

# Infant Mortality

## An Overview: 2013

Infant Deaths	
Number	80
Rate per 1,000 Live Births	6.53
Neonatal Deaths	
Number	48
Rate per 1,000 Live Births	3.92
Postneonatal Death	
Number	32
Rate per 1,000 Live Births	2.61

In comparison, there were 104 infant deaths in 2012, with the infant mortality rate of 8.60 per 1,000 live births. Caution should be used when comparing these annual rates, because the number of South Dakota resident births creates a relatively small denominator to determine infant mortality rates; a small change in the number of infant deaths can result in a relatively large rate change. For example, as Table 32, below, and Figure 6, on the next page, displays, large downward spikes occurred in 1996 and 2000. Decreases of 39 infants from 1995 to 1996 and 37 infants from 1999 to 2000 caused large downward spikes in infant mortality rates. Therefore, infant mortality rates should be monitored over a period of time.

During 2013, there were 80 South Dakota resident infant deaths reported for an infant mortality rate of 6.53 per 1,000 live births.

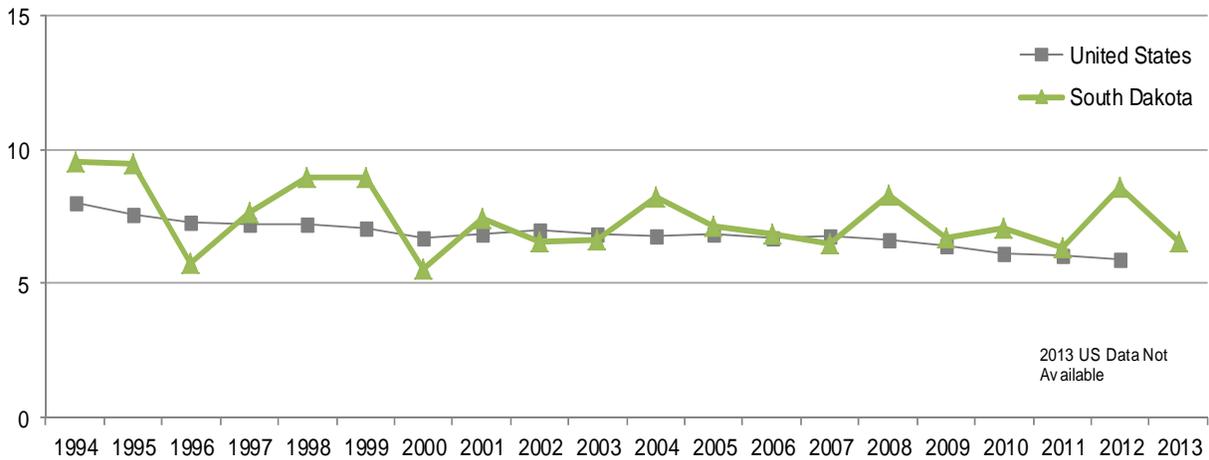
**Table 32**  
**Resident Infant Deaths and Infant Mortality Rates,**  
**South Dakota and United States, 1994-2013**

Year	United States		South Dakota	
	Number	Mortality Rate	Number	Mortality Rate
2013	*NA	*NA	80	6.53
2012	23,629	5.98	104	8.60
2011	23,985	6.07	75	6.34
2010	24,586	6.15	83	7.04
2009	26,412	6.39	80	6.71
2008	28,059	6.61	100	8.28
2007	29,138	6.75	79	6.45
2006	28,527	6.69	82	6.88
2005	28,440	6.87	82	7.15
2004	27,936	6.79	93	8.20
2003	28,025	6.85	73	6.62
2002	28,034	6.97	70	6.54
2001	27,568	6.85	78	7.45
2000	27,200	6.70	57	5.51
1999	27,937	7.06	94	8.94
1998	28,371	7.20	92	8.95
1997	28,045	7.21	78	7.67
1996	28,487	7.32	60	5.73
1995	29,583	7.59	99	9.46
1994	31,710	8.02	100	9.52

Note: U.S. 2013 data are not available.  
 Infant mortality rates are per 1,000 live births.

Source: National Center for Health Statistics  
 South Dakota Department of Health, Office of Health Statistics

**Figure 6**  
**Resident Infant Mortality Rates, South Dakota and United States, 1994-2013**

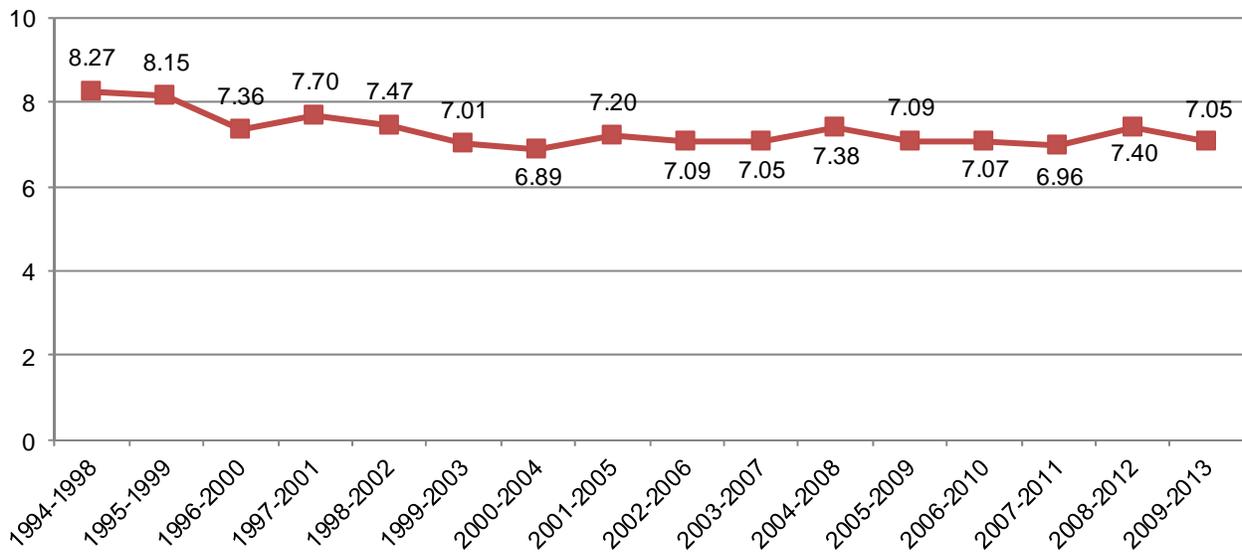


Note: Rate Per 1,000 Live Births. U.S. 2013 data are not available.  
 Source: National Center for Health Statistics and South Dakota Department of Health, Office of Health Statistics

Figure 7, below, displays South Dakota's infant mortality rate grouped in five year increments. This graph shows that since the early 1990's South Dakota's infant mortality

rate has decreased slightly, but in more recent years, the infant mortality has remained steady.

**Figure 7**  
**Resident Infant Mortality Rates for South Dakota, 1994-2013**



Note: Rate Per 1,000 Live Births.  
 Source: South Dakota Department of Health, Office of Health Statistics

Table 33, below, lists the overall leading causes of infant death in 2009-2013. The leading causes of infant death in 2013 can be broken down as follows: certain

conditions in perinatal period, 45.0 percent; congenital malformations, 22.5 percent; sudden infant death syndrome with 11.3 percent; and accidents, 10.0 percent.

**Table 33**  
**South Dakota Resident Leading Causes of Infant Death, 2009-2013**

	Total	2009	2010	2011	2012	2013
<b>Total Deaths</b>	<b>422</b>	<b>80</b>	<b>83</b>	<b>75</b>	<b>104</b>	<b>80</b>
<b>Certain Conditions in the Perinatal Period (P00-P96)</b>	<b>182</b>	<b>32</b>	<b>36</b>	<b>31</b>	<b>47</b>	<b>36</b>
Extreme immaturity and other preterm infants (Less than 37 comp wks of gestation) (P07.2-P07.3)	69	14	12	13	14	16
Neonatal cardiac failure (P29.0)	12	6	0	1	3	2
Newborn affected by chorioamnionitis (P02.7)	8	0	2	2	3	1
Necrotizing enterocolitis of newborn (P77)	8	2	1	2	1	2
Primary atelectasis of newborn (P28.0)	8	2	2	1	1	2
Hypoxic ischemic encephalopathy of newborn (P91.6)	6	1	1	1	3	0
Newborn affected by premature rupture of membranes (P01.1)	6	0	3	1	2	0
Newborn affected by other forms of placental separation and hemorrhage (P02.1)	6	1	2	0	2	1
Newborn affected by incompetent cervix (P01.0)	5	0	0	3	2	0
Bacterial sepsis of newborn, unspecified (P36.9)	5	0	1	1	0	3
<b>Congenital Malformations, Deformations, &amp; Chromosomal Abnormalities (Q00-Q99)</b>	<b>103</b>	<b>18</b>	<b>21</b>	<b>17</b>	<b>29</b>	<b>18</b>
Congenital malformations of the heart (Q20-Q24)	24	5	3	6	7	3
Congenital malformations of the nervous system (Q00-Q07)	20	6	6	2	3	3
Anencephaly (Q00.0)	9	3	2	2	1	1
Chromosomal abnormalities (Q90-Q99)	18	2	5	5	3	3
Patau's syndrome (Q91.4-Q91.7)	7	1	3	2	0	1
Edward's syndrome (Q91.0-Q91.3)	6	0	0	3	1	2
Congenital malformations and deformations of the musculoskeletal system (Q65-Q79)	11	2	2	0	3	4
Congenital malformations of the urinary system (Q60-Q64)	9	1	1	1	4	2
Potter's Syndrome (Q60.6)	5	1	0	1	2	1
Congenital malformation, unspecified (Q89.9)	5	2	0	2	1	0
<b>Sudden Infant Death Syndrome (R95)</b>	<b>43</b>	<b>13</b>	<b>7</b>	<b>8</b>	<b>6</b>	<b>9</b>
<b>Accidents (V01-X59, Y85-Y86)</b>	<b>35</b>	<b>6</b>	<b>7</b>	<b>5</b>	<b>9</b>	<b>8</b>
Accidental suffocation and strangulation in bed (W75)	14	4	3	2	4	1
Unspecified threat to breathing (W84)	10	2	1	1	2	4
<b>Ill-Defined and Unknown Causes of Mortality (R96-R99)</b>	<b>9</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>
<b>Influenza and Pneumonia (J09-J18)</b>	<b>7</b>	<b>1</b>	<b>0</b>	<b>3</b>	<b>2</b>	<b>1</b>
<b>Assault (homicide) (X85-Y09, Y87.1)</b>	<b>7</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>1</b>
<b>All Other Causes</b>	<b>36</b>	<b>8</b>	<b>8</b>	<b>7</b>	<b>8</b>	<b>5</b>

Source: South Dakota Department of Health, Office of Health Statistics

There were 48 neonatal deaths (deaths occurring to infants from birth through 27 days old) for a rate of 3.92 deaths per 1,000 live births. There were 32 postneonatal deaths (deaths occurring to infants 28 days

to 1 year of age) for a rate of 2.61 deaths per 1,000 live births. In comparison, in 2012 neonatal and postneonatal rates were 5.71 and 2.89 per 1,000 live births, respectively.

## Infant Mortality by Race

Beginning with the 2004 data, race is assigned based on standards set forth by the National Center for Health Statistics and the US Census Bureau in order for South Dakota's race data to be comparable. All race data in this section are categorized in the following manner:

Single-race White  
 Single-race American Indian  
 Two or more races

The remaining single-race categories (Black, Asian, Pacific Islander) are included in the totals, but are not shown specifically in any tables.

Table 34a, below, indicates that from 2012 to 2013, the number of South Dakota resident infant deaths decreased for both whites and American Indians. Table 34b, below, displays infant mortality grouped by five-year increments.

**Table 34a**  
**South Dakota Resident Infant Deaths and Mortality Rates**  
**by Infant's Race, 2004-2013**

Year	Race of Infant						Total	
	White		American Indian		Two or more races			
	Num	Rate	Num	Rate	Num	Rate	Num	Rate
2013	48	5.25	22	11.25	5	13.70	80	6.53
2012	58	6.37	26	13.43	10	25.06	104	8.60
2011	43	4.82	24	12.29	4	11.76	75	6.34
2010	54	5.84	19	10.35	8	24.54	83	7.04
2009	56	6.00	19	10.08	2	5.87	80	6.71
2008	60	6.36	29	14.56	9	29.80	100	8.28
2007	51	5.33	21	10.22	6	21.43	79	6.45
2006	50	5.34	26	13.33	2	7.41	82	6.88
2005	55	6.13	25	14.36	1	2.07	82	7.15
2004	62	6.95	28	16.63	2	4.07	93	8.20

Note: Infant mortality rates are per 1,000 live births.  
 Source: South Dakota Department of Health, Office of Health Statistics

**Table 34b**  
**South Dakota Resident Infant Deaths and Mortality Rates by Infant's Race,**  
**Five-Year Increments, 2004-2013**

Year	Race of Infant						Total	
	White		American Indian		Two or more races			
	Num	Rate	Num	Rate	Num	Rate	Num	Rate
2009-2013	259	5.66	110	11.50	29	16.37	422	7.05
2008-2012	271	5.89	117	12.19	33	19.32	442	7.40
2007-2011	264	5.68	112	11.52	29	18.25	417	6.96
2006-2010	271	5.77	114	11.73	27	17.77	424	7.07
2005-2009	272	5.83	120	12.47	20	11.94	423	7.09
2004-2008	278	6.01	129	13.69	20	10.96	436	7.38

Note: Infant mortality rates are per 1,000 live births.  
 Source: South Dakota Department of Health, Office of Health Statistics

When analyzed by race, Table 35a, below, indicates that the South Dakota resident neonatal mortality rate per 1,000 live births decreased for both whites and American Indians from 2012 to 2013. The American Indian neonatal mortality rate has been

consistently higher than white neonatal mortality rates for each year since 2004. In Table 35b, below, the neonatal mortality is grouped in five-year increments. This indicates that the neonatal mortality rate has shown little change since 2004.

**Table 35a**  
**South Dakota Resident Neonatal Deaths and Mortality Rates by Infant's Race, 2004-2013**

Year	Race of Infant						Total	
	White		American Indian		Two or more races			
	Num	Rate	Num	Rate	Num	Rate	Num	Rate
2013	32	3.50	9	4.60	2	5.48	48	3.92
2012	43	4.72	15	7.75	6	15.04	69	5.71
2011	30	3.36	10	5.12	3	8.82	46	3.89
2010	37	4.00	14	7.63	4	12.27	56	4.75
2009	34	3.64	7	3.71	2	5.87	45	3.77
2008	40	4.24	12	6.02	7	23.18	61	5.05
2007	37	3.87	9	4.38	4	14.29	51	4.16
2006	30	3.20	10	5.13	1	3.70	43	3.61
2005	41	4.57	9	5.17	1	2.07	52	4.54
2004	44	4.93	12	7.13	1	2.04	57	5.03

Note: Neonatal mortality rates are per 1,000 live births.  
Source: South Dakota Department of Health, Office of Health Statistics

**Table 35b**  
**South Dakota Resident Neonatal Deaths and Mortality Rates by Infant's Race, Five-Year Increments, 2004-2013**

Year	Race of Infant						Total	
	White		American Indian		Two or more races			
	Num	Rate	Num	Rate	Num	Rate	Num	Rate
2009-2013	176	3.85	55	5.75	17	9.60	264	4.41
2008-2012	184	4.00	58	6.04	22	12.88	277	4.64
2007-2011	178	3.83	52	5.35	20	12.59	259	4.32
2006-2010	178	3.79	52	5.35	18	11.85	256	4.27
2005-2009	182	3.90	47	4.88	15	8.96	252	4.23
2004-2008	192	4.15	52	5.52	14	7.67	264	4.47

Note: Neonatal mortality rates are per 1,000 live births.  
Source: South Dakota Department of Health, Office of Health Statistics

Table 36a, below, indicates that the postneonatal mortality rate per 1,000 live births increased for both white infants and American Indian infants from 2012 to 2013. The American Indian postneonatal mortality rate has been consistently higher than white

postneonatal mortality rates for each year since 2004. When looking at the data in five-year increments as shown in Table 36b, below, the postneonatal mortality for whites has shown little change and the rate for American Indians has decreased.

**Table 36a**  
**South Dakota Resident Postneonatal Deaths and Mortality Rates**  
**by Infant's Race, 2004-2013**

Year	Race of Infant						Total	
	White		American Indian		Two or more races			
	Num	Rate	Num	Rate	Num	Rate	Num	Rate
2013	16	1.75	13	6.65	3	8.22	32	2.61
2012	15	1.65	11	5.68	4	10.03	35	2.89
2011	13	1.46	14	7.17	1	2.94	29	2.45
2010	17	1.84	5	2.72	4	12.27	27	2.29
2009	22	2.36	12	6.37	0	0.00	35	2.93
2008	20	2.12	17	8.53	2	6.62	39	3.23
2007	14	1.46	12	5.84	2	7.14	28	2.29
2006	20	2.13	16	8.20	1	3.70	39	3.27
2005	14	1.56	16	9.19	0	0.00	30	2.62
2004	18	2.02	16	9.50	1	2.04	36	3.17

Note: Postneonatal mortality rates are per 1,000 live births.  
Source: South Dakota Department of Health, Office of Health Statistics

**Table 36b**  
**South Dakota Resident Postneonatal Deaths and Mortality Rates**  
**by Infant's Race, Five-Year Increments, 2004-2013**

Year	Race of Infant						Total	
	White		American Indian		Two or more races			
	Num	Rate	Num	Rate	Num	Rate	Num	Rate
2009-2013	83	1.81	55	5.75	12	6.78	158	2.64
2008-2012	87	1.89	59	6.15	11	6.44	165	2.76
2007-2011	86	1.85	60	6.17	9	5.66	158	2.64
2006-2010	93	1.98	62	6.38	9	5.92	168	2.80
2005-2009	90	1.93	73	7.59	5	2.99	171	2.87
2004-2008	86	1.86	77	8.17	6	3.29	172	2.91

Note: Postneonatal mortality rates are per 1,000 live births.  
Source: South Dakota Department of Health, Office of Health Statistics

Table 37, below, shows the leading causes of infant death from 2009 to 2013. The overall leading cause of infant death for South Dakota residents from 2009 to 2013 was certain conditions in perinatal period. Certain conditions in perinatal period accounted for 43.1 percent of all infant deaths in South Dakota from 2009 to 2013. The largest contributor to this group was extreme immaturity.

When analyzed by race, the leading cause of death for white infants was certain conditions in perinatal period with 111 white infant deaths or 42.9 percent of all white infant deaths. The leading cause of death for American Indian infants was certain conditions in the perinatal period with 42 American Indian infant deaths or 38.2 percent of all American Indian infant deaths.

**Table 37**  
**South Dakota Resident Infant Deaths by Cause of Death and Race, 2009-2013**

	Total		Race			
			White		American Indian	
	Num	Rate	Num	Rate	Num	Rate
<b>Total Deaths</b>	<b>422</b>	<b>7.05</b>	<b>259</b>	<b>5.66</b>	<b>110</b>	<b>11.50</b>
<b>Certain Conditions in the Perinatal Period (P00-P96)</b>	<b>182</b>	<b>3.04</b>	<b>111</b>	<b>2.43</b>	<b>42</b>	<b>4.39</b>
Extreme immaturity and other preterm infants (Less than 37 comp wks of gestation) (P07.2-P07.3)	55	0.92	26	0.57	14	1.46
Neonatal cardiac failure (P29.0)	12	0.20	5	0.11	4	0.42
Necrotizing enterocolitis of newborn (P77)	8	0.13	4	0.09	2	0.21
Primary atelectasis of newborn (P28.0)	8	0.13	7	0.15	1	0.10
Newborn affected by chorioamnionitis (P02.7)	8	0.13	4	0.09	3	0.31
Newborn affected by other forms of placental separation and hemorrhage (P02.1)	6	0.10	6	0.13	0	0.00
Hypoxic ischemic encephalopathy of newborn (P91.6)	6	0.10	5	0.11	1	0.10
Newborn affected by premature rupture of membranes (P01.1)	6	0.10	5	0.11	1	0.10
Bacterial sepsis of newborn, unspecified (P36.9)	5	0.08	3	0.07	1	0.10
Newborn affected by incompetent cervix (P01.0)	5	0.08	5	0.11	0	0.00
<b>Congenital Malformations, Deformations, &amp; Chromosomal Abnormality (Q00-Q99)</b>	<b>103</b>	<b>1.72</b>	<b>74</b>	<b>1.62</b>	<b>20</b>	<b>2.09</b>
Congenital malformations of the heart (Q20-Q24)	24	0.40	17	0.37	5	0.52
Congenital malformations of the nervous system (Q00-Q07)	20	0.33	14	0.31	4	0.42
Anencephaly (Q00.0)	9	0.15	8	0.17	1	0.10
Chromosomal abnormalities (Q90-Q99)	18	0.30	14	0.31	2	0.21
Patau's syndrome (Q91.4-Q91.7)	7	0.12	6	0.13	0	0.00
Edward's syndrome (Q91.0-Q91.3)	6	0.10	5	0.11	1	0.10
Congenital malformations and deformations of the musculoskeletal system (Q65-Q79)	11	0.18	9	0.20	1	0.10
Congenital malformations of the urinary system (Q60-Q64)	9	0.15	6	0.13	3	0.31
Potter's Syndrome (Q60.6)	5	0.08	4	0.09	1	0.10
Congenital malformation, unspecified (Q89.9)	5	0.08	3	0.07	2	0.21
<b>Sudden Infant Death Syndrome (R95)</b>	<b>43</b>	<b>0.72</b>	<b>27</b>	<b>0.59</b>	<b>14</b>	<b>1.46</b>
<b>Accidents (V01-X59, Y85-Y86)</b>	<b>35</b>	<b>0.58</b>	<b>15</b>	<b>0.33</b>	<b>16</b>	<b>1.67</b>
Accidental suffocation and strangulation in bed (W75)	14	0.23	5	0.11	8	0.84
Unspecified threat to breathing (W84)	10	0.17	5	0.11	3	0.31
<b>Ill-Defined and Unknown Causes of Mortality (R96-R99)</b>	<b>9</b>	<b>0.15</b>	<b>3</b>	<b>0.07</b>	<b>3</b>	<b>0.31</b>
<b>Influenza and Pneumonia (J09-J18)</b>	<b>7</b>	<b>0.12</b>	<b>3</b>	<b>0.07</b>	<b>4</b>	<b>0.42</b>
<b>Assault (homicide) (X85-Y09, Y87.1)</b>	<b>7</b>	<b>0.12</b>	<b>4</b>	<b>0.09</b>	<b>2</b>	<b>0.21</b>
<b>All Other Causes</b>	<b>36</b>	<b>0.60</b>	<b>22</b>	<b>0.48</b>	<b>9</b>	<b>0.94</b>

Source: South Dakota Department of Health, Office of Health Statistics

### Infant Mortality and Birth Weight

Table 38, below, displays infant mortality rates by birth weight. The highest mortality rate was for babies born who weighed less than 1,000 grams with an infant mortality rate of 500.00, a neonatal mortality rate of 461.76, and a postneonatal mortality rate of

38.24. The highest rates occurred below 2,500 grams which is considered low birth weight babies. The lowest infant mortality rate occurred in the 3,500-3,999 gram group with 2.04.

**Table 38**  
**South Dakota Resident Infant Mortality Rates by Birth Weight, 2009-2013**

Birth Weight (in Grams)	Births	Infant Deaths	Infant Mortality Rate	Neonatal Mortality Rate	Postneonatal Mortality Rate
<b>Total</b>	<b>59,894</b>	<b>422</b>	<b>7.05</b>	<b>4.41</b>	<b>2.64</b>
<1,000	340	170	500.00	461.76	38.24
1,000-1,499	344	20	58.14	40.70	17.44
1,500-1,999	725	22	30.34	22.07	8.28
2,000-2,499	2,369	36	15.20	9.29	5.91
2,500-2,999	9,312	41	4.40	1.83	2.58
3,000-3,499	22,926	75	3.27	0.87	2.40
3,500-3,999	18,149	37	2.04	0.55	1.49
4,000-4,499	5,009	17	3.39	1.00	2.40
4,500+	703	2	2.84	1.42	1.42

Note: Infant, neonatal, and postneonatal mortality rates are per 1,000 live births.  
Failure of births to add to total is due to not stated birth weights.

Source: South Dakota Department of Health, Office of Health Statistics

### Infant Mortality and Prenatal Care

Table 39, below, displays infant mortality rates by prenatal care. The highest infant mortality rate, 55.98, occurred when mothers did not have prenatal care. This is

true for neonatal and postneonatal mortality rates. In comparison, when mothers received prenatal care in the first trimester the infant mortality rate was only 5.81.

**Table 39**  
**South Dakota Resident Infant Mortality Rates by Prenatal Care, 2009-2013**

Trimester Prenatal Care Began	Births	Infant Deaths	Infant Mortality Rate	Neonatal Mortality Rate	Postneonatal Mortality Rate
<b>Total</b>	<b>59,894</b>	<b>422</b>	<b>7.05</b>	<b>4.41</b>	<b>2.64</b>
First Trimester	41,111	239	5.81	3.41	2.41
Second Trimester	13,997	98	7.00	4.79	2.21
Third Trimester	3,204	22	6.87	3.43	3.43
No Prenatal Care	393	22	55.98	43.26	12.72

Note: Infant mortality rates are per 1,000 live births.

Failure of births and infant deaths to add to the total is due to not stated trimester prenatal care began.

Source: South Dakota Department of Health, Office of Health Statistics

## Infant Mortality and Gestation Period

Table 40, below, displays infant mortality rates by gestation period. The highest infant mortality rate occurred to those with less than 25 weeks gestation with a rate of 754.10.

The highest neonatal mortality rate and postneonatal mortality rate both occurred at less than 25 weeks with a rate of 715.85 and 38.25, respectively.

**Table 40**  
**South Dakota Resident Infant Mortality Rates by Gestation Period, 2009-2013**

<b>Weeks of Gestation</b>	<b>Births</b>	<b>Infant Deaths</b>	<b>Infant Mortality Rate</b>	<b>Neonatal Mortality Rate</b>	<b>Postneonatal Mortality Rate</b>
<b>Total</b>	<b>59,894</b>	<b>422</b>	<b>7.05</b>	<b>4.41</b>	<b>2.64</b>
<25 Weeks	183	138	754.10	715.85	38.25
25-29 Weeks	325	43	132.31	98.46	33.85
30-31 Weeks	259	13	50.19	42.47	7.72
32 Weeks	232	6	25.86	21.55	4.31
33 Weeks	306	10	32.68	16.34	16.34
34 Weeks	567	9	15.87	8.82	7.05
35 Weeks	893	15	16.80	12.32	4.48
36 Weeks	2,066	18	8.71	4.36	4.36
37 Weeks	4,656	36	7.73	4.30	3.44
38 Weeks	9,613	38	3.95	0.83	3.12
39 Weeks	19,815	52	2.62	0.50	2.12
40 Weeks	15,368	29	1.89	0.72	1.17
41 Weeks	4,924	12	2.44	1.22	1.22
42+ Weeks	582	2	3.44	0.00	3.44

Note: Infant mortality rates are per 1,000 live births.

Failure of births and infant deaths to add to the total is due to not stated weeks of gestation.

Source: South Dakota Department of Health, Office of Health Statistics

## Infant Mortality and Tobacco Use

Table 41, below, displays infant mortality rates by tobacco use of the mother. Mothers who reported they used tobacco while pregnant had an infant mortality rate

of 10.58 while mothers who reported they did not use tobacco while pregnant had an infant mortality rate of 6.22.

**Table 41**  
**South Dakota Resident Infant Mortality Rates by Tobacco Use of Mother, 2009-2013**

<b>Tobacco Use of Mother</b>	<b>Births</b>	<b>Infant Deaths</b>	<b>Infant Mortality Rate</b>	<b>Neonatal Mortality Rate</b>	<b>Postneonatal Mortality Rate</b>
<b>Total</b>	<b>59,894</b>	<b>422</b>	<b>7.05</b>	<b>4.41</b>	<b>2.64</b>
Yes	10,023	106	10.58	5.99	4.59
No	49,544	308	6.22	4.04	2.18

Note: Infant mortality rates are per 1,000 live births.

Failure of births to add to the total is due to not stated tobacco use of the mother.

Source: South Dakota Department of Health, Office of Health Statistics

## Infant Mortality and Mother Demographics

The following tables, 42a-42d, compare infant mortality rates among different demographics of the mother, different previous pregnancy histories, different labor and delivery situations, and different post-delivery conditions. The comparison is done using the Chi-Square test. An explanation of this test is given in the Technical Notes section on page 228.

The rates denoted with an asterisk are the ones found to illustrate an association with the variables listed in the left column. For example, the test indicates that when there is a change in the education of the mother, there is an associated change with the

infant mortality rate as well as the neonatal and post-neonatal mortality rate.

However, it should be noted that this test does not consider relationships among multiple variables at the same time. Therefore, dependencies detected by Chi-square analyses may be unrealistic or non-causal. There may be other unseen factors that make the variables appear to be associated. However, if properly used, this test is a very useful tool for the evaluation of associations and can be used as a preliminary analysis of more complex statistical evaluations.

**Table 42a**  
**South Dakota Resident Infant Mortality Rates by Demographics of Mother, 2009-2013**

	Births	Infant Deaths	Infant Mortality Rate	Neonatal Mortality Rate	Postneonatal Mortality Rate
<b>Education</b>					
11 years or less	7,706	86	11.16*	6.75*	4.41*
12+ years	49,299	270	5.48*	3.69*	1.79*
<b>Marital Status</b>					
Single	22,932	201	8.77*	5.36*	3.40*
Married	36,922	195	5.28*	3.63*	1.65*
<b>Mother's WIC Status</b>					
No WIC	36,265	212	5.85*	4.44	1.41*
WIC	22,933	171	7.46*	3.88	3.58*
<b>Age</b>					
<20	4,817	50	10.38*	6.23	4.15*
20-24	14,849	109	7.34*	4.38	2.96*
25-29	20,240	116	5.73*	3.71	2.03*
30-34	13,906	74	5.32*	4.24	1.08*
35+	6,066	47	7.75*	4.62	3.13*
<b>BMI</b>					
Underweight (<18.5)	2,022	14	6.92*	2.47*	4.45*
Recommended (18.5-24.9)	28,528	147	5.15*	3.40*	1.75*
Overweight (25.0-29.9)	15,020	125	8.32*	5.53*	2.80*
Obese (30.0-34.9)	7,609	59	7.75*	4.86*	2.89*
Very Obese (35.0-39.9)	3,647	20	5.48*	4.39*	1.10*
Morbidly Obese (40.0+)	2,211	16	7.24*	4.52*	2.71*
<b>Diabetes</b>					
No Pre-Existing Diabetes	59,363	384	6.47*	4.19*	2.27
Pre-Existing Diabetes	481	11	22.87*	16.63*	6.24
<b>Hypertension-Gestational</b>					
No Hypertension-Gestational	57,102	384	6.72	4.45*	2.28
Hypertension-Gestational	2,742	11	4.01	1.09*	2.92
<b>Chlamydia</b>					
No Chlamydia	58,395	380	6.51	4.30	2.21*
Chlamydia	1,417	13	9.17	3.53	5.65*
<b>Hypertension-Eclampsia</b>					
No Hypertension-eclampsia	59,725	392	6.56*	4.27*	2.29
Hypertension-eclampsia	119	3	25.21*	16.81*	8.40

**Table 42a (continued)**  
**South Dakota Resident Infant Mortality Rates by Demographics of Mother, 2009-2013**

	Births	Infant Deaths	Infant Mortality Rate	Neonatal Mortality Rate	Postneonatal Mortality Rate
<b>Payment Source</b>					
Medicaid	20,779	158	7.60*	4.38*	3.22*
Private Insurance	33,224	175	5.27*	3.79*	1.47*
Self-Pay	1,473	21	14.26*	10.86*	3.39*
Indian Health Service	1,704	25	14.67*	7.04*	7.63*
Champus/Tricare	1,705	9	5.28*	4.69*	0.59*
Other Government	224	3	13.39*	8.93*	4.46*
Other	437	0	0.00*	0.00*	0.00*

Note: \*The Chi-square statistic is significant at the 0.05 level.  
Source: South Dakota Department of Health, Office of Health Statistics

**Table 42b**  
**South Dakota Resident Infant Mortality Rates by Previous Pregnancy History, 2009-2013**

	Births	Infant Deaths	Infant Mortality Rate	Neonatal Mortality Rate	Postneonatal Mortality Rate
<b>Number of Living Children</b>					
0	21,681	152	7.01*	5.12*	1.89*
1	18,591	100	5.38*	3.39*	1.99*
2	10,909	75	6.88*	4.03*	2.84*
3	4,957	30	6.05*	3.23*	2.82*
4+	3,726	39	10.47*	6.17*	4.29*
<b>Number of Dead Children</b>					
0	59,043	362	6.13*	3.93*	2.20*
1+	811	33	40.69*	29.59*	11.10*
<b>Number of Previous Pregnancies</b>					
0	17,914	105	5.86*	4.19*	1.67*
1	16,373	103	6.29*	4.21*	2.08*
2	11,379	75	6.59*	3.95*	2.64*
3	6,642	34	5.12*	3.16*	1.96*
4	3,520	31	8.81*	4.26*	4.55*
5+	3,998	46	11.51*	7.50*	4.00*
<b>Previous Pre-Term Infant</b>					
No	57,869	371	6.41*	4.16*	2.25
Yes	1,975	24	12.15*	8.10*	4.05
<b>Other Poor Previous Pregnancy Outcomes</b>					
No	57,526	364	6.33*	4.07*	2.26
Yes	2,318	31	13.37*	9.92*	3.45
<b>Number of Previous C-Sections</b>					
0	51,908	341	6.57	4.35	2.22*
1	5,288	32	6.05	3.97	2.08*
2+	2,634	22	8.35	3.80	4.56*
<b>Infertility Treatment</b>					
No	59,003	376	6.37*	4.03*	2.34
Yes	841	19	22.59*	22.59*	0.00
<b>Infertility Treatment – Drugs, Insemination</b>					
No	59,233	377	6.36*	4.03*	2.33
Yes	610	18	29.51*	29.51*	0.00

Note: \*The Chi-square statistic is significant at the 0.05 level.  
Source: South Dakota Department of Health, Office of Health Statistics

**Table 42c**  
**South Dakota Resident Infant Mortality Rates by Labor and Delivery, 2009-2013**

	Births	Infant Deaths	Infant Mortality Rate	Neonatal Mortality Rate	Postneonatal Mortality Rate
<b>Tocolysis</b>					
No	58,711	355	6.05*	3.92*	2.13*
Yes	1,108	38	34.30*	23.47*	10.83*
<b>Cervical Cerclage</b>					
No	59,613	383	6.42*	4.14*	2.28
Yes	206	10	48.54*	43.69*	4.85
<b>Premature Rupture of Membranes</b>					
No	57,892	341	5.89*	3.68*	2.21*
Yes	1,951	54	27.68*	22.55*	5.13*
<b>Antibiotics Received by the Mother During Labor</b>					
No	43,444	264	6.08*	3.77*	2.30
Yes	16,418	132	8.04*	5.66*	2.38
<b>Precipitous Labor</b>					
No	57,396	360	6.27*	3.97*	2.30
Yes	2,447	35	14.30*	11.85*	2.45
<b>Induction of Labor</b>					
No	42,466	334	7.87*	5.20*	2.66*
Yes	17,396	62	3.56*	2.07*	1.49*
<b>Augmentation of Labor</b>					
No	43,299	342	7.90*	5.24*	2.66*
Yes	16,563	54	3.26*	1.81*	1.45*
<b>Non-Vertex Presentation</b>					
No	57,415	302	5.26*	3.12*	2.14*
Yes	2,447	94	38.41*	31.88*	6.54*
<b>Steroids for Fetal Lung Maturation Received by the Mother Prior to Delivery</b>					
No	58,957	365	6.19*	4.02*	2.17*
Yes	905	31	34.25*	22.10*	12.15*
<b>Clinical Chorioamnionitis Diagnosed During Labor – Maternal Temp <math>\geq 38^{\circ}\text{C}</math></b>					
No	59,482	382	6.42*	4.10*	2.32
Yes	380	14	36.84*	34.21*	2.63
<b>Fetal Intolerance of Labor Requiring In-Utero Resuscitative Measures, Further Fetal Assessment or Operative Delivery</b>					
No	55,726	357	6.41*	4.15*	2.26
Yes	4,136	39	9.43*	6.29*	3.14
<b>Epidural or Spinal Anesthesia During Labor</b>					
No	18,427	179	9.71*	7.38*	2.33
Yes	30,963	100	3.23*	1.52*	1.71
<b>Fetal Presentation</b>					
Cephalic	56,916	294	5.17*	3.04*	2.13*
Breech	2,200	90	40.91*	34.09*	6.82*
<b>Method of Delivery</b>					
Vaginal	43,124	244	5.66*	3.78*	1.88*
Vaginal after previous C-section	1,279	13	10.16*	7.04*	3.13*
Primary C-section	8,788	97	11.04*	7.17*	3.87*
Repeat C-section	6,657	41	6.16*	3.30*	2.85*

**Table 42c (continued)**  
**South Dakota Resident Infant Mortality Rates by Labor and Delivery, 2009-2013**

	Births	Infant Deaths	Infant Mortality Rate	Neonatal Mortality Rate	Postneonatal Mortality Rate
<b>Maternal Transfusion</b>					
No	59,581	388	6.51*	4.23*	2.28
Yes	259	7	27.03*	19.31*	7.72
<b>Unplanned Operating Procedure Following Delivery</b>					
No	59,679	386	6.47*	4.16*	2.31
Yes	161	9	55.90*	55.90*	0.00

Note: \*The Chi-square statistic is significant at the 0.05 level.  
Source: South Dakota Department of Health, Office of Health Statistics

**Table 42d**  
**South Dakota Resident Infant Mortality Rates by Post Delivery Conditions, 2009-2013**

	Births	Infant Deaths	Infant Mortality Rate	Neonatal Mortality Rate	Postneonatal Mortality Rate
<b>Five Minute APGAR Score</b>					
0-7	1,977	238	120.38*	109.76*	10.62*
8	5,115	34	6.65*	2.93*	3.71*
9	48,210	102	2.12*	0.31*	1.80*
10	4,375	9	2.06*	0.23*	1.83*
<b>Ten Minute APGAR Score</b>					
0-2	146	129	883.56*	883.56*	0.00
3-7	249	37	148.59*	128.51*	20.08
8-10	107	5	46.73*	28.04*	18.69
<b>Plurality</b>					
1	58,119	345	5.94*	3.68*	2.25
2+	1,759	51	28.99*	24.45*	4.55
<b>Breastfeeding at the Time of Discharge</b>					
No	14,921	95	6.37*	2.35*	4.02*
Yes	44,379	92	2.07*	0.36*	1.71*
<b>Assisted Ventilation Required Immediately Following Delivery</b>					
No	56,977	288	5.05*	3.09*	1.97*
Yes	2,888	107	37.05*	27.70*	9.35*
<b>Assisted Ventilation for More than Six Hours</b>					
No	58,677	328	5.59*	3.54*	2.05*
Yes	1,188	67	56.40*	40.40*	15.99*
<b>Neonatal Intensive Care Unit Admission</b>					
No	54,521	264	4.84*	3.30*	1.54*
Yes	5,344	131	24.51*	14.22*	10.29*
<b>Newborn Given Surfactant Replacement Therapy</b>					
No	59,418	354	5.96*	3.87*	2.09*
Yes	447	41	91.72*	58.17*	33.56*
<b>Antibiotics Received by the Newborn for Suspected Neonatal Sepsis</b>					
No	57,011	325	5.70*	3.75*	1.95*
Yes	2,854	70	24.53*	14.72*	9.81*

Note: \*The Chi-square statistic is significant at the 0.05 level.  
Source: South Dakota Department of Health, Office of Health Statistics

