Technical Notes for Vital Statistics

A. SOURCES OF DATA

Vital Events

Birth, death, and marriage certificates, and reports of fetal deaths were the source documents for data on vital events of South Dakota during the 2018 calendar year. Divorce data were compiled from transcripts that were received from each county.

The cut-off date for 2018 data in this report was August 31, 2019. Any data pertaining to a 2018 event for which a certificate was filed after August 31, 2019 were not included in this report. Because the number of records received after that date is so small, in most instances, it is of little significance for the purpose of analysis.

Births, deaths, and fetal deaths relating to South Dakota residents that occurred in another state were included in this report. The inclusion of these data is made possible by an agreement among all registration areas in the United States for resident exchange of copies of certificates.

Birth and fetal death records are the responsibility of the person in attendance; however, the records are usually completed by medical records personnel who are not necessarily present at the delivery. Death records are the responsibility of the funeral director. The medical certification of the cause of death is completed by a physician or coroner.

Marriage records are created by the Register of Deeds using information provided from each spouse and completed with information provided by the individual solemnizing the record. Divorce records are submitted via a transcript from the Clerk of Courts.

United States data were obtained from publications produced by the Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics, Hyattsville, Maryland.

Populations

The populations used to develop the South Dakota rates were based on the given year's estimate. For example, rates for 2018 were calculated using the 2018 population estimate from the US Census Bureau. Each intercensal year's rates are based on the given year's population estimate, while the census years of 2000 and 2010 are based on the actual census totals for the given year.

Rates

Absolute counts of births and deaths do not readily lend themselves to analysis and comparison between years and various geographic areas because of population differences. These demographic differences include total number, age, and sex distributions, and ethnic or racial differentials. In order to assess the health status of a particular population at a specified time, the absolute number of events is converted to a relative number such as probability of living or dying, a rate, a ratio, or an index. This conversion is made by relating the crude number of events to the living population at risk in a particular area at a specified time.

Reliability of Rates

All rates are subject to variation, and this variation is inversely related to the number of events used to calculate the rate. The smaller the number of events, the higher the variability. Rates based on a small number of events over a specified time period or for small populations vary considerably and should be viewed with caution. South Dakota contains many counties with sparse or small populations. Therefore, when calculating health status indicators for these sparsely populated counties, there will always be the possibility that the rate is just a chance variation. For instance, in a five-year period a county with a small population could have annual infant mortality rates of 0, 0, 0, 0, and 25. While rates for 4 of the

years are 0, the fifth year rate of 25, taken alone, is probably not a true indicator of the county's health status.

To attempt to minimize chance variation the report uses five-year averages. Thus, in the example above the infant mortality rate would have been approximately five for the five-year period, which is probably a more accurate depiction of the county's health status. Despite these precautions, using five-year averages for the most sparsely populated counties will still not reduce chance variation significantly for some of the indicators due to the small number of events.

The standard error (SE) of a rate is used in health statistics when studying or comparing rates. The SE defines a rate's variability and can be used to calculate a confidence interval (CI) to determine the actual variance of a rate 95 percent of the time. Rates for two different populations are considered to be significantly different when their confidence intervals do not overlap.

The standard error and confidence intervals are calculated in the following manner. For example, County A's low birth weight rate is 5.3 percent. This was based on 122 low birth weight births from 2014 through 2018. The square root of 122 is roughly 11.0. By dividing the rate of 5.3 by 11.0, the estimated SE of approximately 0.48 is the result. The estimated SE can then be used to compute a 95 percent CI for the rate. The standard formula for determining the 95 percent CI of a rate is:

$$\text{RATE} \pm (1.96 * \text{SE})$$

Following this formula produces an equation of $5.3 \pm (1.96 * 0.48)$ and the result is 5.3 ± 0.9. From this the estimated 95 percent CI is from 4.4 to 6.2 percent. It could then be stated, with 95 percent certainty, that the actual low birth weight rate for County A is between 4.4 and 6.2 percent.

Therefore, County A's low birth weight rate would not be considered significantly different from the state rate. This is because the confidence intervals for County A (4.4-6.2) and the state (5.2-5.6) overlap. Conversely, County B's low birth weight rate is considered significantly different from the state rate because their respective confidence intervals (5.8-6.9) and (5.2-5.6) do not overlap.

All national rates for the United States were taken from the publications produced by the Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics, Hyattsville, Maryland.

B. DATA LIMITATIONS

Quality

The quality of data presented in this report is directly related to the completeness and accuracy of the information contained on the certificates.

Medical Certification

Causes of death on death certificates are coded according to the tenth revision of the *International Classification of Disease* (ICD-10). This classification as adopted by the World Health Organization in 1999 is used throughout the world for selecting the underlying cause of death and classifying the cause.

Starting in 2001, the National Center for Health Statistics introduced categories *U01-*U03 for classifying and coding deaths caused by acts of terrorism. Please note *U01 was added to intentional self-harm (suicide) and *U02-*U03 was added to assault (homicide).

Race/Ethnicity

The race or ethnicity reported on the vital records reflects the opinion of the informant and does not follow any prescribed rules for the reporting of race or ethnicity.

Birth data were tabulated using the race or ethnicity of the mother. No attempt is made to determine the race or ethnicity of the child from the race or ethnicity shown for the father and the mother.

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 to other areas. Race data in this report are categorized in the following manner:

White, non-Hispanic
American Indian, non-Hispanic
Black, non-Hispanic
Asian, non-Hispanic
Pacific Islander, non-Hispanic
Hispanic
Multi-racial, non-Hispanic

If more than one of the first five races is reported, the race is categorized as "multi-racial, non-Hispanic". Due to space constraints and small numbers, some of these race categories are grouped into an "Other" category.

C. GEOGRAPHIC ALLOCATION

In South Dakota, registration of vital events is classified geographically in two ways. The first way is by place of occurrence, i.e., the actual state and county in which the birth or death took place. The second and more customary way is by place of residence, i.e., the state or county stated to be the usual residence of the decedent in the case of deaths or of the mother in the case of a newborn.

Fetal deaths and infant deaths, in cases where the child was never discharged from the hospital, are classified to the residence of the mother.

Occurrence statistics have administrative value and statistical significance, especially when calculating accident statistics. Residence statistics are useful in determining health indices for planning and evaluation purposes. The statistics provided in this report are residence data unless otherwise stated.

Allocation of vital events by place of residence is sometimes difficult, because classification depends entirely on the statement of the usual place of residence furnished by the informant at the time the original certificate is completed. For various reasons, this statement may be incorrect or incomplete. For example, mailing addresses very often differ from the actual geographic residence.

D. DEFINITIONS

Age-Adjusted Death Rate (Direct Method) – Age-specific death rates for a selected population are applied to a standard population in order to calculate what rate would be expected if the selected population had the same age distribution as the standard. The total of expected deaths divided by the total of the standard population and multiplied by 100,000 yields the age-adjusted death rate per 100,000. (It is important to use the same standard population in the computation of each age-adjusted rate to achieve comparability. Age-adjusted death rates should never be compared with any other types of death rate or be used as absolute measurements of mortality.)

Age-Adjusted Death Rate – Absolute counts of deaths or crude death rates do not readily lend themselves to analysis and comparison between years and various geographic areas. For example, the older a population, the more people die. Statistically, South Dakota has a high percentage of elderly; therefore, if crude rates of death, based on population, in South Dakota were compared with those of the United States, it would appear that South Dakota had a high rate of mortality. The comparison would be misleading.

Consequently, a mortality rate which has been adjusted for age has been devised to allow more refined measurement with which to compare deaths over geographic areas or time periods. This is referred to as an age-adjusted death rate.

Age-Adjusted Years of Potential Life Lost (YPLL) – Age-adjusted rates for years of potential life lost (YPLL) before age 75 years use the year 2000 standard population and are based on eight age

groups (< 1 year, 1-4, 5-14, and 10-year age groups through 65-74 years).

Age-Specific Birth Rate – Number of live births to women in a specific age group per 1,000 female population in that age group.

Age-Specific Death Rate – Number of deaths in a specific age group per 100,000 population in that age group.

Annulment – A judicial pronouncement declaring a marriage invalid.

Apgar Score – A standardized mechanism to assess the physical condition of newborns.

Birth Weight – The first weight of the fetus or newborn obtained after birth. This weight should be measured, preferably, within the first hour of delivery before significant postnatal weight loss has occurred. Low birth weight babies are those born alive who weigh less than 2,500 grams (about 5 pounds 9 ounces).

Birth Weight in Grams – In order to provide data comparable to that published for the United States and other countries, birth weight is reported in grams for this report. The equivalents of the gram intervals in pounds and ounces are as follows:

499 grams or less	= 1 lb. 1 oz. or less
500 - 999 grams	= 1 lb. 2 ozs. – 2 lbs. 3 ozs.
1,000 - 1,499 grams	= 2 lbs. 4 ozs. – 3 lbs. 4 ozs.
1,500 - 1,999 grams	= 3 lbs. 5 ozs. – 4 lbs. 6 ozs.
2,000 - 2,499 grams	= 4 lbs. 7 ozs. – 5 lbs. 8 ozs.
2,500 - 2,999 grams	= 5 lbs. 9 ozs. – 6 lbs. 9 ozs.
3,000 - 3,499 grams	= 6 lbs. 10 ozs. – 7 lbs. 11 ozs.
3,500 - 3,999 grams	= 7 lbs. 12 ozs. – 8 lbs. 12 ozs.
4,000 - 4,499 grams	= 8 lbs. 13 ozs. – 9 lbs. 14 ozs.
4,500 - 4,999 grams	= 9 lbs. 15 ozs. – 11 lbs. 0 ozs.
5,000 grams or more	= 11 lbs. 1 oz. or more

Cause Specific Death Rate – The number of resident deaths due to a specific cause divided by the total resident population X 100,000.

Chi-Square Test

The Chi-Square test is the most commonly used method for comparing frequencies or proportions. It is a statistical test used to determine if observed data deviate from those expected under a particular hypothesis. The Chi-Square test is also referred to as a test of a measure of fit or "goodness of fit" between data. Typically, the hypothesis tested is whether or not two samples are different enough in a particular characteristic to be considered members of different populations. Chi-Square analysis belongs to the family of univariate analysis, i.e., those tests that evaluate the ***possible*** effect of one variable (often called the independent variable) upon an outcome (often called the dependent variable). As with all non-parametric tests (that do not require normal distribution curves), Chi-Square tests only evaluate a single variable, thus they do not take into account the interaction among more than one variable upon the outcome.

Crude Birth Rate – The number of resident live births divided by the total resident population X 1,000.

Crude Death Rate – The number of resident deaths divided by the total resident population X 100,000.

Divorce – The legal dissolution of a marriage.

Fetal Death – Death prior to the complete expulsion or extraction from its mother of a product of human conception, irrespective of the duration of pregnancy. The death is indicated by the fact that after such expulsion or extraction, the fetus does not breathe or show any other evidence of life such as beating of the heart, pulsation of the umbilical cord, or definite movement of voluntary muscles. (South Dakota requires the reporting of any fetus of at least 20 weeks gestation).

Fetal Death Rate – The number of fetal deaths divided by the total number of live births and fetal deaths X 1,000.

Fertility Rate – The number of resident births divided by female population ages 15-44 X 1,000.

Gestation – Weeks of pregnancy as reported on the certificate of live birth. In

this report, the obstetric estimate of gestation is used to determine the length of gestation rather than the date of the last normal menstrual cycle. The obstetric estimate of gestation is determined by the physician certifying the birth.

Infant Death – Death of a live born infant less than one year (365 days) of age. Infant deaths equal the sum of neonatal plus postneonatal deaths.

Infant Mortality Rate – The number of infant deaths divided by the total number of live births X 1,000.

Live Birth – The complete expulsion or extraction from its mother of a product of human conception, irrespective of the duration of pregnancy, which, after such expulsion or extraction, breathes or shows any other evidence of life such as beating of the heart, pulsation of the umbilical cord, or definite movement of voluntary muscles, whether or not the umbilical cord has been cut or the placenta is attached.

Low Birth Weight – A birth weight under 2,500 grams or 5 pounds, 9 ounces.

Marriage – The legal union of two people.

Mean – The arithmetic average of a set of values or the sum of all the values divided by the number of values in the group.

Median – The value or number that divides a population into two equal halves. The value that falls exactly in the middle of the entire range of values ranked in order from low to high such that 50 percent of the values fall above it and 50 percent fall below it. If the number of values is even, a value halfway between the two values nearest the middle is used.

Mode – The most frequently occurring value in a distribution.

Neonatal Mortality Rate – (Neonatal Death = Death occurring to infants from birth through 27 days old). The number of neonatal deaths divided by the total number of live births X 1,000.

Neonatal Period – The period of infancy from the first through the 27th day of life.

Place of Occurrence and Residence – In South Dakota, registration of vital events is classified geographically in two ways. The first way is by place of occurrence, i.e., the actual county in which the event took place. The second, and more customary way, is by place of residence, i.e., the county stated to be the usual residence of the decedent in the case of deaths or of the mother in the case of a newborn. Births and deaths relating to South Dakota residents which occurred in another state are included in this report. The inclusions of these data are made possible by an agreement among all registration areas in the United States for resident exchange of copies of certificates.

Postneonatal Mortality Rate – (Postneonatal Death = Death occurring to infants 28 days to 1 year of age). The number of postneonatal deaths divided by the total number of live births X 1,000.

Postneonatal Period – The period of infancy from 28 days to less than one year old.

Significance – Most of the health status indicators in South Dakota's counties are not significantly different from the state's averages. This means that although a county's calculated rate may be higher or lower than the state average, the small number of events in the county makes the rate vary considerably from year to year. For example, if in 2018, County A had 100 babies born and none died, the infant mortality rate would be 0.0. But if in 2017, County A had another 100 babies born and one died, the infant mortality rate would be 10.0.

When there is a small number of events and the probability of such an event is small, a mathematical formula is used to calculate whether or not the difference in rates is statistically significant or due more to chance.

Years of Potential Life Lost before Age 75 (YPLL) – Based only on deaths before the age of 75. For example, if someone dies

at 35 years of age, that is calculated as 40 years of potential life lost. Conversely, if someone dies at 75 years or older, that is calculated as zero years of potential life lost.

E. DEFINITIONS OF MEDICAL TERMS – The following definitions are for maternal and infant items reported on the South Dakota Certificate of Live Birth. The definitions below are based on those developed for the 2003 revision of the U.S. Standard Certificate of Live Birth. These definitions are similar to, but not the same as those developed for the 1989 revision of the U.S. Standard Certificate of Live Birth.

RISK FACTORS IN THIS PREGNANCY:

Diabetes – Glucose intolerance requiring treatment.

Hypertension, Pregnancy-Associated – Diagnosis in this pregnancy of elevation of blood pressure above normal for age, gender, and physiological condition.

Hypertension, Chronic – Diagnosis prior to the onset of this pregnancy of elevation of blood pressure above normal for age, gender, and physiological condition.

OBSTETRIC PROCEDURES AND CHARACTERISTICS OF LABOR AND DELIVERY:

Induction of Labor – Initiation of uterine contractions by medical or surgical means for the purpose of delivery before the spontaneous onset of labor (i.e., before labor has begun).

Tocolysis – Administration of any agent with the intent to inhibit preterm uterine contractions to extend the length of the pregnancy.

Meconium, moderate/heavy – Staining of the amniotic fluid caused by passage of fetal bowel contents during labor and/or at delivery that is more than enough to cause a greenish color change of an otherwise clear fluid.

Breech/Malpresentation – Presenting part of the fetus listed as breech, complete breech, frank breech, footling breech.

Precipitous Labor – Labor lasting less than 3 hours.

CONGENITAL ANOMALIES:

Anencephaly – Partial or complete absence of the brain and skull.

Meningomyecele/Spina Bifida – Meningomyelocele is herniation of meninges and spinal cord tissue. Meningocele (herniation of meninges without spinal cord tissue) should also be included in this category. Both open and closed (covered with skin) lesions should be included. Spina bifida is herniation of the meninges and/or spinal cord tissue through a bony defect of spine closure.

Omphalocele/Gastroschisis – Omphalocele is a defect in the anterior abdominal wall, accompanied by herniation of some abdominal organs through a widened umbilical ring into the umbilical stalk. Gastroschisis is an abnormality of the anterior abdominal wall, lateral to the umbilicus, resulting in herniation of the abdominal contents directly into the amniotic cavity.

Cleft Lip/Palate – Cleft lip is incomplete closure of the lip. It may be unilateral, bilateral, or median. Cleft palate is incomplete fusion of the palatel shelves. It may be limited to the soft palate, or it may extend into the hard palate.

Down Syndrome – The most common chromosomal defect (trisomy 21).

F. MORTALITY CODING

Codes for alcohol-induced deaths - Causes of death attributable to alcohol-induced mortality include ICD–10 codes: E24.4, Alcohol-induced pseudo-Cushing's syndrome; F10, Mental and behavioral disorders due to alcohol use; G31.2, Degeneration of nervous system due to alcohol; G62.1, Alcoholic polyneuropathy; G72.1, Alcoholic myopathy; I42.6, Alcoholic

cardiomyopathy; K29.2, Alcoholic gastritis; K70, Alcoholic liver disease; K85.2, Alcohol-induced acute pancreatitis; K86.0, Alcohol-induced chronic pancreatitis; R78.0, Finding of alcohol in blood; X45, Accidental poisoning by and exposure to alcohol; X65, Intentional self-poisoning by and exposure to alcohol; and Y15, Poisoning by and exposure to alcohol, undetermined intent. Alcohol-induced causes exclude accidents, homicides, and other causes indirectly related to alcohol use, as well as newborn deaths associated with maternal alcohol use.

Codes for farm accident deaths - Causes of death attributable to farm accident mortality include ICD–10 code: W30, Contact with agricultural machinery; or if the decedent was doing agricultural work at the time of the injury; or if the location of the injury was on a farm. Farm accidents exclude suicides and homicides.

Codes for firearm deaths - Causes of death attributable to firearm mortality include ICD–10 codes *U01.4, Terrorism involving firearms (homicide); W32–W34, Accidental discharge of firearms; X72–X74, Intentional self-harm (suicide) by discharge of firearms; X93–X95, Assault (homicide) by discharge of firearms; Y22–Y24, Discharge of firearms, undetermined intent; and Y35.0, Legal intervention involving firearm discharge. Deaths from injury by firearms exclude deaths due to explosives and other causes indirectly related to firearms.

Codes for drug overdose deaths -

Category	ICD-10 Codes[1]	
	Underlying Cause	**Contributing Cause**
All Drug poisoning	X40 X41 X42 X43 X44 X60 X61 X62 X63 X64 X85 Y10 Y11 Y12 Y13 Y14	T36 T37 T38 T39 T40 T41 T42 T43 T44 T45 T46 T47 T48 T49 T50
Illicit drug poisoning	X40 X41 X42 X43 X44 X60 X61 X62 X63 X64 X85 Y10 Y11 Y12 Y13 Y14	T40.1 T40.5 T40.7 T40.8 T40.9 T43.6
Pharmaceutical poisoning[2]	X40 X41 X42 X43 X44 X60 X61 X62 X63 X64 X85 Y10 Y11 Y12 Y13 Y14	T36 T37 T38 T39 T40.2 T40.3 T40.4 T41 T42 T43.0 T43.1 T43.2. T43.3 T43.4 T43.5 T43.8 T43.9 T44 T45 T46 T47 T48 T49 T50.0 T50.1 T50.2 T50.3 T50.4 T50.5 T50.6 T50.7 T50.8
Prescription opioid poisoning	X40 X41 X42 X43 X44 X60 X61 X62 X63 X64 X85 Y10 Y11 Y12 Y13 Y14	T40.2 T40.3 T40.4
Illicit opioid poisoning (opium and heroin)	X40 X41 X42 X43 X44 X60 X61 X62 X63 X64 X85 Y10 Y11 Y12 Y13 Y14	T40.0 T40.1
All opioid poisoning (illicit and prescription)	X40 X41 X42 X43 X44 X60 X61 X62 X63 X64 X85 Y10 Y11 Y12 Y13 Y14	T40.0 T40.1 T40.2 T40.3 T40.4

[1] For ICD-10, the death must have an underlying cause code from among those shown. Contributing cause codes can then indicate the specific type of drug involved, but they do not specify intent.

[2] "Pharmaceutical" is used as opposed to "prescription" drugs because a small number of codes include both prescription and over-the-counter drugs.