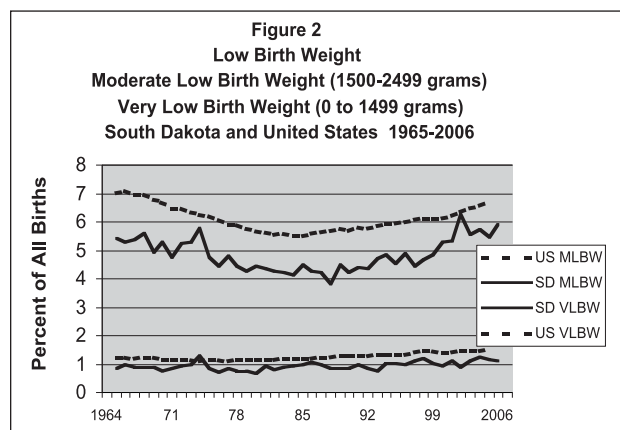
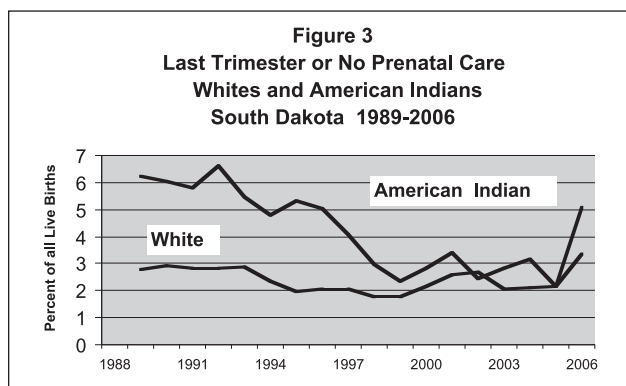


figure are broken into two subgroups, moderate low birth weight (MLBW – newborns with weights between 1,500 and 2,499 grams) and very low birth weight (VLBW – newborns with weights between 0 and 1,499 grams).

Data from 2005 (most recent U.S. data available) show that on a national scale the percent of MLBW and VLBW newborns slightly increased from the previous year.<sup>6</sup> In South Dakota, 2006 brought a slight increase in MLBW and a slight decrease in the percent of VLBW newborns.<sup>2</sup> Nationally, the increase in LBW, in part, is related to increasing multiple births that have accompanied assisted reproductive technologies and changes in the medical management of pregnancies.<sup>7</sup> In South Dakota, multiple births in 2004 to 2006 contributed to 26 percent of the VLBW newborns and to 29 percent of them between 1994 and 1996. Multiples contributed to 23 percent of all LBW newborns in South Dakota during both periods of time.<sup>2</sup> Thus, multiples are an unlikely contributor to the increase in South Dakota's rate of LBW for newborns that has been observed over the past 10 years.

The South Dakota Department of Health convened a task force in 2006 to examine the state's rate of infant mortality.<sup>2</sup> Among its findings was identification that the infant mortality rate of babies whose mothers' received no prenatal care was six times higher than that for babies whose mothers received care during pregnancy. Utilization of prenatal care as a marker of access to care and as a correlate of perinatal outcome has been previously examined in South Dakota and revealed findings similar to those identified by this recent task force.<sup>9</sup> These previous and current findings arouse concern when the 2006 data on utilization of prenatal care are examined. Figure 3 shows that between 2005 and 2006 a steep increase occurred in the percent of pregnant women who received no or only last-trimester prenatal care. Also noted in the 2006 data is a higher than usual reporting on birth certificates of



“unknown” for this variable. This failure to collect or report data on prenatal care could affect the percentages appearing in Figure 3. Nonetheless, the finding that almost 1 percent of women who gave birth in 2006 had no prenatal care and 5 percent had only last-trimester care requires attention and consideration of possible new barriers that are affecting how prenatal care is accessed.<sup>2</sup>

**Infant Mortality**

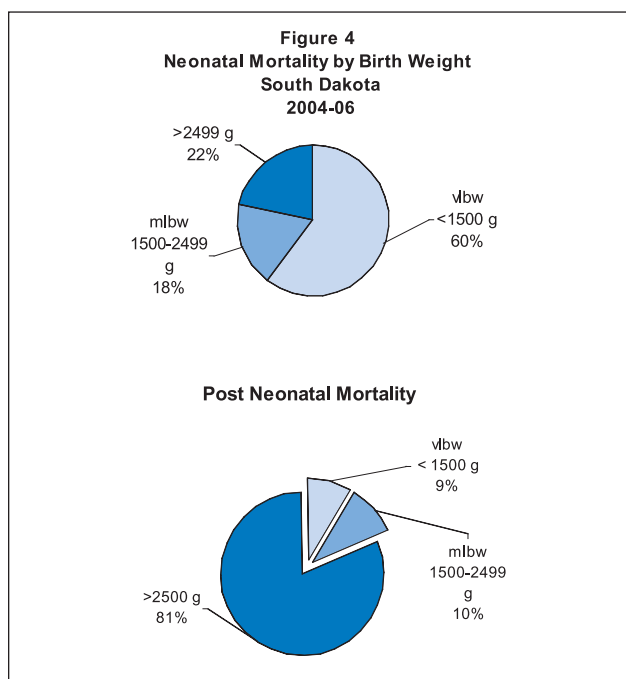
Over the past three years (2004-2006), 54 percent of all infants who died in South Dakota were LBW.<sup>1,2,10</sup> Refining this finding to examine when infants die during the first year of life allows for more meaningful understanding of their mortality. Figure 4 shows that for infants who die in

the neonatal period (0 to 27 days of life), 78 percent are LBW while this is only true of 19 percent who die after the first 27 days of life. Currently, in the state, about half of all infant deaths occur in the first 27 days of life and 40 percent in the first day of life. This varies, however, by ethnicity. For whites, 60 percent of infant deaths are neonatal, while this is true of 40 percent of infants of ethnic minorities whose rate of death is higher in the post-neonatal period.

Disparities in mortality for white and minority infants are further clarified when rates of causes of death are examined. Table 1 presents these data. During the neonatal period, congenital anomalies as a cause of death are 55 percent

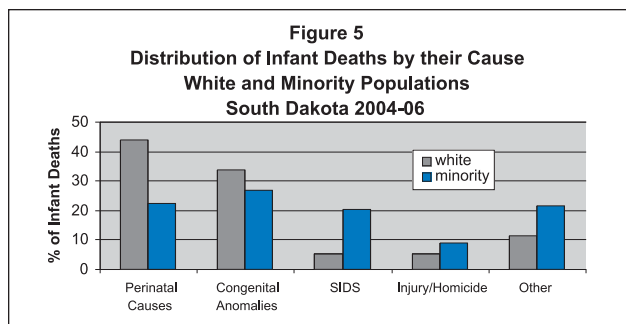
**Table 1: Causes of Infant Death, South Dakota and the United States.**

Cause of Death	Mean Rates of Infant Death per 1,000 live births					
	South Dakota 2004-06				United States 2004	
					Infant	Infant
	White	Minority	White	Minority	Total Population	Total Population
Perinatal Causes	2.60	2.55	0.11	0.13	2.71	3.42
Congenital Anomalies	1.47	2.28	0.62	0.94	2.33	1.37
Sudden Infant Death Syndrome	0.04	0.00	0.29	2.42	0.78	0.55
Injury/Homicide	0.00	0.00	0.33	1.07	0.49	0.36
Other	0.11	0.13	0.59	2.42	1.09	1.09
<b>Total</b>	<b>4.22</b>	<b>4.97</b>	<b>1.94</b>	<b>6.98</b>	<b>7.40</b>	<b>6.79</b>



higher for minorities than for white newborns, while rates of death from other causes are similar for both groups.<sup>1,2,10</sup> Differences in rates of causes of death are more apparent in the post-neonatal period. Notably, the rate of death due to Sudden Infant Death Syndrome (SIDS) is eight times higher for minority infants than for white infants. For injuries, the rate of death is three times higher for minority infants than for white infants. Minority infants are also more likely to die of “other” causes than are white infants. These “other” causes are usually represented with one death per cause and include, but are not limited to, renal failure, viral infections, non-infective gastroenteritis and bronchiolitis. The total rate of death for minority infants during the post-neonatal period is approximately 3.5 times higher for minority (7.0) than for white (1.9) infants.

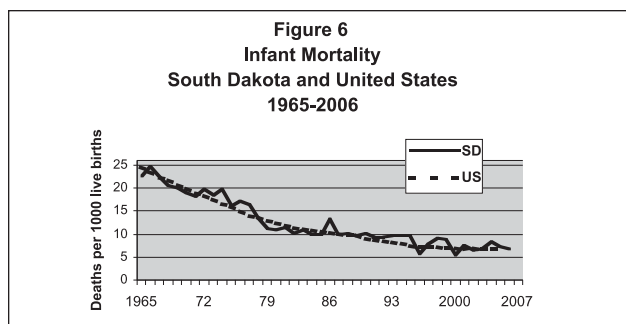
Table 1 also allows a comparison of South Dakota’s total infant mortality rate with that of the nation.<sup>11</sup> The rates of perinatal causes of death are lower in South Dakota than



nationwide while the opposite is true for congenital anomalies. Overall, in 2006, if the state experienced three fewer infant deaths, its total infant mortality rate would be equal to what is observed nationally.

To further delineate differences in causes of infant deaths in South Dakota, Figure 5 shows how they are distributed in the white and minority population of infants. Perinatal causes contribute to 45 percent of all white infant deaths while this is true of approximately one-third of the deaths of minority infants. During the post-neonatal period SIDS now accounts for approximately one in five deaths of minority infants, while this is true for less than one in 10 of white infant deaths. The differing patterns apparent in Figure 5 show how the character of infant death varies depending on the ethnic background of the group of infants being described.

Figure 6 presents data comparing South Dakota's rate of infant death with that of the nation. Progress in lowering the infant mortality rate (IMR) is presented. The preliminary U.S. rate for 2005 (6.89) showed a slight increase from its 2004 rate.<sup>12</sup> This is the second time this decade that an annual decrease was not observed in this parameter of the nation's health. In 2006, South Dakota's IMR was 6.88, showing a decrease from the previous year's rate but not lower than its 2000 historic low of 5.5 per 1,000 live births. Post-neonatal mortality rates for South Dakota increased for both white and minority infants, and the neonatal rate also increased for the state's minority infants. The decrease



in the state's IMR may be attributed to the decrease in its neonatal death rate for white babies (3.2) in 2006. Not surprisingly, there was also a decrease in the percentage of VLBW births that occurred for white newborns.<sup>2</sup>

## Discussion

A common theme in contemporary public health literature on the epidemiology of maternal and child health is "disparities" in outcomes related to the ethnic and social backgrounds of mothers and their infants. Noted is the dramatic improvement of infant mortality that has been observed over the past four decades. Yet, ongoing disparities in mortality persist and are related to economic resources. After 40 years of partnership between the American Academy of Pediatrics and the Indian Health Service, the observation was made in 2006 "that acute, infectious diseases that once were responsible for excess morbidity and mortality now are replaced by excess rates resulting from harmful behaviors, substance use, obesity and injuries (unintentional and intentional)."<sup>13</sup> In South Dakota this observation is validated in cause-specific rates of mortality for infants. Though ethnic disparities in mortality are less apparent in the first 27 days of life, following this time they become obvious in the post-neonatal rates of death for SIDS, congenital anomalies and injuries. Of note is how the SIDS rate has dramatically declined in the state over the past decade, yet similar to the mortality rate as a whole, it remains much higher for the minority (primarily American Indian) population than for the white population.

To respond to these causes of death requires approaches linked to spheres of the community that go beyond the walls of the hospital and clinic setting. Research investigating disparities in infant mortality describes how increasing the availability of community health centers, equitable and timely access to health care, and the training of more minority physicians are likely to be effective strategies that will ameliorate infant mortality rates. In addition, research on the role of stress on preterm delivery is suggested as potentially important to understanding the dynamics that lead to low birth weight and its accompanying higher risk of death.<sup>14</sup>

Analyses of U.S. Census data from 2000 show that of the country's 3,141 counties the four with the highest rates of poverty (63 to 68 percent) for the population of households with children under 5 years of age are all in South Dakota. These four counties (Ziebach, Buffalo, Shannon and Todd) all are home to Indian reservations, and together, between 2002 and 2006, their IMR was over 11.3 while the state as

a whole had an IMR of 7.1 per 1,000 live births. Further, included among the 60 counties in the nation with the lowest median income for families with children less than 18 years of age were six South Dakota counties, all of which are largely reservation land and contribute approximately half of the American Indian births in the state.<sup>15</sup> These six counties were home to 8 percent of the babies born in the state between 2002 and 2006, but contributed to 14 percent of all infant deaths over these five years.

Poverty is an insidious condition, and its tentacles interrupt patterns of life to create hazards and chaos for all whom they touch. The most vulnerable to its malignant effects are those whose brains and neurosensory capabilities are in their earliest and most rapidly formative period. Suggestions for how poverty's malevolence may be addressed are proposed by those who advocate for the welfare of children.<sup>16</sup> Education regarding its adversity must also be available for all citizens and especially those in positions that form public policy.

Adequate nutrition, appropriate cycles of sleep and activity, and sensitive responsive care that calms and soothes a baby are all disrupted when lack of income, unemployment, and educational failure – and its often accompanying exposure to toxic and untoward substances and violence – surround a pregnancy and a new baby's life.<sup>17</sup> When these conditions persist over generations, the expectation of similar dim futures create norms that are extraordinarily resistant to positive change. These are the challenges that increasingly face those who assume the mission of decreasing infant mortality. The complexity of social turmoil that accompanies poverty must be addressed in ways that are acceptable and effective if the lives of the next generations are to be protected – not just to survive but to thrive.

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## In Memoriam

*Honoring physician members of the SDSMA who passed away in 2007.*

John W. Argabrite, MD	Watertown
Vincent K. Cutshall, MD	Sioux Falls
Ben O. Henderson, DO	Mobridge
David J. Witzke, MD	Sioux Falls

Edwin W. Gerrish, MD	Watertown
Stephen H. Noel, MD	Dakota Dunes
Chester W. P. Mayo, MD	Aberdeen