APPENDIX

On January 1, 2010, the Missouri Department of Health and Senior Services (MDHSS) implemented two significant changes relating to the tabulation of statistical data on vital events in Missouri. MDHSS launched a web-based registration system and began registering births and deaths using the 2003 Revision of the US Standard Certificates of Live Births and Deaths. The web-based registration system collected some existing data items in different ways. The revised certificates stopped collecting some data items, included new data items, and collected old information in new ways. As a result, differences in tabulations since 2010 may be the result of changes in data collection methods rather than changes in health status. Major changes in data collection methods are addressed in this appendix. Differences between 2019 tabulations and pre-2010 tabulations should be evaluated with these changes in mind.

RELIABILITY OF THE DATA

In analyzing any data including vital statistics, the potential for error in the data must not be overlooked. There are several types of errors possible including: under-registration, errors made by the informant, and errors in compiling and processing.

The most potentially dangerous error is that of improper interpretation. Statistics are neither more true nor false than the interpretation given to them. Particular caution must be used in analyzing trend data, because changes have occurred over the years in medical diagnosis, coding definitions, and registration methodology.

Care should be taken in using rates where the number of events or reference population is small. Minor differences in the number of events may result in major changes in the rates. Rates based on fewer than 20 events are very unstable. Most of the rates computed for this report are crude rates. In comparing rates for geographic areas and time periods, crude rates are limited because they do not take into account the differences in age, sex, race, and other population characteristics.

SOURCES OF VITAL RECORDS

Vital statistics in Missouri are compiled from six basic records which are filed with MDHSS by state law. These records are: (1) live birth records, (2) death records, and (3) fetal death records, each beginning in 1911; (4) marriage and (5) divorce records, beginning in 1949; and (6) abortion records, beginning in 1975.

Missouri cooperates with other states in the exchange of records for live births, fetal deaths, deaths, and abortions, including events occurring to Missouri residents in other states. However, MDHSS has not received individual abortion records from Illinois since 1983 and did not receive records from Tennessee clinics from 1997 to 2005. Instead, MDHSS received estimates of Missouri resident abortions from some Tennessee clinics from 1997 to 2005, and an estimate of Missouri resident abortions was received from Illinois for 1988-2019. MDHSS also received abortion counts of Missouri resident abortions for 2014-2017 from Arkansas and Oklahoma in 2019. These estimates and counts are included in Graph D.

There is no interstate exchange of records for marriages, dissolutions, and annulments. Tables using these data files (Tables 31 through 42) report events that occurred in Missouri, by county of occurrence, regardless of the residence of the parties involved.

The data within this report represent the 2019 calendar year of events. Live births were accepted through February 24, 2020, death, fetal death, marriage and abortion records through April 15, 2020 and dissolutions through April 24, 2020.

Except where noted, historical vital statistics data are taken from annual MDHSS vital statistics reports.

POPULATION

All Missouri county and city population estimates for 2019 were developed by the United States Census Bureau (Vintage 2019). Counts for all decennial years were taken from the United States Census Bureau for those years. Age-sex-specific estimates and counts were also taken from the Census Bureau with the exception of the Less than Age One population, which used the number of that year's resident live births.

The source of the state total estimates for non-Census years 1911-1969 is the US Census Bureau P-25 series. State estimates for 1971-1979 were obtained from the US Census Bureau publication, "Preliminary Intercensal Estimates of the Population of Counties." Age-sex-specific population estimates for 1981 - 1989 were developed by the US Census Bureau in unpublished tables. State population estimates for 1991-1999 and 2001-2009 also came from the US Census Bureau. MDHSS used these as controls in developing 1991-1999 age-sex-specific population estimates for Missouri. Estimates of the 2001-2009 age-sex-specific state population were adjusted to the 2010 counts and provided by the US Census Bureau (published October 2012). State total population estimates for 2011-2019 came from the US Census Bureau (Vintage 2019).

RACE and HISPANIC ORIGIN (ETHNICITY)

Since the 1989 report, birth, fetal death, and infant death data have been presented by race of mother. Before 1989, this data was presented by race of child. The change in 1989 was implemented to be consistent with the National Center for Health Statistics (NCHS), which also implemented this change in 1989. Race of child had been computed by an algorithm based on the race of mother and race of father. Persons of mixed parentage were classified according to the race of the nonwhite parent. Because of this rather arbitrary formula and the increasing proportion of out-of-wedlock births in which father's race is missing, NCHS decided to implement this change to race of mother.

Beginning with the 2010 vital statistics report, tabulations of race for live births, deaths, and abortions refer to four mutually-exclusive groups that take into account Hispanic origin. The groups are "white, non-Hispanic"; "black, non-Hispanic"; "other/multiple race, non-Hispanic"; and "Hispanic, all races". For tabulations prior to 2010, "race" refers to the classification of the population into three distinct groups: white, black, and other. Before 2010, persons of Latin American birth or ancestry who were not identified as being American Indian or other designated race were classified as white.

The 2010 methodology was changed to be consistent with changes in population data from the decennial US Census, the 2003 US Standard certificates for live births and deaths, and the 2003 US Standard Report of Fetal Death. Prior to 2010, only one race could be selected. "Multiple race" was available as a primary selection, but no details were captured. Beginning with 2010 birth and death data, more than one race can be selected. Analysis of 2019 Missouri resident data showed that 3.1 percent of births were to mothers of multiple races and 0.3 percent of deaths were to multiple race decedents. Therefore, records of mothers and decedents which indicate only white or only black as their race, and do not indicate Hispanic origin, are classified in this report as white,

non-Hispanic, or black, non-Hispanic, respectively. The "other/multiple, non-Hispanic" race group now includes persons selecting multiple races as well as persons identified as American Indian or Alaska Native (AIAN), Asian Indian, Chinese, Filipino, Japanese, Korean, Vietnamese, other Asian, Native Hawaiian, Guamanian or Chamorro, Samoan, Other Pacific Islander, or other specified race, but not of Hispanic origin. Persons of unknown race are not included in “other/multiple,” but are included in the total of all races. This method allows for comparison of statistics on race across the different methods of collecting race information.

Appendix Table A shows the effects of the changes in race and Hispanic origin classification on low birth weight rates using 2019 resident live births. The number of white, non-Hispanic and black, non-Hispanic births using the 2010 method were both reduced from the White and Black totals using the pre-2010 method, as the Hispanic births and births involving multiple races have been removed. White, non-Hispanic births (2010 method) were 6.1 percent less than white births (pre-2010 method). The 2010 method resulted in about 10.7 percent fewer black, non-Hispanic births than black births using the pre-2010 method. The low birth weight rate for white, non-Hispanics of 7.5 percent was equal to the 7.5 white rate. The low birth weight rate for black, non-Hispanics was 15.8 percent compared to 15.4 percent for black births using the pre-2010 method. The overall black to white ratio for low birth weight was 2.07 using the pre-2010 method compared with 2.12 using the new 2010 method.

Appendix Table A
Effects of Changes in Racial Classification Methods on 2019 Low Birth Weight (less than 5.5 lbs) Rates by Race

Pre-2010 Definition (single race* selected)

Mother's Race	Live Births	LBW	LBW Rate	Black/White Ratio
White	55,754	4,154	7.5	
Black	11,734	1810	15.4	2.07
Other and Multiple	4,340	395	9.1	
Unknown race	275	20	7.3	
Total	72,103	6,379	8.9	

2010 Definition (multiple races and Hispanic origin included)**

Mother's Race	Live Births	LBW	LBW Rate	Black/White Ratio
White, Non-Hispanic	52,346	3,904	7.5	
Black, Non-Hispanic	10,475	1,653	15.8	2.12
Hispanic, any Race	4,383	337	7.7	
Other and Multiple	4,828	478	9.9	
Unknown race	71	7	9.9	
Total (includes unknown race)	72,103	6,379	8.9	

* Single-race method includes Hispanic mothers in White, Black and Other/Multiple classifications.
**Multiple-race method excludes Hispanic mothers from White, Black and Other/Multiple classifications.

Users of the MDHSS MOPHIMS/MICA query tools (https://healthapps.dhss.mo.gov/MoPhims/MICAHome) should note that the above changes are not reflected in the Birth and Death MICA queries for 2010 and beyond. Instead, an algorithm from NCHS is used to make race-specific statistics from both multiple-race and single-race data collection systems that are sufficiently comparable to permit analysis. Hispanic origin was maintained as a separate category of analysis in the Birth and Death MICAs. This was done to keep analyses as consistent with the prior years of data as possible. (Filtering of Hispanic origin for data queries is still supported.)

As a result, small differences will be found between statistics calculated by MICA and statistics in this report. The changes in racial classification tended to have a greater effect on the "other/multiple race, non-Hispanic" category as the low birth weight rate for this group increased from 9.1 percent using the single-race method to 9.9 percent using the multiple-race method. The birth denominator count for this classification was similar using both methods, but the individual mothers within each group were very different. The single-race method includes a large proportion of Hispanics as "other/multiple race", while the multiple-race method includes mothers with multiple declared races instead. (See Appendix Table A above.)

"RESIDENT" AND "RECORDED" EVENTS

It is important to understand the significance of the terms "Resident" and "Recorded" when analyzing vital statistics.

"Resident" data for vital events pertain to persons residing in a particular area, independent of where the event occurred. An exception to this is that when a person dies in a hospital, nursing home, or other institution, the usual place of residence before admission determines the place of residence. In the case of live births, fetal deaths, and infant deaths, the residence of the mother is considered to be the residence of the child. "Recorded" data for vital events are based on where the event occurred. Analysis using recorded data may include records of non-Missouri residents.

Resident and recorded figures are independent of each other and should neither be added to nor subtracted from the other. Thus, the number of events occurring or not occurring in the same geographic area where the people reside cannot be simply calculated from resident and recorded data. Each table indicates whether the analysis is for resident or recorded data.

GEOCODING

Beginning with 2008 data, MDHSS uses a computerized geocoding package (Address Broker) to improve the accuracy of residence address information on Missouri resident birth and death records for the entire state. If the record's address, including resident county, city, and zip code, matches well with available address data, the software overwrites the existing values on the record and also adds latitude, longitude, and Census tract. If no match is available or the best match is not accurate enough, address information is left as reported, and latitude, longitude, and Census tract are not added.

From 2000 through 2007, only the following metropolitan counties were geocoded: Buchanan, Cass, Clay, Greene, Jackson, Jefferson, Platte, Ray, St. Charles, St. Louis County, and St. Louis City.

REGIONS

Beginning with the 2010 report, Missouri Regional Planning Commission areas were replaced with Behavioral Risk Factor Surveillance System (BRFSS) regions. This change was made to support and enhance MDHSS BRFSS survey data. More information on BRFSS, along with public access data, can be found at: https://health.mo.gov/data/brfss/index.php. A map of the BRFSS region boundaries is included in this report on page vi.

METRO (METROPOLITAN) vs. NON-METRO COUNTIES

Tables displaying BRFSS region data also include metro and non-metro groupings. These groupings cut across BRFSS regions so that a subset of all BRFSS regions is not equivalent to the metro or non-metro groupings. The metro counties are: Andrew, Bollinger, Buchanan, Bates, Boone, Caldwell, Callaway, Cape Girardeau, Cass, Christian, Clay, Clinton, Cole, Dallas, Greene, Franklin, Howard, Jackson, Jasper, Jefferson, Lafayette, Lincoln, McDonald, Moniteau, Newton, Osage, Platte, Polk, Ray, St. Charles, St. Louis, Warren, Webster, and Washington counties, as well as St. Louis City. The eighty other counties are defined as non-metro. A map of metro and non-metro regions is included in this report on page vi, adapted from a map prepared by the US Census Bureau, Geography Division. (US Department of Commerce, Economics and Statistics Administration, August 31, 2010.)

UNKNOWNS AND IMPUTED DATA

Records of Missouri residents with unknown county of residence are included in the state totals of this publication. In general, state totals always include records with variables that have any unknown values. The number of 2019 records with unknown county of residence by system is as follows:

Live Births.....	0
Fetal Deaths.....	0
Deaths.....	0
Abortions	8

To account for unknown data items and inconsistencies in reporting to MDHSS, the following imputations and data interpretations were made in this report:

- Unknown sex is considered male.
- Unknown county of mother's or decedent's residence is replaced with the county of recording when the recording occurs in Missouri.
- Unknown marital status is considered not married, out-of-wedlock. (Prior to 2010, unknown marital status was considered married.)
- Unknown live birth order is considered 1st.
- Unknown number born is considered singleton.
- Maternal age greater than or equal to age 65 is considered unknown.
- Unknown month of last live birth is considered June.
- Unknown day of last live birth is considered 15th.
- Unknown average amount smoked for any trimester or for the three months prior to pregnancy is considered unknown maternal smoking status.
- Prepregnancy weight less than 50 pounds or greater than 400 pounds is considered unknown prepregnancy weight. Postpregnancy weight less than 50 pounds or greater than 450 pounds is considered unknown postpregnancy weight.
- Negative weight gain during pregnancy (weight loss) is considered 0 pounds gained.

INDICATORS CHANGED OR REMOVED FROM THIS REPORT

The following indicators appeared in prior editions of this report but were changed as noted or removed beginning with the 2010 report:

- Maternal Drinking During Pregnancy: Data item was removed by NCHS from the 2003 revision of the US Standard Birth Certificate. Self-reporting by mothers on this data item was found to be poor at best.
- Maternal Smoking During Pregnancy (Table 10): Smoking during any trimester of pregnancy. Data item was revised by NCHS on the 2003 revision of the US Standard Birth Certificate to provide opportunity to analyze the patterns of maternal smoking. (See "Enhanced Data on Maternal Smoking (Table 5A, Table 10)" for details.)
- Years at Present Address: Data item was removed from certificate by MDHSS to make room for other items.
- Maternal Transfers: Due to the low number of events in recent years, this indicator was removed.

- Crown Heel Length: Data item was removed by MDHSS due to poor reporting and lack of reliability.
- Birth Spacing Less Than 18 Months (Table 10): The full date of last live birth is now collected instead of only month and year. As a result, births that took place more than 17 months but less than 18 months after the last live birth are now counted. This is a factor contributing to the increase in the rate for this indicator since 2009.
- Obstetric and Pediatric Conditions and Procedures, Congenital Anomalies and Abnormal Conditions of Newborn (Table 5B): See "Medical Information on Birth Records" below for a detailed description of changes made to these indicators.
- Live Birth Order (Table 6, Table 7, and Table 10): Definition changed to include all prior live births, regardless of current vital status. As such, Live Birth Order of 1st identifies "first-time" mothers. Prior to the 2010 report, Live Birth Order only counted prior live births currently living.
- Mother more than 15% Underweight, Mother more than 20% Overweight: Indicators have been replaced with the BMI-based Underweight and Obese indicators (Table 10).
- Prenatal Care and Inadequate Prenatal Care (Table 10): Beginning in 2010 the complete date of first prenatal visit is collected, affecting the beginning trimester of Prenatal Care and the rates of inadequate prenatal care. (See "Date of First Prenatal Visit and Adequacy of Prenatal Care (Table 10)" for details.)
- Mother on Medicaid and WIC: Removed from the 2010 report due to the high correlation between the Mother on Medicaid and Mother on WIC indicators.
- Recorded Births and Deaths by Cities with 2,500 to 24,999 Population: These listings were removed due to the extreme influence local health care capacity has on where these events occur.
- Causes of Death, Groupings of Causes of Death, and Rankable Causes of Death (Tables 18-19, Table 21, Table 23, and Table 26): Changes made by MDHSS (See "Cause of Death Classification and Rankable Causes of Death" below for details.).
- Cause of Accidental Death (Table 27): Definition of public transportation accidental death in car or truck changed because of no longer updating motor vehicle accidental deaths with added information from the Highway Patrol beginning in 2010. This resulted in less specific ICD-10 codes and the need to expand the codes for car and truck accidents and reduce the codes for Public Transport: Other/Unspecified. (See "Accidental Death Table (Table 27)" below for details.).

RATES

Rates are calculated by dividing the number of events of concern by the population at risk or a related population and multiplying by a constant. Live birth, death, natural increase, marriage, and dissolution rates are expressed in terms of 1,000 estimated mid-year population. Cause-specific death rates are expressed in terms of 100,000 population. Infant, perinatal, fetal, neonatal, and post-neonatal death rates are stated per 1,000 live births (Tables 22-25). (See "Population" above for more details.)

Rates per 100 (percentages) are used for most prenatal and birth outcome indicators (Tables 7-10), such as inadequate prenatal care and low birth weight births, where the denominator is based on the number of live births. When the rate being calculated is a percent, events for which the value of interest is unknown are excluded from the calculation. Hence, percentages in this report are the percent of events for which the value is known, not the percentage of all potential events.

FORMULAE FOR VARIOUS RATE INDICATORS

Total Fertility Rate (Graph B) is the average number of live births a woman would have if a given set of age-specific birth rates applied throughout her reproductive years.

General Fertility Rate (Table 3) is the total number of live births per 1,000 women aged 15-44 for a given year.

Age-Specific Fertility Rate (Table 3) is the number of live births born to mothers of a given age per 1,000 females of that age group for a given year.

Abortion Ratio (Table 14) is the comparison of the total number of abortions to the total number of live births for a given year, and then multiplied by 1,000.

$$\text{Abortion Ratio} = \frac{Number\ of\ abortions\ during\ year}{Live\ births\ for\ that\ year} \times 1{,}000$$

Crude Death Rate is defined as the total number of deaths of area residents for the year divided by the appropriate population (usually midyear population estimate) of the area, then multiplied by some constant. The constants used in this report are 100,000 for cause-specific rates and deaths for all causes (Tables 18 and 26A) and 1,000 for death rates in all other tables and graphs.

$$\text{Crude death rate} = \frac{Number\ of\ deaths\ during\ year}{Midyear\ population\ for\ that\ year} \times 1{,}000 \text{ or } 100{,}000$$

Age-Specific Death Rate (Tables 4 and 20) is calculated in the same manner as the crude death rate except that both the number of deaths and the population used are restricted to a given age group.

$$\text{Age-specific death rate for a given age group} = \frac{Number\ of\ deaths\ in\ that\ age\ group\ during\ year}{Population\ in\ that\ age\ group\ for\ that\ year} \times 1{,}000$$

The **Age-Adjusted Death Rate** (Tables 18A, 26A) is a weighted average of age-specific death rates. Comparison of areas or time periods using crude death rates can often be misleading, since these rates are affected by the age composition of the population. For example, a county may have a high crude death rate simply because it has an older population. To control for differences in age composition, age-specific rates can be weighted (normalized) according to a standard population. Such a calculation produces an age-adjusted rate.

The age-adjusted rates shown in this report are calculated by the direct method, using the following formula:

$$\text{Age-Adjusted Death Rate} = \sum_{A\,01}^{A\,11} \left(Ma \times \frac{Pa}{P}\right)$$

where Ma = the age-specific rate for each given age group
Pa = the standard population in each given age group
P = the total standard population, and
∑ indicates that the results for the eleven age groups are summed.

The eleven age groups used for age adjustment are as follows: Under 1, 1-4, 5-14, 15-24, 25-34, 35-44, 45-54, 55-64, 65-74, 75-84, and 85+.

This adjustment serves to control for differences in age compositions and makes comparisons between areas or time periods more appropriate. **It is important, however, not to compare age-adjusted death rates with rates adjusted to different standard populations or with unadjusted rates.**

This report uses the 2000 US population as the standard. In the 1991 to 1998 annual vital statistics reports, the 1940 US standard population was used. This makes comparisons of age-adjusted death rates with annual vital statistics reports before 1999 inappropriate. The standard population was changed to United States 2000 to be comparable with national age-adjusted death rates published by NCHS. The 1940 distribution was considered out-of-date at that time since it was representative of a younger population. For a more detailed discussion of this topic, see "Age Standardization of Death Rates: Implementation of the Year 2000 Standard." National Vital Statistics Reports, Vol. 47, No. 3 at: http://www.cdc.gov/nchs/data/nvsr/nvsr47/nvs47_03.pdf

GESTATIONAL AGE CHANGE in 2014

Beginning in 2014, Missouri adopted a new standard for estimating gestational age as recommended by NCHS (see https://www.cdc.gov/nchs/data/nvsr/nvsr64/nvsr64_05.pdf). The new measure is the obstetric estimate of gestation at delivery, replacing the formerly-used method of calculating the period between the date of last normal menses (DLNM) and the date of birth. The new method is considered more accurate according to various studies documented in the NCHS article. This change primarily affects the rate of births less than 37 weeks gestation presented in Table 10. It tends to increase the gestational age and thus substantially reduce the rate of births less than 37 weeks. The change also has a relatively slight effect on other indicators that use gestational age, including inadequate prenatal care and weight gain during full-term pregnancy. See Appendix Table B for a comparison of these indicators using the two methods of estimating gestation for 2011-2019.

Appendix Table B
Resident Rates per 100 Live Births for Four Gestational Age Indicators, Obstetric Estimate vs. Date of Last Normal Menses (DLNM): Missouri 2011-2019

	Less than 37 Weeks		Weight Gain < 15 lbs		Weight Gain 45 + lbs		Inadequate Prenatal Care	
	Obstetric Estimate	DLNM	Obstetric Estimate	DLNM	Obstetric Estimate	DLNM	Obstetric Estimate	DLNM
2012	9.9	11.8	11.5	11.4	20.8	20.7	18.5	18.4
2013	9.6	11.5	11.4	11.3	21.3	21.3	18.7	18.6
2014	9.8	11.9	11.6	11.5	21.6	21.6	20.2	20.0
2015	10.0	12.0	12.1	12.1	21.0	21.0	19.4	19.3
2016	10.2	12.1	13.1	13.1	20.8	20.8	19.2	19.0
2017	10.6	12.4	13.4	13.5	20.4	20.4	20.0	19.8
2018	10.7	12.5	14.1	14.0	21.0	21.0	21.0	20.8
2019	10.9	12.7	14.5	14.5	21.0	21.0	21.1	20.9

MEDICAL INFORMATION ON BIRTH RECORDS

Table 5B presents selected risk factors, obstetric procedures, characteristics of labor and delivery, methods of delivery, presence of infections, maternal health concerns, abnormal conditions of the newborn, and congenital anomalies. Many of these indicators are collected from the birth certificate by means of a check-off box system. A study conducted by MDHSS supported the belief that check-off boxes increase reporting of these data items. Starting in 2010, revisions to the check-off boxes were implemented, and the following data items are no longer collected on the birth certificate:

- Maternal Risk Factors: anemia, cardiac disease, acute or chronic lung disease, genital herpes, hydramnios/oligohydramnios, hemoglobinopathy, incompetent cervix, previous live born infant weighing 4000+ grams at birth, renal disease, Rh sensitization, uterine bleeding
- Obstetric Procedures: amniocentesis, electronic fetal monitoring, ultrasound, chorionic villus sampling (CVS)
- Characteristics of Labor: abruptio placenta, placenta previa, other excessive bleeding, seizures during labor, dysfuntional labor, cephalopelvic disproportion, cord prolapse, anesthetic complications
- Abnormal Conditions of Newborn: anemia, fetal alcohol syndrome, hyaline membrane disease, meconium aspiration syndrome

MEDICAID STATUS OF BIRTHS (Table 5A, Table 10)

Another change on the 2003 revision of the US Standard Birth Certificate concerned the mother's participation in Medicaid. Prior to 2010, the birth certificate asked if the mother was on Medicaid at any time during the pregnancy. Even if the mother was not on Medicaid at the time of delivery, but had participated at some time in her pregnancy, the expected response to the question was "Yes." As of the 2010 report, Medicaid status is captured using a question about the principal payment source for the delivery. Medicaid is indicated only if the mother's delivery will be primarily paid for by Medicaid. As a result, Medicaid births will generally be fewer than in previous years.

ENHANCED DATA ON MATERNAL SMOKING (Table 5A, Table 10)

The 2003 revision of the US Standard Birth Certificate contains more detailed data on mothers' smoking habits during pregnancy than the previous certificate did. Before 2010, mothers were asked about the average number of cigarettes smoked daily during the entire pregnancy. As of 2010, information on maternal smoking is captured for each trimester of pregnancy and for the three-month period prior to becoming pregnant. This allows for targeted analysis and investigation into the impact of smoking on gestational development and birth outcomes. In addition, the previous data item allowed for a mother to answer yes to smoking status but leave the average amount smoked unknown. Starting with 2010 data, if the average amount smoked for any period of smoking is unknown, then the mother's smoking status is unknown. (See "Unknowns" above.) These changes resulted in an increase in maternal smoking during pregnancy.

DATE OF FIRST PRENATAL VISIT AND ADEQUACY OF PRENATAL CARE (Table 10)

Prior to 2010, only the ordinal month of the pregnancy (first month, second month, etc.) was reported to identify the beginning of prenatal care. The 2003 revision of the US Standard Birth Certificate collects the full date of the first prenatal visit. The ordinal month is then calculated based on the mother's date of last normal menses. Beginning with the 2010 report, this calculation provides results that are, on average, almost a month later in the pregnancy than previous results. This in turn results in inadequate prenatal care rates that are 50 percent higher than in prior years. The higher rates are probably more representative of the actual rate of inadequate prenatal care. In other words, the increase is likely an artifact of the less accurate reporting in the past of the month prenatal care began.

DEFINITIONS FOR 2010 AND LATER

APGAR – An assessment of the health of an infant taken at one minute and five minutes after birth. For the 2003 revision of the US Standard Birth Certificate, the assessment is repeated at ten minutes if the score at five minutes was less than 6. Apgar scores range from 0 to 10 and are used internationally. Factors used to determine the score are: heart rate, respiratory effort, muscle tone, reflex irritability, and color. A score below 8 implies a moderately or severely depressed condition. The score used for this report is taken at five minutes after birth. The score assigned is completely at the discretion of the attending physician. As such, caution should be used in interpreting patterns of low scores by geographic area because of possible regional subjective bias. In addition, different medical personnel might assign different scores to the same child.

Attendant – Classification of the physician or other person in attendance at or immediately after delivery of the infant. MD: Medical Doctor; DO: Doctor of Osteopathy; CNM/CM: Certified Nurse Midwife or Certified Midwife; CPM (added in 2014): Certified Professional Midwife; Other Midwife: includes other non-certified midwives. Attendant is presented in Table 5A.

Birth Order – Number of previous pregnancy outcomes plus one. This differs from "live birth order" in that it includes other previous pregnancy outcomes besides live births such as abortions or miscarriages. It is used in Table 24.

Birth Spacing: Less than 18 months – Live births occurring to mothers who had a prior live birth within 18 months. The percent is of second and higher order births and the newborn is a singleton or is the first live birth in a multiple birth set. As of the 2010 report, the full date of the last live birth is collected, making it possible to identify prior births more than 17 months but less than 18 full months. This contributed to the percentage increase seen in 2010.

Breastfed After Delivery (Infant Care: Breastfed After Delivery) – Live births where the mother breastfed, or attempted to breastfeed, the baby prior to discharge from the birthing facility. This does not imply that breastfeeding was successful or that the mother intends to continue breastfeeding after discharge.

Complication Report (table 12C) -- Report completed by physicians performing post-abortion care upon a woman.

Fetal Death – Spontaneous death in utero at 20 or more completed weeks of gestation, or has a delivery weight of 350 grams or more.

FSP – Participation by mother in the Food Stamp Program during her pregnancy.

Full-term-Birth – A live birth with a gestational age of 37 or more weeks.

Gestational Age – The age of a fetus or baby in terms of the number of completed weeks spent in its mother's womb. (See GESTATIONAL AGE CHANGE in 2014 earlier in APPENDIX for more Information.)

High Weight Gain (Risk Factor) – A full-term singleton live birth to a mother who gained more than 44 pounds during pregnancy.

Inadequate Prenatal Care – Fewer than five prenatal care visits for pregnancies less than 37 weeks gestation, fewer than eight visits for pregnancies 37 or more weeks, or prenatal care began after the first four months of pregnancy. Before 1994 records with unknown month prenatal care began or unknown prenatal visits were excluded. Beginning in 1994, if adequacy of prenatal care could be determined, even if month care began or number of visits was unknown, then these records were included. This is referred to as the Missouri Index of Adequacy of Prenatal Care Utilization.

Infant Death – Live born infant dying during the first year of life.

Infant Transfer – Live born infant transferred to another facility after delivery.

Live Birth Order – Number of previous babies born alive to mother, regardless of current vital status, plus one. Live birth order of one indicates first-time mother. Prior to the 2010 report, only prior live births still living were counted.

Low Birth Weight – A live birth of less than 2,500 grams (five and one-half pounds).

Low Weight Gain (Risk Factor) – A full-term singleton live birth to a mother who gained less than 15 pounds during pregnancy.

Maternal Death – Death of a mother, whether while pregnant, during delivery, or up to a year after delivery, as a result of complications of pregnancy, childbirth, or puerperium (ICD-10 codes O00-O99).

Maternal Weight Gain – The amount of weight a mother gains (or loses) from prior to pregnancy to time of birth.

Maternal Weight Status Before Pregnancy – Pre-pregnancy classification as underweight, normal, overweight, or obese, based on a woman's body mass index (BMI). The BMI formula uses height and weight to calculate this measure of body fatness or thinness.

Natural Increase – Number of resident live births minus resident deaths for a given period.

Neonatal Death – Death of a live born infant during the first 27 days of life.

NICU – Neonatal Intensive Care Unit.

Non-Smoker – A live birth to a mother who indicated that she did not smoke during the three months prior to pregnancy and did not smoke during the first, second, and third trimesters of pregnancy.

In other words, the mother entered '0' for the average amount smoked for each time period. If the mother failed to provide information for any period, her smoking status is unknown.

Non-Live Birth Outcome – A pregnancy that did not result in a live birth (resulted in a spontaneous miscarriage, fetal death, or an induced abortion) (Table 5A).

Out-of-Wedlock birth – A live birth involving a mother who was unmarried at the time of conception, at the time of birth, and throughout the time between conception and birth.

Perinatal Death – An obstetric event that resulted in a fetal death or neonatal death.

Prenatal Care (1st, 2nd, 3rd Trimester) – Trimester that prenatal care began as indicated by the time between the date of last normal menses and date of first prenatal visit. All live births belong in one of five categories: 1st Trimester, 2nd Trimester, 3rd Trimester, None, Unknown.

Poor Pregnancy Outcome – A pregnancy of at least 20 weeks gestation that results in a perinatal death, small for gestational age live birth, or an intrauterine-growth-restricted live birth.

Postneonatal Death – Death occurring after the 27th day of life but before one year of life.

Pregnancy – An obstetric event that resulted in a live birth, fetal death, or induced abortion (Table 11).

Preterm Birth – A live birth of less than 37 weeks gestation.

Principal Payment Source – The primary source of payment of the hospital charges incurred as a result of the delivery.

Quit Smoking (During Pregnancy) – A live birth to a mother who indicated: (a) smoking during the first trimester but did not smoke for the second and third trimesters or (b) smoking during the first and second trimesters but did not smoke for the third trimester.

Singleton – A live birth resulting from a pregnancy where one and only one fetus was conceived. One surviving live birth resulting from a multiple gestation pregnancy is not considered a singleton birth.

Small for Gestational Age – A singleton live birth where the birth weight is at or below the 10th percentile of births of the same gender and gestational age.

Smoked Pack Per Day – A live birth to a mother who reported smoking an average of 20 or more cigarettes per day over the course of an entire three-trimester pregnancy. (See "Unknowns" above.)

CAUSE OF DEATH CLASSIFICATION AND RANKABLE CAUSES OF DEATH (Tables 18, 19, 21, 26)

Cause of death data are analyzed and presented by the underlying cause. The underlying cause of death is defined as the disease or injury that initiated the chain of morbid events leading directly to death, or the circumstances of the accident or violence that produced the fatal injury.

The causes of death presented here are classified in accordance with the Tenth Revision of the International Classification of Diseases (ICD-10), World Health Organization. This revision is used

to classify deaths occurring in the United States on or after January 1, 1999. Comparisons with cause of death statistics from earlier years must be done with caution, since systems for classifying causes of death have changed over the years. Consequently, the mortality trend for a single disease may be distorted as a result of changes in defining and coding the cause of death. For a general measure of the extent of the changes between the ninth and tenth revisions, consult https://www.cdc.gov/nchs/data/nvsr/nvsr49/nvsr49_02.pdf.

In tables presenting "leading" causes of death, selected causes of death are grouped together according to guidelines designated by NCHS into "rankable causes." Modifications of those guidelines would produce a different picture of leading causes of death. For example, if all deaths from infectious diseases were combined into a single group instead of distributed in their current groupings, the resulting single group would have constituted the sixth leading cause of death in Missouri for 2010. Leading cause of death rankings are based on numbers of deaths, not death rates. Twenty of the current NCHS 51 rankable causes of death (each marked with an asterisk) are included in this report and listed below.

In Tables 21 and 26, which list "Selected" causes of death, the following specific causes of death, listed in prior years, were removed beginning with the 2010 report: tuberculosis, syphilis, stomach cancer, and peptic ulcer. These causes were removed due to the low incidence of deaths from those causes in Missouri. The circulatory disease groupings were simplified in the 2010 report. Also, deaths due to SIDS (ICD-10 code R95) and to pregnancy, childbirth, and the puerperium (ICD-10 codes O00-O99) were removed from tables of rankable causes because they are presented in tables of infant and maternal mortality.

Three new causes of death were added beginning with the 2010 report: enterocolitis due to *Clostridium difficile*, Parkinson's disease, and pneumonitis due to solids and liquids. Also, two new cause groupings were added: falls and accidental poisonings. Both of these groupings were formerly included among the "other unintentional injuries" grouping. All of these causes/groupings have been added because of their striking increase in numbers since 2000. The twenty rankable and seventeen other selected causes of death and cause of death groupings presented in this report are listed below along with their ICD-10 diagnosis codes.

Cause of Death Groupings Used in Tables 21 and 26…..ICD-10 Codes

*Enterocolitis due to clostridium difficile A04.7
*Septicemia A40-A41
*HIV/AIDS B20-B24
*Malignant neoplasms C00-C97
Colon, rectum, and anus C18-C21
Pancreas C25
Trachea, bronchus, and lung C33-C34
Breast C50
Cervix uteri, corpus uteri, and ovary C53-C56
Prostate C61
Urinary tract C64-C68
Non-Hodgkin's lymphoma C82-C85
Leukemia C91-C95
Other malignant neoplasms ..... Residual of C00-C97
*Diabetes mellitus E10-E14
*Alzheimer's disease G30
*Parkinson's disease G20-G21

*Diseases of heart..... I00-I09, I11, I13, I20-I51
*Essential hypertension.....I10, I12
*Cerebrovascular diseases I60-I69
*Influenza and pneumonia J09-J18
*Chronic lower respiratory diseases.....J40-J47
*Pneumonitis due to solids and liquids.....J69
*Chronic liver disease and cirrhosis K70, K73-K74
*Nephritis and nephrosis N00-N07, N17-N19, N25-N27
*Conditions originating in perinatal period.....P00-P96
*Congenital anomalies Q00-Q99
Symptoms and ill-defined conditions, including SIDS R00-R99
(Note that in 2010-2012 reports, SIDS deaths were included in All other diseases)
All other diseases.....Residual of A00-R99

*Unintentional injuries V01-X59,Y85-Y86
Motor vehicle crashes ..V02-V04, V09.0, V09.2, V12-V14, V19.0-V19.2, V19.4-V19.6, V20-V79, V80.3-V80.5, V81.0-V81.1, V82.0-V82.1, V83-V86, V87.0-V87.8, V88.0-V88.8, V89.0, V89.2
Falls.....W00-W19
Accidental poisoning by and exposure to noxious substances.....X40-X49
Other unintentional injuries..... V01, V05-V06, V09.1, V09.3-V09.9, V10-V11, V15-V18, V19.3, V19.8-V19.9, V80.0-V80.2, V80.6-V80.9, V81.2-V81.9, V82.2-V82.9, V87.9, V88.9, V89.1, V89.3, V89.9, V90-V99, W20-X39, X50-X59, Y85-Y86
*Suicide..... X60-X84, Y87.0
*Homicide..... X85-Y09, Y87.1
All other external causes: events of undetermined intent, legal intervention, complications of medical care, and late effects of injuries Y10-Y36, Y40-Y84, Y87.2, Y88-Y89

*Indicates NCHS rankable causes of death

The other 31 causes of death designated by NCHS as rankable causes but not included in this report are listed below. They are included, however, in the MOPHIMS Death MICA at https://healthapps.dhss.mo.gov/MoPhims/MOPHIMSHome

Additional Cause of Death Groupings Used for Ranking by NCHS But Not in This Report

Cause	ICD-10 Code
Salmonella infections	A01-A02
Shigellosis and amebiasis	A03, A06
Tuberculosis	A16-A19
Whooping cough	A37
Scarlet fever and erysipelas	A38, A46
Meningococcal infection	A39
Syphilis	A50-A53
Acute poliomyelitis	A80
Arthropod-borne viral encephalitis	A83-A84, A85.2
Measles	B05
Viral hepatitis	B15-B19
Malaria	B50-B54
Benign/in situ neoplasms and neoplasms of uncertain or unknown behavior	D00-D48
Anemias	D50-D64
Nutritional deficiencies	E40-E64
Meningitis	G00, G03
Atherosclerosis	I70
Aortic aneurysm and dissection	I71
Acute bronchitis and bronchiolitis	J20-J21
Pneumoconiosis and chemical effects	J60-J66, J68
Peptic ulcer	K25-K28
Diseases of appendix	K35-K38
Hernia	K40-K46
Cholelithiasis and other disorders of gallbladder	K80-K82
Infections of kidney	N10-N12, N13.6, N15.1
Hyperplasia of prostate	N40
Inflammatory diseases of female pelvic organs	N70-N76
Pregnancy, childbirth, and the puerperium	O00-O99
Legal intervention	Y35, Y89.0
Operations of war and their sequelae	Y36, Y89.1
Complications of medical and surgical care	Y40-Y84, Y88

ACCIDENTAL DEATH TABLE (Table 27)

Beginning with 2004 data, the accidental death table was updated to reflect revised ICD-10 cause of death groupings. These groupings are adapted from criteria for the “Injury Mortality Summary” provided by the Research and Statistics Department of the National Safety Council (NSC). Many of the categories were new in 2004, and even when the category name did not change, the numbers were not precisely comparable to prior years’ data because of changed definitions. Poisonings at home, in particular, were grossly underreported under the old system. The new system gives a more complete count of poisoning deaths and presents poisoning deaths due to all drugs, both prescribed and illicit.

Note that accidental deaths in Table 27 are deaths that occurred in Missouri, whether the injury occurred in Missouri or not. Tables with accidental death counts are not comparable to most of the other mortality tables because those tables display Missouri resident deaths. See “‘Resident’ and ‘Recorded’ Events” above.

Accidental death data are also categorized by the physical location where the accident occurred. A work accident is any unintentional injury death for which the “Injury at work?” checkbox on the death certificate is marked “Yes.” A home accident is any unintentional injury death occurring at any non-institutional residence including its garage and grounds. Deaths due to unintentional injury where the injury occurred anywhere else are classified as public. Beginning with the 2010 report, ICD-10 codes V87.0-V87.8, V88.0-V88.8, V89.0 and V89.2 were included in the definition for accidental Public transport: car or truck deaths. If a death falls into more than one category such as late effects of a motor vehicle crash while the decedent was at work, the order of precedence is: late effects, work, home/public.

Accidental Death Categories in Table 27	**ICD-10 Codes**
Grand total	V01-X59, Y85-Y86
Work total	“Injury at work?” checkbox = “Yes”
Heavy transport vehicle	V60-V69
Other motor vehicle	V02-V04, V09.0, V09.2, V12-V14, V190-V19.2, V19.4-V19.6, V20-V59, V70-V79, V80.3-V80.5, V81.0-V81.1, V82.0-V82.1, V87.0-V87.8, V88.0-V88.8, V89.0, V89.2
Other transport	Residual of V01-V99
Falls	W00-W19
Farm machinery	W30
Other machinery	W31
Struck by/against object	W20-W29, W35-W49
Electric current	W85-W87
Other/unspecified accident	W32-W34, W50-W84, W88-W99, X00-X59
Home total	W00-X59 with place of injury code of 0
Public non-transport total	W00-X59 with place of injury code not 0
Falls	W00-W19
Machinery	W30-W31
Firearms	W32-W34
Struck by/against object	W20-W29, W35-W49
Drowning	W65-W74
Choke/suffocate	W75-W77, W78-W80, W81-W84
Excess natural heat/cold	X30-X31
Fire/flame/smoke	X00-X09
Poisoning (drug/alcohol)	X40-X45
Poisoning (gas/other)	X46-X49
Other/unspecified accident	Residual of W00-X59
Public transport total	V01-V99
Car or truck	V40-V69, V87.0-V87.8, V88.0-V88.8, V89.0, V89.2
Pedestrian/motor vehicle	V02-V04,V09.0,V09.2
Pedal cyclist	V12-V14, V19.0-V19.2,V19.4-V19.6
Motorcyclist	V20-V29
Railroad (not w/motor vehicle)	V05, V15, V80.6, V81.2-V81.9
Nonroad vehicle, including ATVs	V83-V86
Water transport	V90-V94
Air transport	V95-V97
Other/unspecified	Residual of V01-V99
Late effects of accidents	Y85-Y86

TOBACCO USAGE AND MORTALITY DATA (Table 28)

Beginning in 2010, the death certificate includes a question that asks, “Did tobacco use contribute to the death?” This allows the medical certifier to make a determination as to the role of tobacco use in causing the death. This item should not be interpreted as or substituted for the decedent’s smoking status at death.

Note that this is different from the “Smoking-Attributable” death estimates, which are calculated by applying likelihood percentages to all deaths with specified ICD-10 underlying cause codes based on the extent to which smoking increases the risk of dying from those particular diseases. Missouri smoking-attributable death estimates are published in the ‘Leading Causes of Death’ Community Data Profile available online at: https://healthapps.dhss.mo.gov/MoPhims/ProfileBuilder?pc=10.

NEW DEATH TABLE IN 2013 (Table 29)

In 2013, a new death table was added entitled Resident Deaths by Selected Characteristics by Sex. It includes death variables that are not reported in other tables such as certifier, death place, month of death, disposition of body, marital status, education of deceased, and whether an autopsy was performed.

ABRIDGED LIFE TABLES (Table 30)

The abridged life tables used beginning in 2010, were developed by MDHSS. They represent a slight change to the calculations used before 2010, which had been developed from an NCHS program using the technique of "reference to a standard table." These life tables are technically defined as "current life tables" since they are cross-sectional in nature. In other words, the 2019 tables do not represent the life expectancy of an actual cohort of all Missourians born in a particular year and followed throughout their lifetime. Rather, the current life table considers a hypothetical cohort and assumes it is subject to the age-specific mortality rates existing for a given year. This means the population figures listed in these tables are not actual population counts for Missouri. Instead, they are only theoretical. The figures are only useable for calculating age-specific life expectancy.

For further information about life expectancy tables and their methodology, go to http://www.cdc.gov/nchs/data/nvsr/nvsr60/nvsr60_09.pdf.

REVISED MARRIAGE TABLES 31-35 in 2016 (WITH SAME-SEX MARRIAGES)

In June 2015, the United States Supreme Court ruled that same-sex couples had a right to marry, and Missouri began recording these marriages after this ruling. However, since the data was incomplete, we did not report this data in detail in 2015 (although the 726 reported same-sex marriages were included in the state totals). In 2016, data on same-sex marriages was reported in detail for the first time in Tables 31 and 33-35. Table 31 shows the number of marriages by month for male-female, female-female, and male-male marriages. In 2019 there are 456 marriages with unknown gender that are included in the state totals. Table 32 includes only male-female marriages because the same-sex numbers are too small to break out by specific age cross-tabulations. Tables 33-35 display marriages by gender by selected other variables.

NEW TABLES ON POST-ABORTION COMPLICATIONS (TABLE 12C)

In 2018, a new table has been added entitled Post-Abortion Complication Report Results. Since 1980, Missouri statutes have allowed health care providers (hospitals, clinics, and physicians) to complete and submit “Complication Report for post-Abortion Care” forms after treating patients for complications following induced abortions. However, reporting from this form has been very sporadic through the years. In 2017, MDHSS revised the form and the regulations related to post-abortion complications in a major effort to improve our understanding of these procedures. Table 12C shows the results of this data for the 2019 calendar year. Data collected includes the type of complication, whether the original abortion procedure was surgical or medical, and whether the patient was hospitalized. In 2019, MDHSS received 93 complication reports representing 112 complications. The post-abortion care for all of the reported complications took place in Missouri, but many of the original abortions were performed in other states. The completeness of reporting is still uncertain, and other states do not exchange this type of data with MHDSS.