

Over the previous ten years of available data, there were more than 740 fetal deaths and nearly 760 infants that died before their first birthday. Each death represents an immeasurable tragedy for their families and loved ones. This report focuses on trends in fetal deaths and infant mortality in St. Louis County, Missouri from 2012 to 2021.

Key Findings

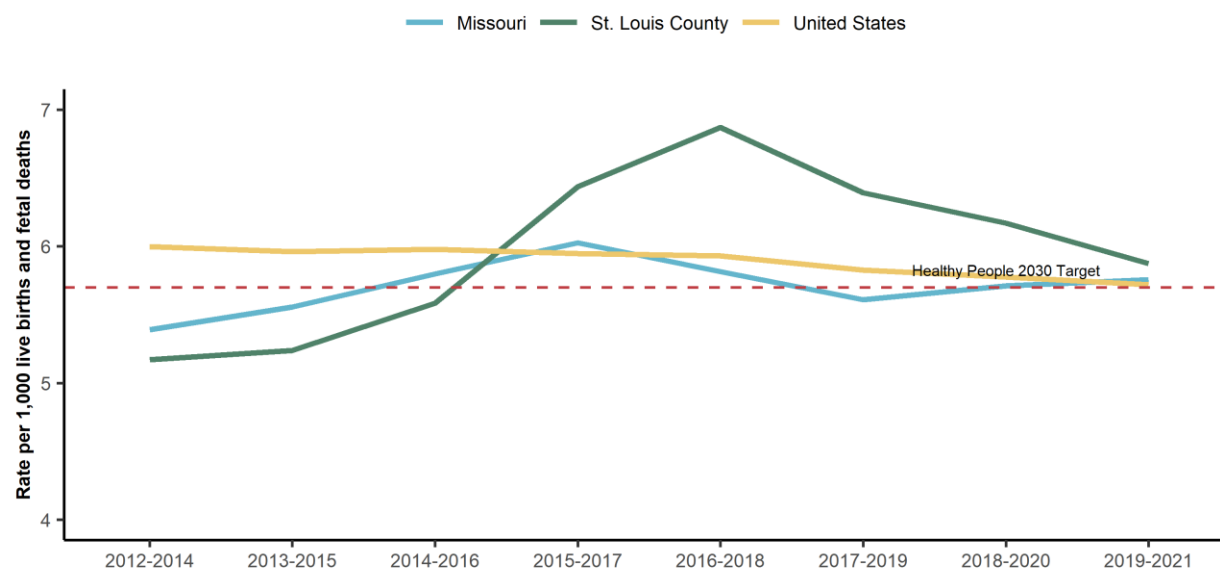
- Most recently, there were nearly six fetal deaths per 1,000 live births and fetal deaths, an increase from 5.2 fetal deaths per 1,000 live births and fetal deaths at the start of the period.
- Among maternal complications associated with fetal deaths, having a previous preterm birth was the most common risk factor, followed by gestational hypertension and pre-pregnancy hypertension.
- There were approximately six infant deaths per 1,000 live births from 2012 to 2021. Despite fluctuations over the period, the infant mortality rate remained relatively constant.
- The top three leading causes of infant mortality were short gestation and low birth weight, congenital malformations, and accidents. While the rate of deaths due to short gestation and low birth weight decreased since 2012, deaths due to congenital malformations and accidents increased.
- Black infants continue to die at a much higher rate than white infants – a disparity that worsened over the period covered in this report. Reflective of this trend were large gaps in infant mortality rate by cause of death, with Black infants disproportionately impacted by each leading cause of infant mortality.
- Linked birth and infant death records align with previous findings, with infants who were born at low birth weight, those who were born pre-term, and infants born in plural births (e.g., twin or triplet) having the highest mortality rates.

Fetal Deaths

Fetal death refers to the spontaneous intrauterine death of a fetus. In the state of Missouri, fetal deaths occurring at 20 complete weeks or more of gestation or weighing 350 grams or more are reported.¹ Leading causes of fetal death include placental, cord, and membrane complications; maternal complications; congenital malformations; and maternal conditions unrelated to pregnancy.² Nearly one-third of fetal deaths, however, were due to an unspecified cause.

From 2012 to 2021, there were 741 total fetal deaths in St. Louis County. The ten-year average rate was 5.9 fetal deaths per 1,000 live birth and fetal deaths. Healthy People 2030 set a target to reduce the fetal death rate to 5.7 per 1,000 live birth and fetal deaths.³ While fetal deaths in St. Louis County remain more prevalent than the Healthy People 2030 objective, the rate decreased since 2016-2018 to 5.9 per 1,000 live births and fetal deaths (**See Figure 1**). Prior to 2015-2017, however, the fetal death rate was below the Healthy People objective with 5.2 deaths per 1,000 in 2012-2014. From 2012-2014 to 2016-2018, fetal deaths increased by 33% to 6.9 per 1,000 – the highest fetal death rate during the years covered in this report.

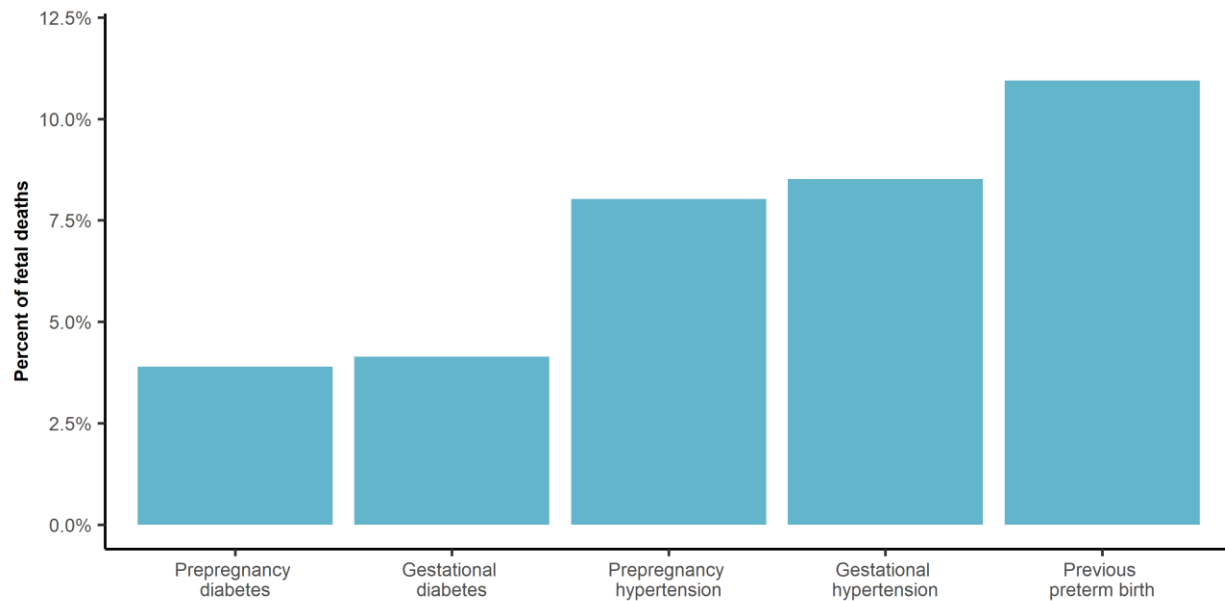
Figure 1. Fetal death rate per 1,000 live births and fetal deaths, 2012-2021



Sources: Missouri DHSS, Bureau of Vital Statistics; CDC Wonder

Fetal death rates in both the United States and Missouri remained lower compared to St. Louis County since 2015-2017. Fetal deaths were highest in the United States in the 2012-2014 period at 6 per 1,000 and decreased by 5% in 2019-2021. In Missouri, the rate was also lowest between 2012 and 2014 with 5.4 fetal deaths per 1,000 live births and fetal deaths and highest in 2015-2017 with 6 per 1,000. Overall, fetal deaths in Missouri increased by 7% in the 2019-2021 period compared to 2012-2014.

Several factors increase the risk of fetal death. While some risk factors are modifiable, many are not. For example, common risk factors that cannot be changed include advanced maternal age, mother's race or ethnicity (the fetal death rate is higher among Black women and non-Hispanic women), and certain medical conditions such as diabetes or hypertension.⁴⁻⁶ Complications related to the pregnancy may also arise such as problems with the umbilical cord or placenta and genetic problems or birth defects.⁷⁻⁹

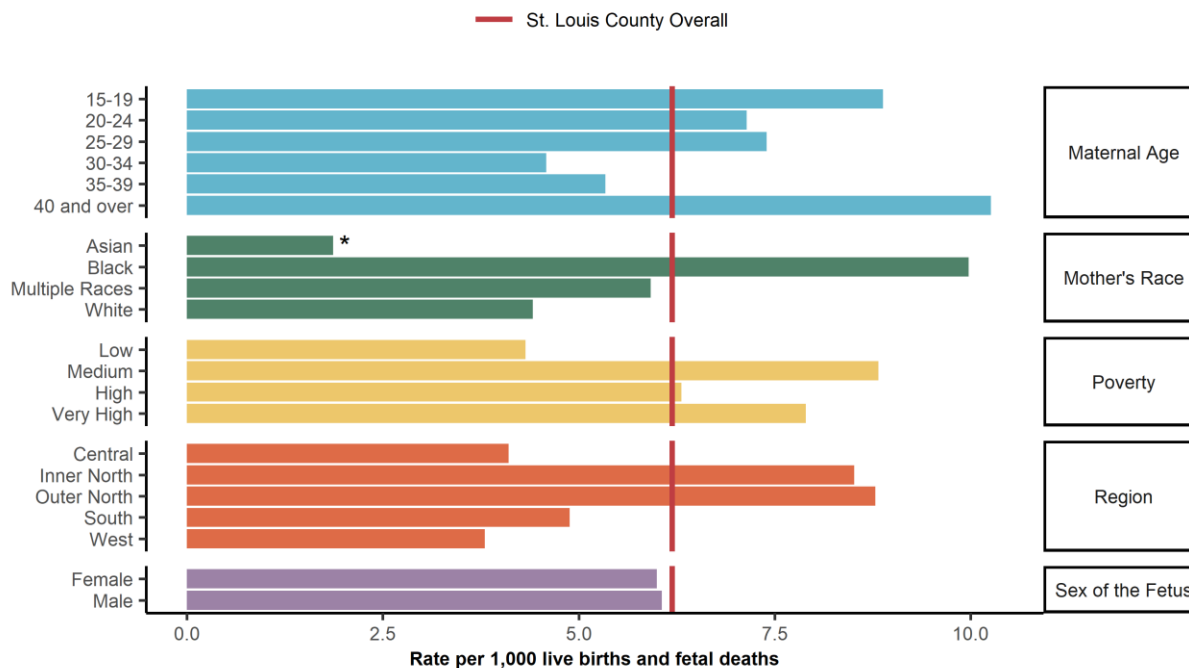
Figure 2. Percent of fetal deaths with risk factors present, St. Louis County, 2017-2021

Sources: Missouri DHSS, Bureau of Vital Statistics

In St. Louis County, the most prevalent risk factor for fetal death was previous preterm birth, followed by gestational hypertension and prepregnancy hypertension (**See Figure 2**). Previous preterm birth was present in 11% of all fetal deaths. Nearly 9% of mothers had gestational hypertension and 8% had prepregnancy hypertension. Four percent of fetal deaths involved gestational diabetes. Similarly, 4% of fetal deaths involved pre-pregnancy diabetes.

The fetal death rate varied according to several characteristics. Mothers in both younger and older age groups, those who were Black, those living in medium to very high poverty neighborhoods, and those living in the Inner North and Outer North county regions had higher rates of fetal death compared to the St. Louis County average (**See Figure 3**).

Figure 3. Fetal death rate by select characteristics, 2017-2021



Source: Missouri DHSS, Bureau of Vital Statistics

*Too few cases to meet precision standard (relative standard error < 30); interpret with caution

- Mothers aged 40 and over had the highest fetal death rate at 10.3 per 1,000, followed by mothers ages 15 to 19 at 8.9 per 1,000. In addition, mothers ages 20 to 29 all experienced higher than average rates of fetal death.
- Black mothers had the highest fetal death rate compared to other racial groups. This was the only racial group with a rate higher than the St. Louis County average with 10 fetal deaths per 1,000 live births and fetal deaths. Fetal death rates were the second-highest among multiple-race mothers at 5.9 per 1,000, followed by white mothers at 4.4 per 1,000. Asian mothers had the lowest rate of fetal death.
- The fetal death rate was highest among mothers living in medium-poverty neighborhoods, followed by those living in very high poverty neighborhoods with 8.8 and 7.9 per 1,000, respectively. There were 6.3 fetal deaths per 1,000 live births and fetal deaths in high poverty neighborhoods and 4.3 per 1,000 in low poverty neighborhoods.
- Fetal deaths were highest among mothers living in the Inner North and Outer North regions with 8.5 and 8.8 per 1,000, respectively – both of which were higher than the rate in St. Louis County overall. Rates were lowest in the West region with 3.8 fetal deaths per 1,000 live births and fetal deaths, followed by the Central (4.1 per 1,000) and South (4.9 per 1,000) regions.
- Fetal death rates were similar for male fetuses and female fetuses with rates of 6.1 and 6.0 per 1,000 live births and fetal deaths, respectively.

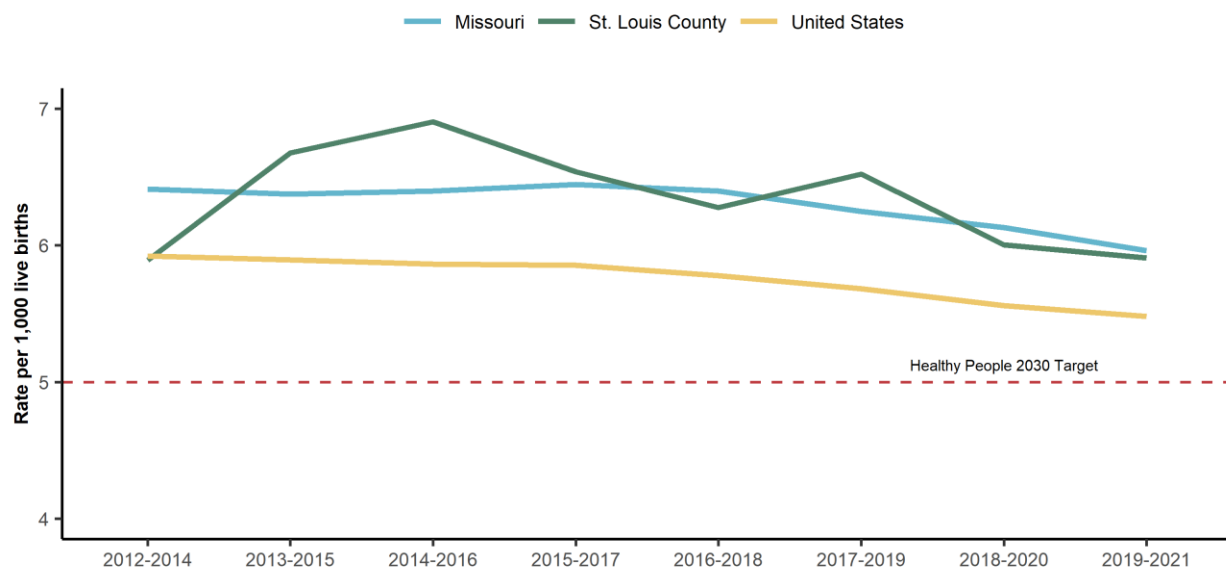
Infant Mortality

Infant deaths are the death of an infant before their first birthday. Nationally, the infant mortality rate has trended downward since data collection began in 1995.¹⁰ However, the U.S. continues to have the highest infant mortality rate when compared to other high income countries. In 2021, the infant mortality rate was 5.4 deaths per 1,000 live births.¹¹

Since 2012, infant mortality in both Missouri and St. Louis County have remained high when compared to the United States average. There were 758 total infant deaths from 2012 to 2021 in St. Louis County, with an average of approximately 76 deaths per year. Over the ten year period, there was an average rate of 6.1 infant deaths per 1,000 live births. The ten-year average infant mortality rate was similar for Missouri overall at 6.3 deaths per 1,000 live births. Infant deaths in St. Louis County accounted for 7% of all infant deaths in Missouri during this period.

Healthy People 2030 set an objective to reduce the infant mortality rate to 5.0 deaths per 1,000 live births.¹² As of 2021, neither St. Louis, Missouri, nor the United States have reached this target. Most recently, the three-year average infant mortality rate was approximately 5.9 deaths per 1,000 live births in both St. Louis County and Missouri (See Figure 4).

Figure 4. Infant mortality rate per 1,000 live births, 2012-2021



Sources: Missouri DHSS, Bureau of Vital Statistics; CDC Wonder

- In St. Louis County, the infant mortality rate remained approximately the same from 2012-2014 to 2019-2021 with 5.9 infant deaths per 1,000 live births. In the years between, there was some fluctuation in the infant mortality rate.
- From 2012-2014, the infant mortality rate increased until 2014-2016 when it reached 6.9 deaths per 1,000 live births.
- Despite more year-to-year variations in St. Louis County, trends in local rates of infant mortality were similar to those from Missouri overall.
- For all years except 2012-2014, the infant mortality rate in St. Louis County and Missouri was greater than the national rate.

Leading Causes of Infant Mortality

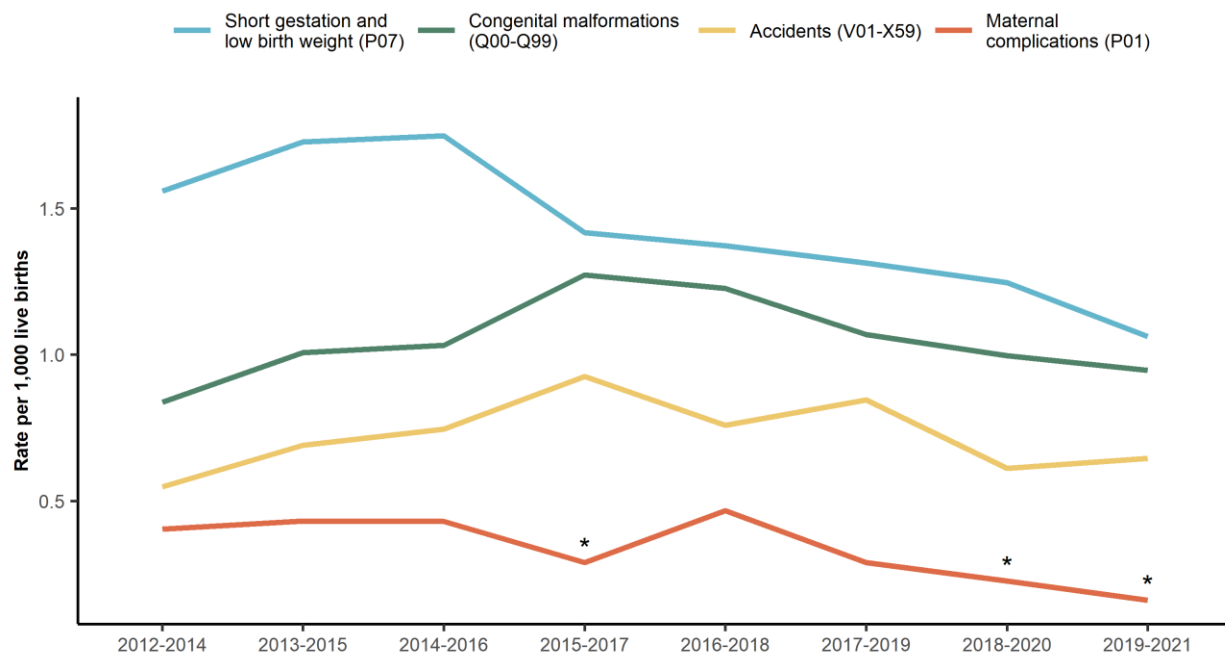
Nationally, the top three leading causes of infant death in 2021 were congenital malformations; disorders due to short gestation and low birth weight; and sudden infant death syndrome (SIDS).¹⁰ In St. Louis County, the leading cause of infant mortality from 2017 to 2021 were disorders related to short gestation and low birth weight, followed by congenital malformations and accidents (**See Table 1**). Combined, these top three leading causes of death accounted for 47% of all infant deaths. Other leading causes of infant mortality included maternal complications of pregnancy; assault; bacterial sepsis; placenta, cord, and membrane complications; neonatal hemorrhage; necrotizing enterocolitis; and diseases of the circulatory system. These remaining leading causes accounted for another 21% of infant deaths.

Table 1. Leading causes of infant mortality, St. Louis County, 2017-2021

Rank	Cause of Death	Count	Percent of Total Deaths	Rate per 1,000 Live Births
	All causes	401	100%	3.24
1	Disorders related to short gestation and low birth weight	73	18.20%	0.59
2	Congenital malformations, deformations, and chromosomal abnormalities	71	17.71%	0.57
3	Accidents (unintentional injuries)	46	11.47%	0.37
4	Newborn affected by maternal complications of pregnancy	18	4.49%	0.15
5	Assault (homicide)	14	3.49%	0.11
5	Bacterial sepsis of newborn	14	3.49%	0.11
7	Newborn affected by complications of placenta, cord, and membranes	12	2.99%	0.10
8	Neonatal hemorrhage	10	2.49%	0.08
9	Necrotizing enterocolitis of newborn	9	2.24%	0.07
10	Diseases of the circulatory system	7	1.75%	0.06
	All others	127	32%	1.03

Among causes of infant mortality, deaths due to disorders related to short gestation and low birth weight were the most common over the previous ten years. Infant mortality rates attributable to short gestation and low birth weight have decreased over time, as have infant mortality rates due to maternal complications (**See Figure 5**). Meanwhile, infant mortality caused by congenital malformations and accidents increased during this same period. National trends demonstrate decreased rates of infant mortality for deaths attributable to short gestation and low birth weight, congenital malformations, and maternal complications since 2012.¹⁰

Figure 5. Infant mortality rate by top four leading causes, St. Louis County, 2012-2021



Source: Missouri DHSS, Bureau of Vital Statistics

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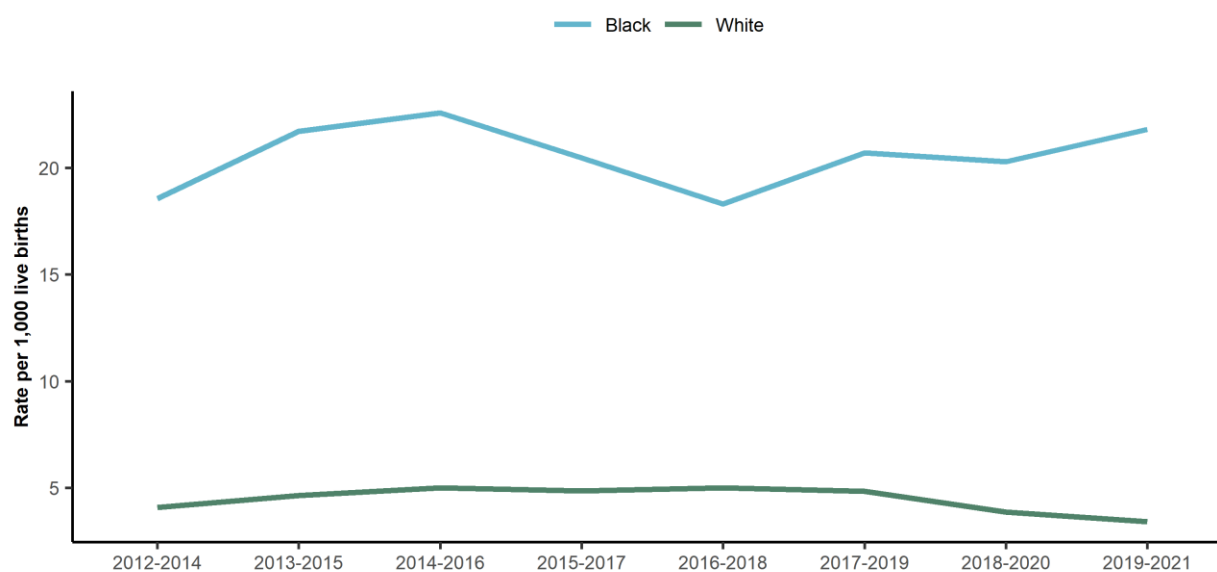
- Since 2012-2014, infant mortality due to short gestation and low birth weight decreased by 32% from 1.6 infant deaths per 1,000 live births to 1.1 in 2019-2021. Rates were highest in 2014-2016 with 1.7 deaths per 1,000 live births and lowest in 2019-2021.
- Deaths due to congenital malformations increased from 0.8 deaths per 1,000 live births in 2012-2014 before peaking in 2015-2017 with 1.3 deaths per 1,000 live births. Since then, infant mortality due to congenital malformations has decreased. Overall, however, rates decreased by 13% from 2012-2014 to 0.9 deaths per 1,000 live births in 2019-2021.
- The infant mortality rate due to accidents, the third leading cause of infant mortality, also increased over the previous ten years. Rates were lowest in 2012-2014 with 0.5 accidental infant deaths per 1,000 live births and highest in 2015-2017 with 0.9 per 1,000 live births. The rate decreased from 2015-2017 to 0.6 per 1,000 live births in 2019-2021.
- Infant mortality due to maternal complications of pregnancy demonstrated a downward trend since 2012-2014. Rates decreased by 60% from 0.4 deaths per 1,000 live births to 0.2 in 2019-2021.

Infant Mortality by Race

Racial disparities in infant mortality have been documented for decades. While infant mortality rates declined over the previous century, during that same period the Black-white disparity grew.¹³ Since 2000, however, the gap between Black infants and white infants decreased nationally.

Locally, the gap in infant mortality rate between white and Black infants grew over the past decade. In 2012-2014, Black infants were more than 4.6 times as likely to die before their first birthday compared to white infants. By 2019-2021, this disparity grew to more than 6.4 times (See Figure 6). Compared to St. Louis, the Black-white disparity in infant mortality is smaller nationally, where Black infants are 2.4 times as likely to die as white infants. On average, there were 10.5 infant deaths per 1,000 live births for Black infants, and 4.4 deaths per 1,000 live births for white infants in the United States in 2021.

Figure 6. Trends in infant mortality rate by race, St. Louis County, 2017-2021

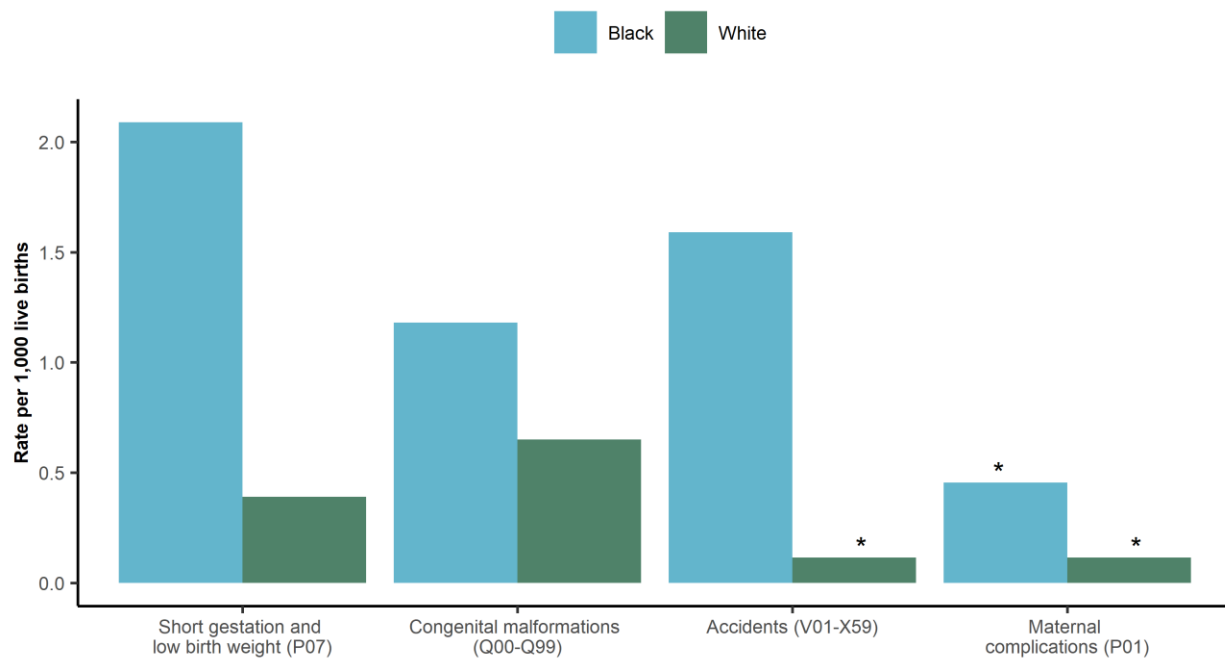


Source: Missouri DHSS, Bureau of Vital Statistics

- The infant mortality rate for Black infants was lowest in 2012-2016 with 18.6 deaths per 1,000 live births, whereas the rate was highest in 2014-2016 with 22.6 deaths per 1,000 live births.
- Compared to 2012-2014, the Black infant mortality rate increased by 17% to 21.8 per 1,000 live births in 2019-2021.
- Infant mortality among white infant was lowest most recently in 2019-2021 with 3.4 deaths per 1,000 live births. Prior to 2019-2021, the infant mortality rate was highest in the 2014-2016 period with 5.0 deaths per 1,000 live births.
- From 2012-2014 to 2019-2021, the white infant mortality rate decreased by 16%.

For all leading causes of infant mortality, Black infants had a higher mortality rate compared to white infants (See Figure 7). Among Black infants, the first leading cause of death was disorders related to short gestation and low birth weight, followed by accidents and congenital malformations. Maternal complications were the fifth leading cause of death for Black infants. The same three causes contributed to the most deaths among white infants, although in a different order: congenital malformations were the leading cause of death, followed by disorders due to short gestation and low birth weight. Deaths due to accidents and maternal complications were tied as the third leading cause of infant mortality among white infants.

Figure 7. Leading causes of infant mortality by race, St. Louis County, 2017-2021



Source: Missouri DHSS, Bureau of Vital Statistics

*Too few cases to meet precision standard (relative standard error < 30); interpret with caution

- Infant mortality due to short gestation and low birth weight was 5.4 times as high for Black infants compared to white infants. However, deaths attributable to short gestation and low birth weight accounted for a similar proportion of infant deaths within both racial groups, with 19% and 18% for Black and white infants, respectively.
- Rates of death due to congenital malformations was 82% higher among Black infants compared to white infants. Congenital malformations accounted for the greatest proportion of deaths among white infants at 30%, compared to 11% for Black infants.
- The greatest disparity among leading causes of infant mortality was for accidental deaths. Black infants were 14 times as likely to die due to an accident compared to white infants. Accidental deaths accounted for 14% of deaths among Black infants, whereas 5% of deaths among white infants were caused by accidents.
- The rate of infant mortality due to maternal complications was the lowest among the top four leading causes of death for Black and tied with accidents for white infants. However, rates remained higher among Black infants who were four times as likely as white infants to die due to maternal complications. Despite this finding, deaths due to maternal complications accounted for a similar proportion of infant mortality with 4% and 5% for Black and white infants, respectively.

Linked Birth and Infant Death Data

Infant deaths were linked with corresponding birth records for the years 2017 to 2021 to help identify trends in infant mortality and related risk factors. There were 479 total infant deaths linked to birth records, compared to 408 total infant deaths from the same period.

Maternal Race

National studies suggest that certain maternal characteristics have an impact on the risk of infant mortality. As was discussed previously, infant mortality is higher among Black infants compared to white infants.¹³ The same is true when comparing infants born to Black mothers to infants born to mothers from other racial groups.¹⁰ Meanwhile, infants born to Asian mothers and white mothers had the lowest mortality rates – a finding that is supported by both national and local data. In St. Louis County, infants born to Black mothers had much higher infant mortality rates compared to their white and Asian counterparts.

Black mothers are more likely to experience chronic stress due, in part, to racism, provider discrimination, and social and economic factors, than their non-Black counterparts. This chronic stress during pregnancy has been shown to contribute to preterm births and other adverse fetal and infant health outcomes.^{14,15}

Maternal Age

Risk of infant death varied according to maternal age. Younger mothers, particularly teenage mothers, had the highest rate of infant mortality, followed by mothers ages 40 and over.¹⁰ Although mothers in these same age groups had higher than average infant mortality rates in St. Louis County, mothers ages 40 years and over had the highest infant mortality rate. Infants born to mothers in the 40 years and older age category had the highest rate of infant mortality with 11.3 deaths per 1,000 live births, followed by infants born to mother ages 20 to 24 years (8.5 deaths per 1,000 live births) and 15 to 19 years (7.7 deaths per 1,000 live births).

Educational Attainment

Disparities in infant mortality by mother's educational attainment have grown over the previous 20 years.¹³ National trends suggest that infants born to mothers without a college degree were more likely to die before their first birthday. The same was true in St. Louis County, with infant mortality being higher among infants born to mothers with lower educational attainment. Infants born to mothers with a high school diploma or less accounted for 38% of infant deaths. Overall, rates were 2.3 to 2.7 times as high among mothers with less than a bachelors' degree compared to mothers with a bachelor's degree and 2.4 to 2.8 times as high compared to mothers with a master's degree or higher.

Marital Status

Approximately six in ten infant deaths were among infants born to mothers who were not married. Infants born to unmarried mothers died at a rate of 9 per 1,000 live births and were 2.1 times as likely to die before their first birthday compared to infants born to mother who were married.

Preterm Birth

Infant mortality has historically been high among infants who were born prematurely (less than 37 weeks of gestation).¹³ In 2021, nearly two-thirds of infant deaths were among preterm infants in the United States.¹⁰ This is consistent with the rate in St. Louis County, where 67% of infant deaths were among infants born prematurely. Infants who were born preterm were 12.3 times as likely to die compared to full-term infants. Infants who were born preterm had a mortality rate of 30.1 per 1,000 live births, whereas the infant mortality rate among full-term infants was 2.5 per 1,000 live births.

Low Birth Weight

Low birth weight (less than 2,500 grams or about 5.5 pounds) is another known risk factor for infant mortality.¹³ From 2017 to 2021, 66% of infant deaths were among infants born with a low birth weight. The infant mortality rate was 16 times as high among infants who had a low birth weight (less than 2,500 grams or about 5.5 pounds) compared to infants who were not born with a low birth weight. Low birth weight infants had a mortality rate of 39.2 per 1,000 compared to 2.4 per 1,000 for infants born at a healthy weight.

Prenatal Care

Less than half (47%) of infant deaths were among infants whose mothers received adequate prenatal care, whereas a smaller proportion (36%) were among infants born to mothers who received inadequate prenatal care. (Seventeen percent of infants were missing sufficient prenatal care data to determine adequacy.) Infants born to mothers who received adequate prenatal care had a mortality rate of 4.2 per 1,000 live births and were 66% less likely to die compared to infants born to mothers who received inadequate prenatal care. The infant mortality rate among infants born to mothers who did not receive adequate prenatal care was 12.5 per 1,000 live births.

Plurality

Less than 15% of infant deaths were among plural births. Nevertheless, the rate of infant mortality was 3.9 times as high among plural births compared to single births. Plural birth infants had a mortality rate of 21.7 per 1,000 live births, whereas single birth infants had a mortality rate of 5.5 per 1,000 live births.

Neighborhood Poverty

Infant mortality was higher in neighborhoods with greater poverty levels. Only those born in neighborhoods with low poverty levels had an infant mortality rate that was less than the St. Louis County overall rate. Infants born in medium poverty neighborhoods had 1.9 times the rate of infant mortality as infants born in low poverty neighborhoods, whereas infants born in high and very high poverty neighborhoods had 2.8 times as high of a rate.

Private Insurance

Infants whose mothers used private insurance to pay for their delivery had an infant mortality rate of 4.7 per 1,000 live births and a 46% lower rate of infant mortality compared to those born to mothers who did not use private insurance to pay for their delivery. The infant mortality rate among infants whose mothers did not have private insurance pay for their delivery was 8.8 per 1,000 live births.

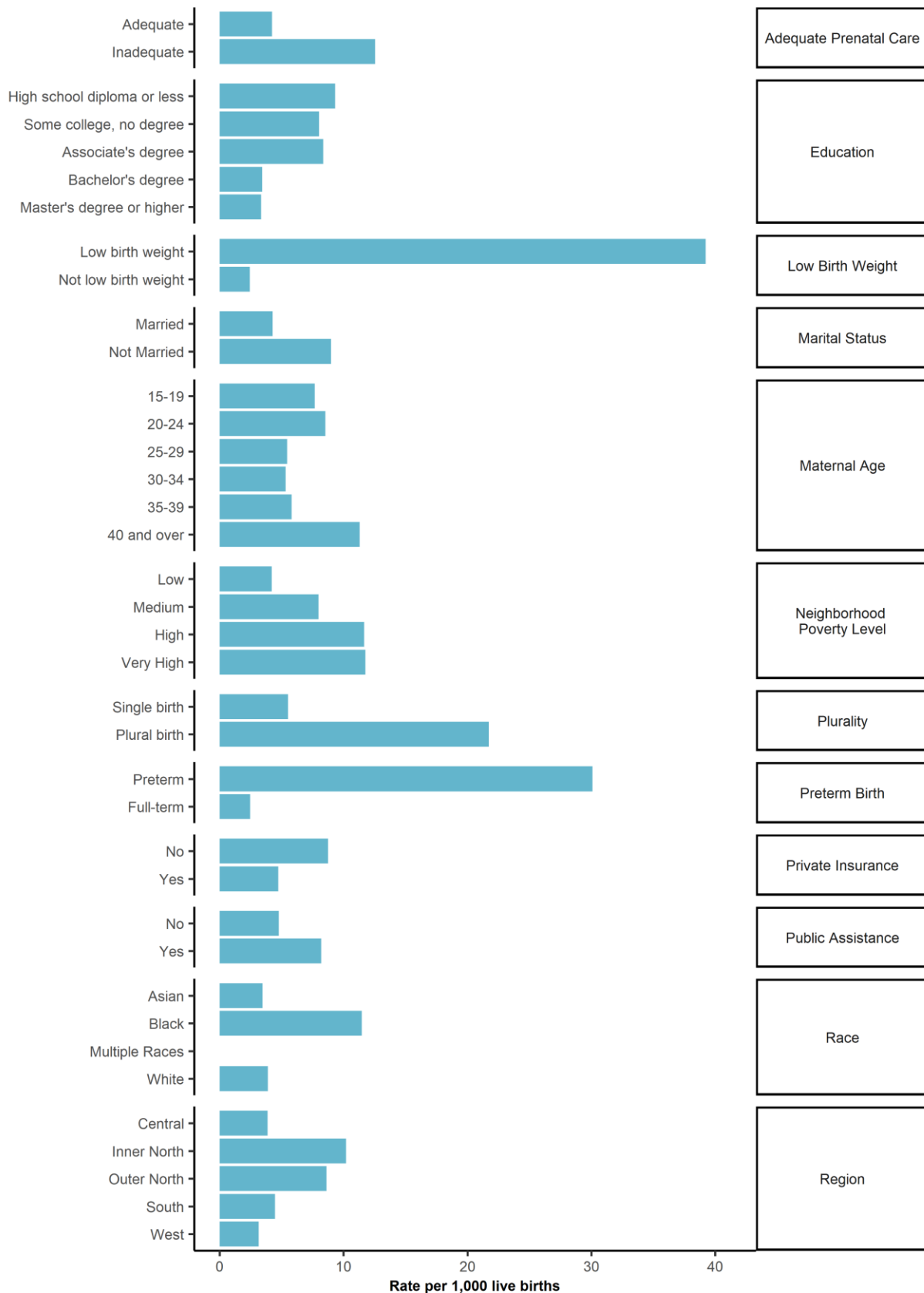
Public Assistance

The infant mortality rate among infants born to mother who received public assistance was 4.8 per 1,000 live births. Compared to infants born to mothers who did receive public assistance, those born to mothers who did not receive public assistance had a 42% lower mortality rate.

County Region

The infant mortality rate was highest in the Inner North region with 10.2 deaths per 1,000 live births, followed by the Outer North region with 8.6 deaths per 1,000 live births. Rates in both regions were higher than in St. Louis County overall. Rates were lowest in the West region with 3.1 deaths per 1,000 live births, followed by the Central (3.9 deaths per 1,000 live births) and South (4.5 deaths per 1,000 live births) regions.

Figure 8. Infant mortality by select characteristics from linked records, St. Louis County, 2017-2021



Source: Missouri DHSS, Bureau of Vital Statistics

Discussion

Rates of both fetal deaths and infant mortality in St. Louis County remain higher than the national targets set through Healthy People 2030.^{1,12} Overall, the fetal death rate increased from 2012 to 2021, whereas the infant mortality rate decreased over the same period. In St. Louis County, fetal deaths and infant mortality rates were greater than the national average; however, the fetal death rate was much closer to both the United States average and Healthy People 2030 target compared to the infant mortality rate.

Despite diverging trends, several disparities were apparent across both indicators: Broadly, rates were higher among infants and fetuses with Black mothers, mothers who were living in the Inner North and Outer North regions or in neighborhoods with higher poverty levels, and among mothers in the youngest and oldest age categories. In addition, the most common risk factors identified for fetal death were previous preterm birth and hypertension – including both gestational and prepregnancy hypertension.

Leading causes of infant mortality were disorders related to short gestation and low birth weight, congenital malformations, accidents, and maternal complications. Across each leading cause of death, infant mortality rates were much greater for Black infant compared to white infants – a pattern reflective of growing racial disparities in infant mortality. Moreover, analysis of linked birth and infant death records revealed that infant mortality rates were highest among infants born with a low birth weight and infants who were preterm.

While many causes of fetal death and infant mortality are not preventable, parents may take certain steps to reduce the risk of death. In addition to regular prenatal care visits, people who are interested in becoming pregnant should take steps to improve their health prior to pregnancy.¹⁶ Parents can also create a safe sleep environment for their infant by always placing the baby on their back to sleep and by keeping their sleep environment free of any soft objects, including toys, bumper pads, and blankets.¹⁷

Resources

Building Blocks of Missouri-St. Louis Region Nurse Family Partnership

Building Blocks of Missouri-St. Louis Region NFP connects specially trained nurses with first-time moms to-be early in pregnancy and continuing through the child's second birthday. Expectant mothers receive care and support throughout the pregnancy.

For more information, please visit: <https://www.nursefamilypartnership.org/>

To learn more about what St. Louis County DPH is doing to promote safe sleep, please visit: <https://stlouiscountymo.gov/st-louis-county-departments/public-health/public-health-news/safe-sleep-and-nurse-family-partnership/>

Missouri WIC

The Missouri WIC program provides supplemental food, health care referrals, nutrition education and breastfeeding promotion and support to eligible pregnant, breastfeeding, and postpartum parents.

For more information about WIC, please visit: <https://health.mo.gov/living/families/wic/>

For WIC locations in St. Louis County, please visit: <https://stlouiscountymo.gov/st-louis-county-departments/public-health/locations/>

St. Louis-Area Doula Network

Doula support during pregnancy, birth, and the postpartum period has been shown to improve birth outcomes and lower infant mortality rates.¹⁸ Saint Louis Doulas of Color Collective and the St. Louis Doula Project connect expecting and new parents with doula support.

For more information about the Saint Louis Doulas of Color Collective, please visit:

<https://stldoulasofcolor.org/find-a-doula/>

For more information about the St. Louis Doula Project, please visit: <https://stldoulaproject.org/>

Methods

Data were obtained from the Missouri Department of Health and Senior Services (DHSS), Bureau of Vital Statistics for the years 2012 to 2021. Vital records include death and birth records and were restricted to residents of St. Louis County, Missouri by residence census tract. Causes of death were identified using International Classification of Disease, Tenth Revision (ICD-10) primary diagnosis codes. Death certificates indicate whether a person had been pregnant, pregnant within 42 days, or pregnant within 43 days to one-year of time of death and were used to identify cases of maternal mortality. Due to limitations in the data, we use the word “women” and “mothers” to describe individuals who were pregnant or had given birth.

Crude rates, specific rates, and the respective 95% confidence intervals were calculated in R version 4.0.4 using counts of live births. The five St. Louis County geographic regions were determined from the St. Louis County Planning Division region maps by assigning each census tract a matching region. Neighborhood poverty level was based on the American Community Survey census tract level poverty estimates. Each census tract was assigned to one of four categories based on the percent of the respective population below federal poverty level: low (0 to <10 percent); medium (10 to <20 percent); high (20 to <30 percent); and very high (30 to 100 percent).

For estimates where relative standard error is 30% or more of the point estimate, rates are marked with an asterisk indicating an unreliable rate. For cells with exact (non-average) counts, counts and rates are suppressed if the denominator population is less than 100,000 and the number of cases is between 1 and 5. For subgroups with mutually exclusive categories where the sum of cases in the categories add up to the county-level total, if a single category is suppressed, an additional category is suppressed to disallow overcoming of suppression with simple addition or subtraction.

Suggested Citation

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