

2020 Infant Mortality Annual Report



Department
of Health

.....
"A life need not be long to be meaningful." — Unknown
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EXECUTIVE SUMMARY

Ohio identified infant mortality as a priority in its 2020-2022 State Health Improvement Plan (SHIP).¹ Infant mortality is the death of an infant before his or her first birthday. The infant mortality rate is the number of infant deaths per 1,000 live births. The infant mortality rate not only serves as a key indicator of maternal and infant health but is also an important measure of the health status of a community.

In 2020, the infant mortality rate fell to 6.7 from 6.9 in 2019 for all races. The rate among Black infants fell to 13.6 in 2020 from 14.3 in 2019. However, the Ohio and the Healthy People 2030 goal is 5.0 or fewer infant deaths per 1,000 live births in every racial and ethnic group. Racial and socio-economic inequities persist. Black infants die at a rate almost three times higher than white infants.

The following report presents results of analyses performed on Ohio infant deaths that occurred in 2020. Throughout this report, race is reported regardless of ethnicity. Both race and ethnicity are obtained from infant death certificates. (See page 36 for detailed methodology.)

General Findings

864 Ohio infants died before their first birthday in 2020.

493 White infant deaths.

326 Black infant deaths.

6.7 Overall infant mortality rate — the lowest it has been in the past decade.

5.1 Mortality rate for white infants.

13.6 Mortality rate for Black infants.

4.4 Overall neonatal mortality rate.

3.4 Neonatal mortality rate for white infants.

8.9 Neonatal mortality rate for Black infants.

2.2 Overall postneonatal mortality rate.

1.6 Postneonatal mortality rate for white infants.

4.7 Postneonatal mortality rate for Black infants.

2.7 Mortality ratio for Black/white infants.

Impact of COVID-19 on Birth Outcomes

- 7,126 live births and 42 fetal deaths (stillbirths) were linked to a maternal COVID-19 infection during pregnancy, also known as a pregnancy-related infection (PRI).
- The fetal death rate for pregnancies linked to a 2020 PRI was not significantly different than that of non-linked pregnancies during that time.
- Sixteen infants had a possible perinatal COVID-19 infection; none died before their first birthday.
- Thirty of the 7,126 infants born to mothers with a confirmed PRI died before their first birthday.
 - Twenty-one infants whose mother had a confirmed PRI died during the neonatal period (first 27 days).
 - Nine infants whose mother had a confirmed PRI died during the postneonatal period (days 28-364).
- There was no significant association between PRI and preterm birth.

A Deeper Look

- Prematurity remains the leading cause of death among all infants.
- Black infants died from prematurity-related causes at three times the rate of white infants.
- White infants were more likely to die of congenital anomalies than prematurity-related causes.
- Thirty percent of infants who died were born before 24 weeks gestation despite only accounting for 0.2% of all live births.
- Nearly half of infants who died were born with very low birth weight (less than 1,500 grams or about 3.3 pounds).

What Is Surveillance?

Public health surveillance provides and interprets data to help prevent and control disease. According to the Centers for Disease Control and Prevention (CDC), “public health surveillance is the ongoing, systematic collection, analysis, and interpretation of health-related data essential to planning, implementation, and evaluation of public health practice, closely integrated with the timely dissemination of these data to those responsible for prevention and control.” In public health, we identify the problem by using surveillance systems to monitor health events and behaviors occurring among a population. After the problem has been identified, the next question is, “What is the cause of the problem?” To fully answer this question, more specific scientific research is needed.

The data presented in this report is public health surveillance data and is an important component in Ohio’s response to the problem of infant mortality. However, we acknowledge that the data included here does not fully explain the numerous and complex causes of infant mortality. Embedded within the persistent disparities and inequities in infant deaths is a history of unequal social, economic, and environmental conditions. By understanding what’s happened in the past, individuals and organizations can better understand what is causing today’s disparities and identify solutions that move toward an equitable future.

How Do We Use Surveillance Data?

Surveillance data, such as that included in this report, provides information that can be used by public health personnel, government leaders, and the public to guide public health policy and programs.

Surveillance data can be used to:

- Detect epidemics, health problems, and changes in health behaviors.
- Estimate magnitude and scope of health problems.
- Measure trends and characterize disease.
- Assess effectiveness of programs and control measures.
- Develop hypotheses and stimulate research.

SECTION 1: GENERAL FINDINGS

Ohio Infant Mortality Rates by Race and Ethnicity

In 2020, 864 Ohio infants died before their first birthday (Table 1, Figure 1). The number of white infants who died was 493, a decrease of 25 from 2019. Additionally, there were 326 Black infant deaths in 2020, a decrease of 30 from 2019. Both the white and Black death counts are the lowest they have been in the past 10 years. In the Hispanic population, 40 infant deaths occurred in 2020, compared with 45 in 2019 (Table 1, Figure 2).

Table 1: Ohio Infant Mortality by Race and Ethnicity (2016-2020)*

| | 2016 | | 2017 | | 2018 | | 2019 | | 2020 | |
|-----------------------------------|---------------|------|---------------|------|---------------|------|---------------|------|---------------|------|
| | Infant Deaths | IMR* | Infant Deaths | IMR* | Infant Deaths | IMR* | Infant Deaths | IMR* | Infant Deaths | IMR* |
| All Races** | 1,023 | 7.4 | 982 | 7.2 | 938 | 6.9 | 929 | 6.9 | 864 | 6.7 |
| Race | | | | | | | | | | |
| White | 609 | 5.8 | 550 | 5.3 | 553 | 5.4 | 518 | 5.1 | 493 | 5.1 |
| Black | 369 | 15.2 | 384 | 15.6 | 339 | 13.9 | 356 | 14.3 | 326 | 13.6 |
| American Indian/ Alaska Native | 2 | ‡ | 0 | ‡ | 2 | ‡ | 3 | ‡ | 1 | ‡ |
| Asian/Pacific Islander | 18 | 3.8^ | 20 | 4.2 | 18 | 3.8^ | 21 | 4.4 | 18 | 4.1 |
| Ethnicity | | | | | | | | | | |
| Hispanic | 54 | 7.3 | 54 | 7.2 | 45 | 6.1 | 45 | 5.8 | 40 | 5.2 |
| Non-Hispanic*** | 969 | 7.4 | 927 | 7.2 | 893 | 7.0 | 884 | 7.0 | 824 | 6.8 |

Data Source: Resident Birth and Mortality Files from the Ohio Department of Health Bureau of Vital Statistics.

*Infant mortality rate per 1,000 live births.

**The total for all races includes deaths of unknown race.

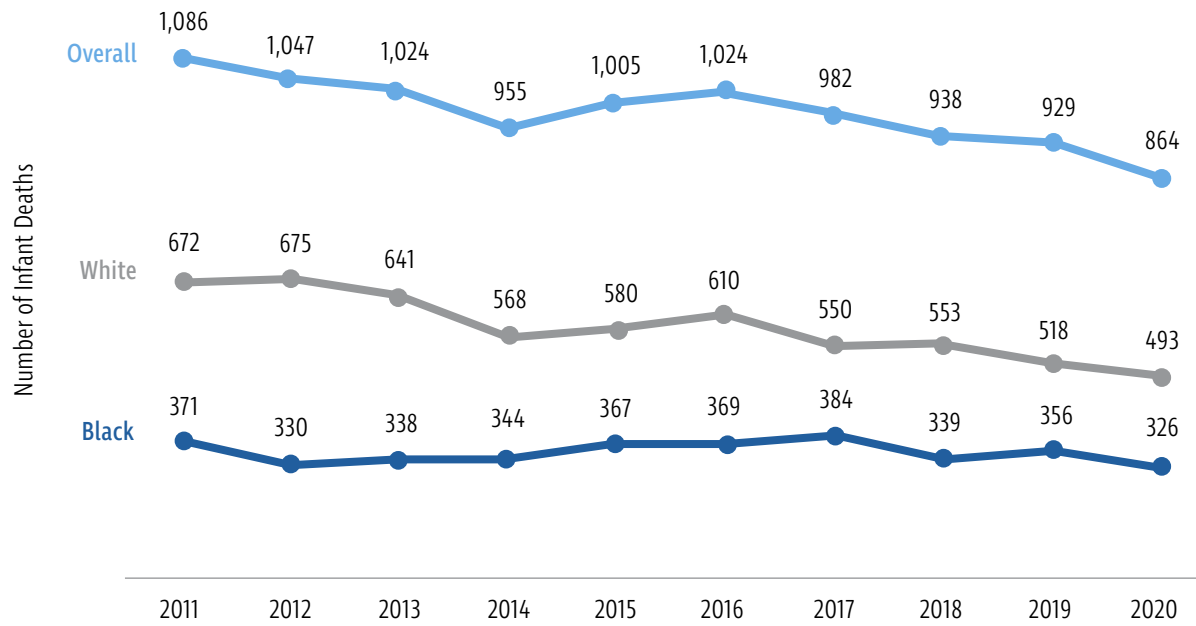
***Non-Hispanic deaths include those of unknown or missing ethnicity.

‡ Rates based on fewer than 10 infant deaths do not meet standards of reliability or precision and are suppressed.

^ Rates based on fewer than 20 infant deaths should be interpreted with caution.

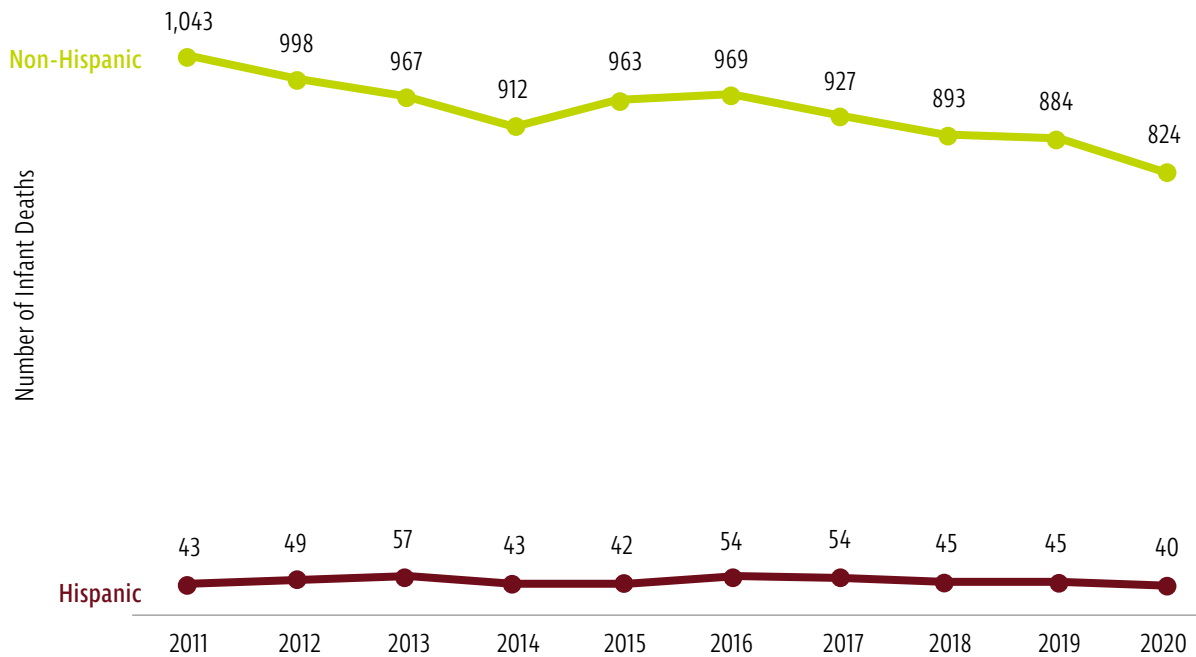
* The methodology the Ohio Department of Health uses for calculating infant mortality rates differs from the methodology used by National Center for Health Statistics and some jurisdictions within Ohio. Therefore, the rates reported here may vary from other reports.

Figure 1: Number of Infant Deaths by Race and Ethnicity, Ohio (2011–2020)



Data Source: Resident Birth and Mortality Files from the Ohio Department of Health Bureau of Vital Statistics.

Figure 2: Number of Infant Deaths by Ethnicity, Ohio (2011–2020)



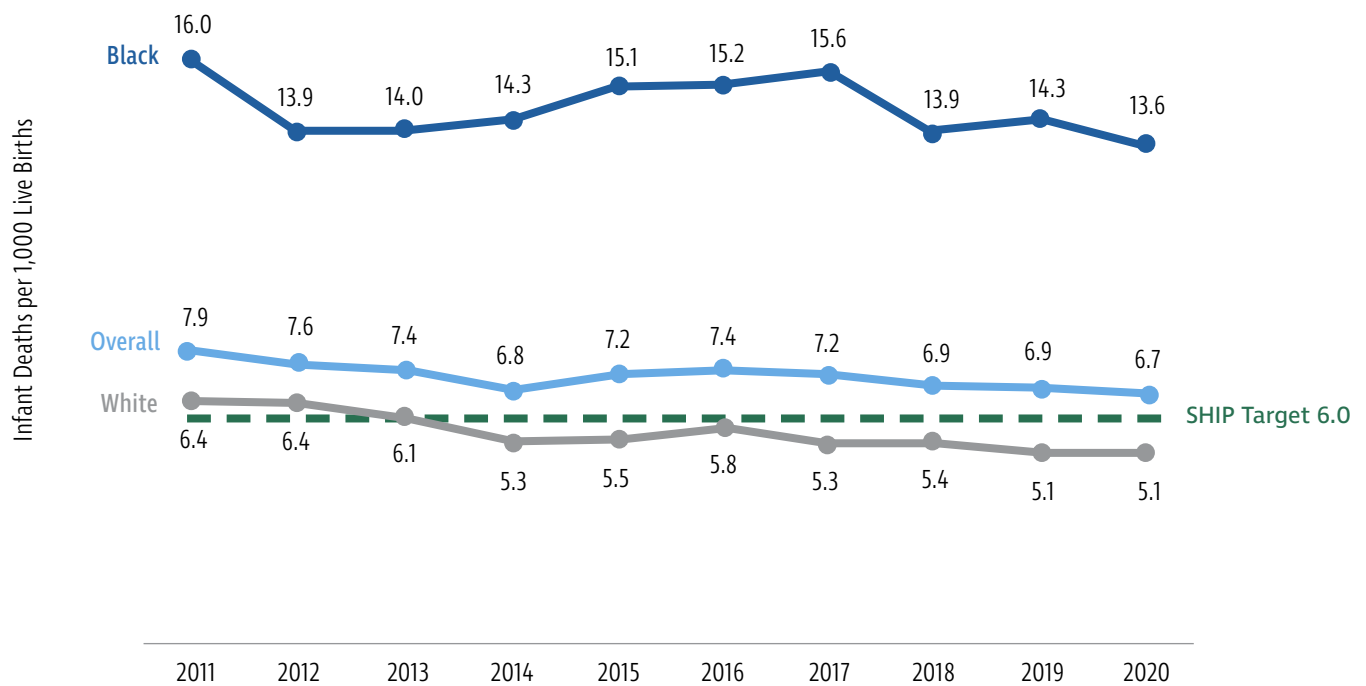
Data Source: Resident Birth and Mortality Files from the Ohio Department of Health Bureau of Vital Statistics.

The infant mortality rate is the number of infant deaths per 1,000 live births. Ohio's infant mortality rate overall was 6.7 per 1,000 live births in 2020, compared with 6.9 in 2019 (Table 1, Figure 3). The Black infant mortality rate fell from 14.3 in 2019 to 13.6 in 2020 (Table 1, Figure 3). Racial disparities exist in infant mortality. Black infants were more than 2.7 times more likely to die than white infants.

Ohio's State Health Improvement Plan (SHIP) has set a 2028 target of 6.0 for Ohio's infant mortality rate overall and for specific priority populations identified in the SHIP.¹ Since 2011, Ohio has experienced a decline in the overall and white infant mortality rates. From 2011 through 2020, the overall infant mortality rate decreased at an average of 1.4% per year, while the white infant mortality rate decreased an average of 2.6% per year.

The Black infant mortality rate is the lowest it has been in the past decade. While there were small fluctuations in the rate up and down from year to year, the rate has dropped from 16.0 in 2011 to 13.6 in 2020.

Figure 3: Infant Mortality Rate (per 1,000 live births) by Race, Ohio (2011–2020)

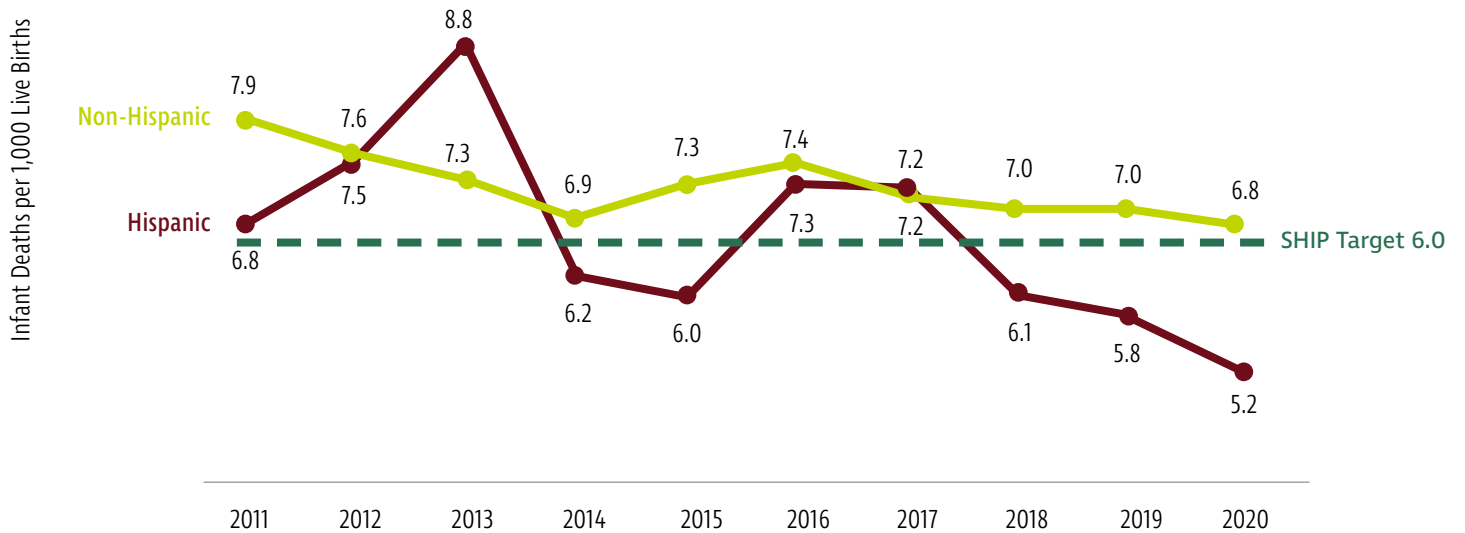


Data Source: Resident Birth and Mortality Files from the Ohio Department of Health Bureau of Vital Statistics.

Note: American Indian/Alaska Native and Asian/Pacific Islander rates are suppressed because rates based on fewer than 10 infant deaths do not meet standards of reliability or precision.

Ohio's Hispanic infant mortality rate was 5.2 per 1,000 live births, compared with 6.8 in the non-Hispanic population in 2020. Both the Hispanic and non-Hispanic infant mortality rates were lower in 2020 than in 2019 (Table 1, Figure 4). Additionally, from 2011 through 2020, the Hispanic population saw an overall decline in the infant mortality rate, an average decrease of 3.3% per year.

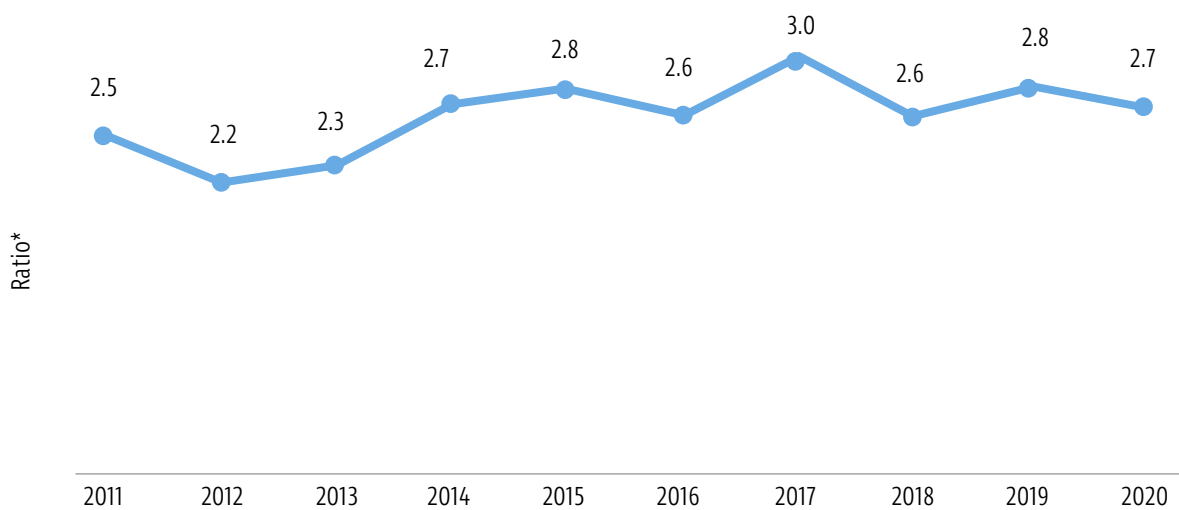
Figure 4: Infant Mortality Rate (per 1,000 live births) by Ethnicity, Ohio (2011–2020)



Data Source: Resident Birth and Mortality Files from the Ohio Department of Health Bureau of Vital Statistics.

The Black/white infant mortality ratio was 2.7 in 2020, compared with 2.8 in 2019. Black infants die at a rate almost three times higher than white infants (Figure 5). Despite declining Black and white infant mortality rates over the last decade, the gap between those rates persists.

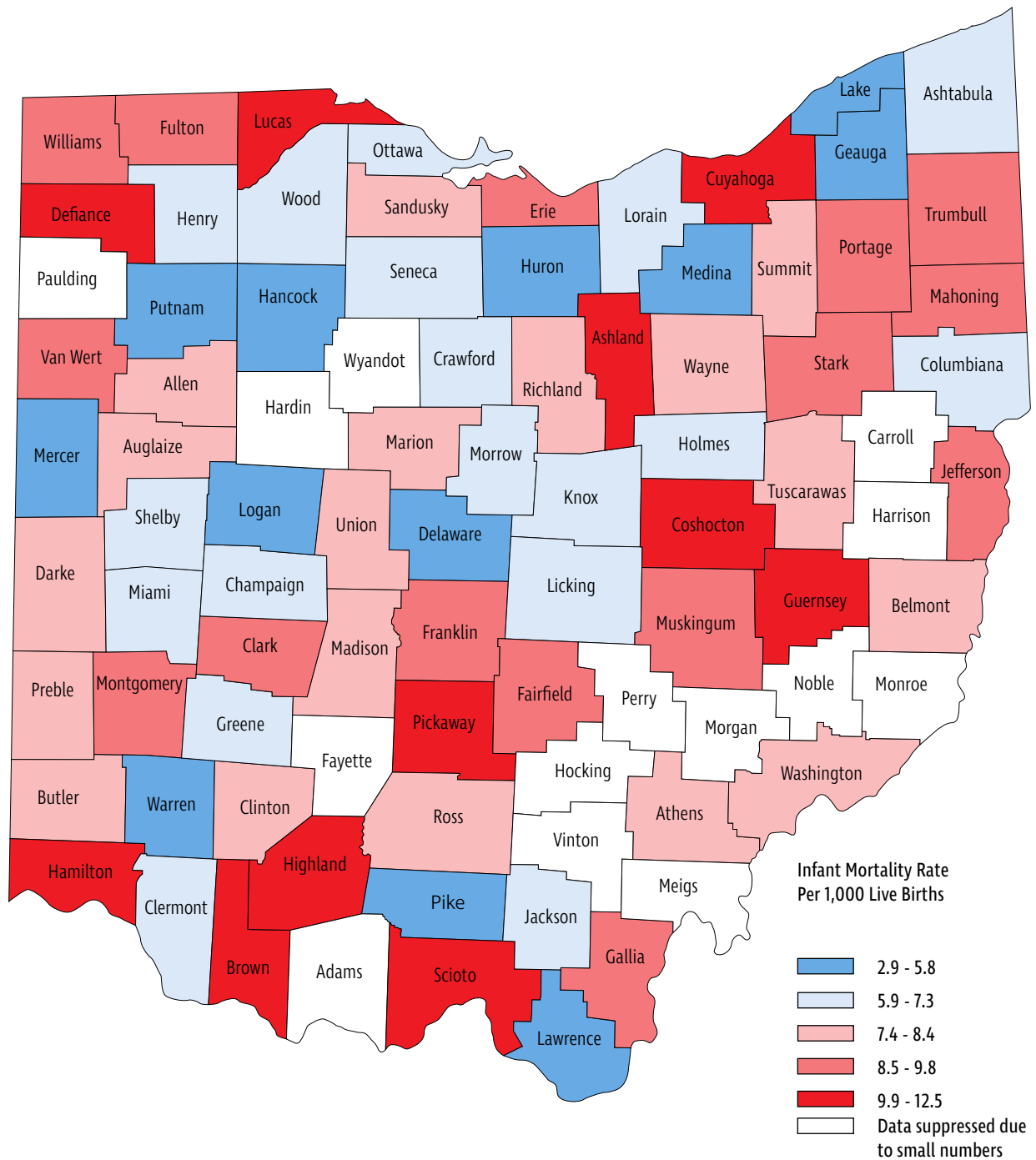
Figure 5: Black/White Infant Mortality Ratio,* Ohio (2011–2020)



Data Source: Resident Birth and Mortality Files from the Ohio Department of Health Bureau of Vital Statistics.
 *Black infant mortality rate divided by the white infant mortality rate.

Ohio Five-Year Average Infant Mortality Rate by County

Figure 6: Five-Year Infant Mortality Rate by County, Ohio (2016-2020)



Data Source: Resident Birth and Mortality Files from the Ohio Department of Health Bureau of Vital Statistics.

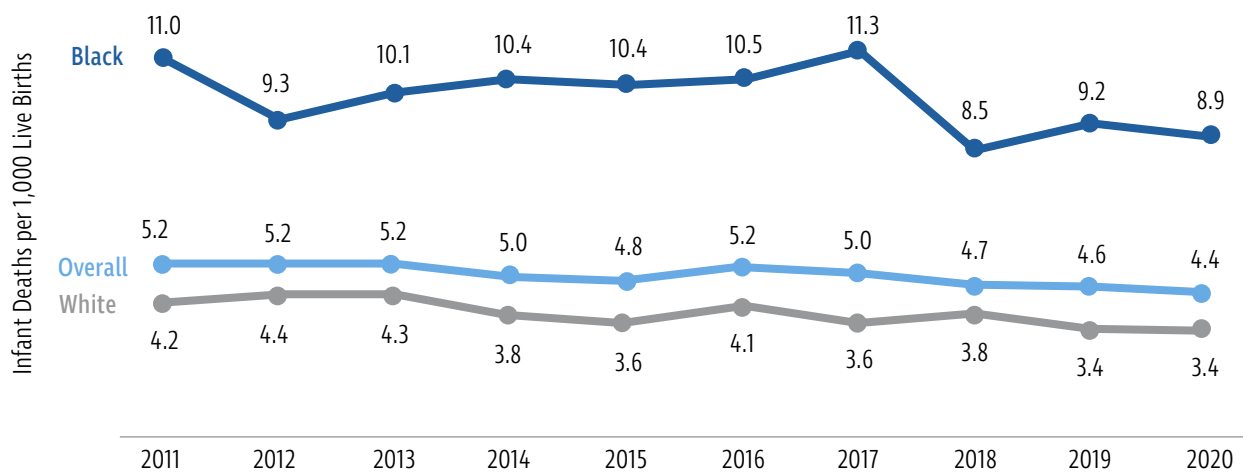
Ohio Neonatal and Postneonatal Mortality by Race and Ethnicity

Infant deaths comprise both neonatal and postneonatal deaths. Neonatal deaths occur during the first 27 days of life, and postneonatal deaths occur at 28 through 364 days of life. Neonatal deaths are the largest contributor to the overall infant mortality rate, accounting for about two-thirds of all infant deaths. Neonatal mortality is associated with prematurity (birth before 37 weeks gestation), low birth weight, congenital anomalies, and health problems originating in the perinatal period (the period immediately before and after birth) such as infections or birth trauma.

From 2011 through 2020, the overall neonatal mortality rate decreased by an average of 1.7% per year. The neonatal mortality rate for white infants decreased an average of 2.6% per year, and the rate for non-Hispanic infants decreased an average of 1.6% per year (Figures 7 and 8).

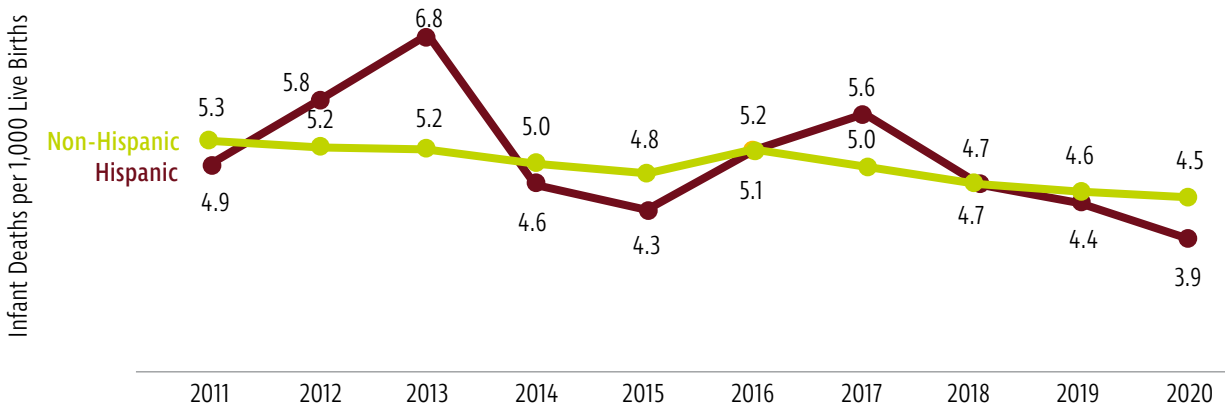
The Black and overall neonatal mortality rates decreased from 2019 to 2020 from 9.2 to 8.9 and 4.6 to 4.4, respectively (Table 2, Figure 7). Excluding 2018, the Black neonatal mortality rate is lower than anytime between 2011 and 2020. Additionally, the non-Hispanic neonatal mortality rate was 4.5 in 2020, compared with 4.6 in 2019, while the Hispanic neonatal mortality rate was 3.9 in 2020, compared with 4.4 in 2019 (Table 2, Figure 8).

Figure 7: Trends in Ohio Neonatal Mortality (per 1,000 live births), by Race (2011–2020)



Data Source: Resident Birth and Mortality Files from the Ohio Department of Health Bureau of Vital Statistics.

Figure 8: Trends in Ohio Neonatal Mortality (per 1,000 live births), by Ethnicity (2011–2020)



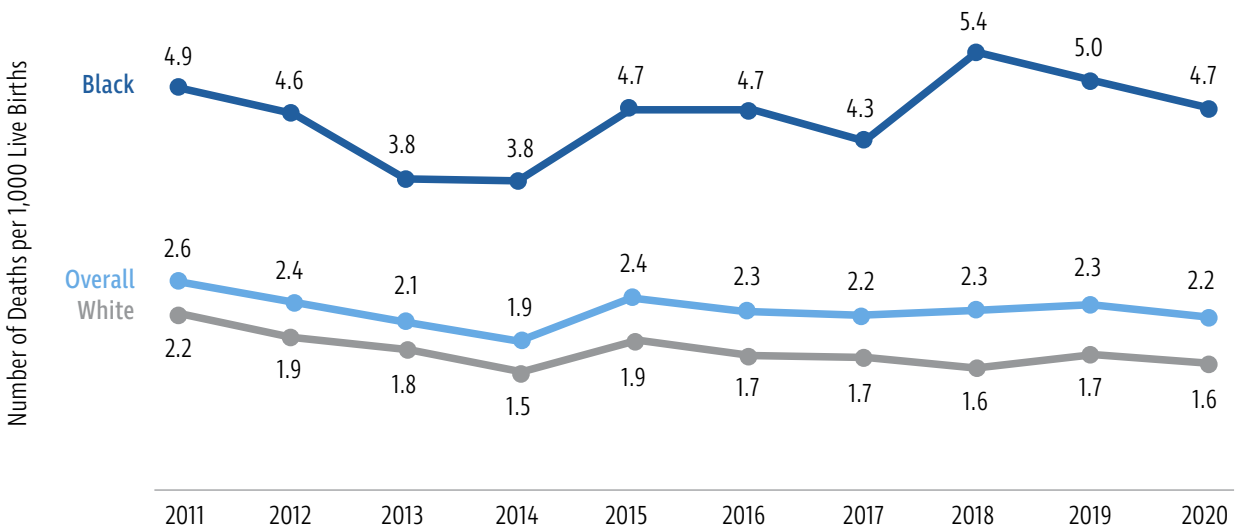
Data Source: Resident Birth and Mortality Files from the Ohio Department of Health Bureau of Vital Statistics.

Postneonatal deaths make up one-third of all infant deaths. Common causes of death in the postneonatal period include sudden unexpected infant death (SUID) — which includes sudden infant death syndrome (SIDS), accidental suffocation and strangulation in bed (ASSB), and undetermined — congenital anomalies, and unintentional injuries.

Ohio’s white infant postneonatal mortality rate decreased an average of 2.6% per year from 2011 through 2020. The overall and Black postneonatal mortality rates have changed slightly during this period (Table 2, Figure 9). Hispanic postneonatal mortality in Ohio has decreased an average of 3.7% per year since 2011 (Table 2, Figure 10). However, because there were relatively few Hispanic postneonatal deaths — fewer than 20 per year during the 10-year period — the rates should be interpreted with caution.

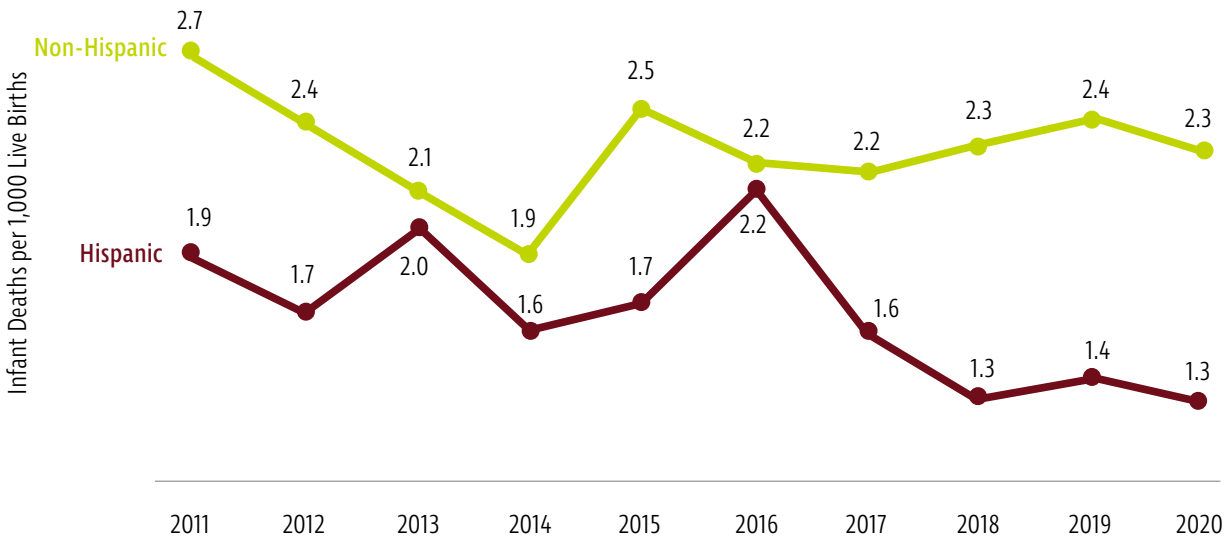
The Black and white postneonatal mortality rates decreased from 2019 — from 5.0 to 4.7 and 1.7 to 1.6, respectively (Figure 9). Additionally, the non-Hispanic neonatal mortality rate was 2.4 in 2020, compared with 2.3 in 2019, while the Hispanic neonatal mortality rate was 1.3 in 2020, compared with 1.4 in 2019 (Table 2, Figure 10).

Figure 9: Trends in Ohio Postneonatal Mortality (per 1,000 live births), by Race (2011–2020)



Data Source: Resident Birth and Mortality Files from the Ohio Department of Health Bureau of Vital Statistics.

Figure 10: Trends in Ohio Postneonatal Mortality (per 1,000 live births), by Ethnicity (2011–2020)



Data Source: Resident Birth and Mortality Files from the Ohio Department of Health Bureau of Vital Statistics.

Table 2: Ohio Neonatal, Postneonatal, and Overall Infant Mortality (per 1,000 live births), by Race and Ethnicity (2016–2020)

| Race/Ethnicity | Year | Neonatal Deaths | Neonatal Mortality Rate | Postneonatal Deaths | Postneonatal Mortality Rate | Total Infant Deaths | Infant Mortality Rate | Births |
|-------------------------------|------|-----------------|-------------------------|---------------------|-----------------------------|---------------------|-----------------------|---------|
| White | 2016 | 429 | 4.1 | 181 | 1.7 | 610 | 5.8 | 104,957 |
| | 2017 | 375 | 3.6 | 175 | 1.7 | 550 | 5.3 | 103,709 |
| | 2018 | 393 | 3.8 | 160 | 1.6 | 553 | 5.4 | 102,570 |
| | 2019 | 342 | 3.4 | 176 | 1.7 | 518 | 5.1 | 101,021 |
| | 2020 | 333 | 3.4 | 160 | 1.6 | 493 | 5.1 | 97,054 |
| Black | 2016 | 255 | 10.5 | 114 | 4.7 | 369 | 15.2 | 24,316 |
| | 2017 | 278 | 11.3 | 106 | 4.3 | 384 | 15.6 | 24,542 |
| | 2018 | 208 | 8.5 | 131 | 5.4 | 339 | 13.9 | 24,359 |
| | 2019 | 230 | 9.2 | 126 | 5.0 | 356 | 14.3 | 24,971 |
| | 2020 | 214 | 8.9 | 112 | 4.7 | 326 | 13.6 | 23,941 |
| All Races | 2016 | 713 | 5.2 | 311 | 2.3 | 1,024 | 7.4 | 138,198 |
| | 2017 | 684 | 5.0 | 298 | 2.2 | 982 | 7.2 | 136,895 |
| | 2018 | 632 | 4.7 | 306 | 2.3 | 938 | 6.9 | 135,226 |
| | 2019 | 614 | 4.6 | 315 | 2.3 | 929 | 6.9 | 134,564 |
| | 2020 | 574 | 4.4 | 290 | 2.2 | 864 | 6.7 | 129,320 |
| Hispanic Ethnicity (Any Race) | 2016 | 38 | 5.1 | 16 | 2.2* | 54 | 7.3 | 7,425 |
| | 2017 | 42 | 5.6 | 12 | 1.6* | 54 | 7.2 | 7,473 |
| | 2018 | 35 | 4.7 | 10 | 1.3* | 45 | 6.1 | 7,434 |
| | 2019 | 34 | 4.4 | 11 | 1.4* | 45 | 5.8 | 7,729 |
| | 2020 | 30 | 3.9 | 10 | 1.3* | 40 | 5.2 | 7,672 |

Data Source: Resident Birth and Mortality Files from the Ohio Department of Health Bureau of Vital Statistics.

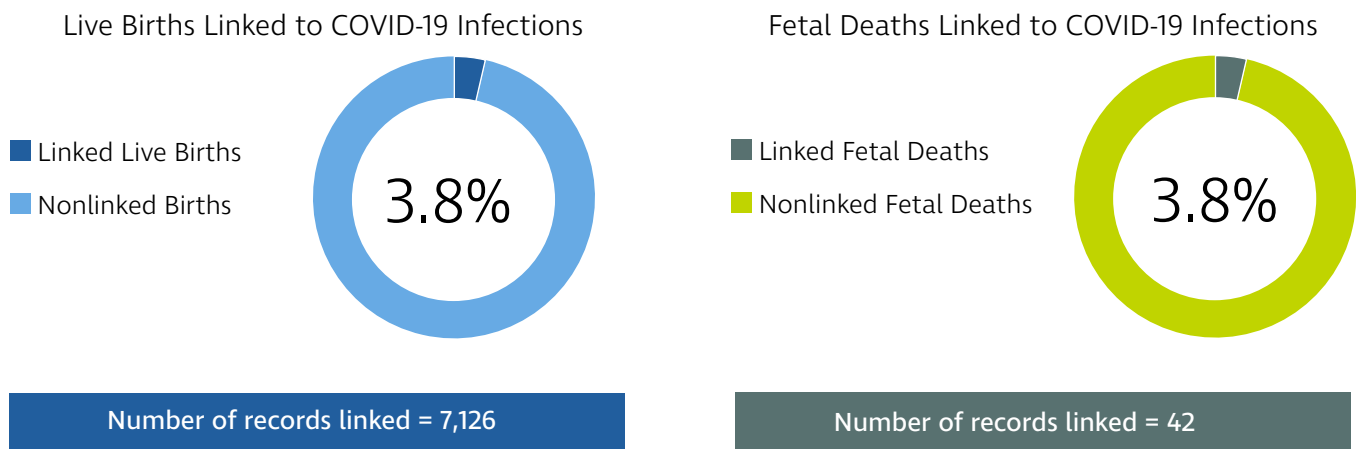
*Rates based on fewer than 20 infant deaths should be interpreted with caution.

SECTION 2: IMPACT OF COVID-19 ON BIRTH OUTCOMES

The Centers for Disease Prevention and Control (CDC) has found that women infected with COVID-19 during pregnancy have increased risk for adverse pregnancy and neonatal outcomes, including preterm birth and admission of their newborn baby (less than 28 days old) to an intensive care unit.² The virus that causes COVID-19 was first detected in Ohio in March 2020. The Ohio Department of Health has been collecting data on Ohio women who have been infected with COVID-19 to assess health-related outcomes of mothers and infants among COVID-19 affected pregnancies.

From March 2020 through August 2021, there were 7,126 live births in Ohio linked to a 2020 COVID-19 infection that occurred during the pregnancy (pregnancy-related infection or PRI). These account for 3.8% of live births that occurred between March 2020 and August 2021 (Figure 11). During this same period, there were 42 fetal deaths linked to a 2020 COVID-19 infection, accounting for 3.8% of fetal deaths during that same period (Figure 11). Pregnancies linked to a 2020 PRI experienced a fetal death rate of 5.9 per 1,000 pregnancies, compared with a fetal death rate of 5.8 per 1,000 pregnancies for pregnancies not linked to a PRI. Of note, this data is preliminary, and the documented number of live births and fetal deaths linked to a 2020 PRI may increase as more data becomes available.

Figure 11: The Number and Percentage in Ohio of Live Births and Fetal Deaths Linked to COVID-19 Infection (March 2020–August 2021)



Infant COVID-19 Infection

From March 2020 to August 2021, 16 Ohio infants tested positive for COVID-19 within the first two weeks of life, which could indicate a possible perinatal infection per CDC guidance. None of these infants died. This finding aligns with national data indicating that infant deaths with COVID-19 listed as a cause of death are rare. Data on infant deaths due to COVID-19 not linked to a maternal infection are not presented to protect confidentiality. No infant deaths linked to a maternal COVID-19 infection have COVID-19 listed as a contributing cause of death.

Infant Deaths Among Mothers With COVID-19 Infection

From March 2020 to August 2021, 21 Ohio infants whose mother had a confirmed PRI died during the neonatal period (the first 27 days of life). This is a rate of 2.9 neonatal deaths per 1,000 live births to women experiencing a PRI, which is lower than the overall neonatal mortality rate in Ohio (4.4 per 1,000). Characteristics of these neonatal deaths are shown in (Figure 12).

- Fourteen of these deaths occurred during the first day of life, and seven occurred during the first two weeks of life.
- Nine of the infants were born to Black mothers, nine to white mothers, one to an Asian/Pacific Islander mother and two to mothers of unknown race.
- Twenty of the deaths were to infants whose mothers were non-Hispanic and one death was to an infant whose mother was Hispanic.
- COVID-19 was not listed as a cause of death or listed condition on the death certificate for any of these deaths (Figure 12).

Figure 12: Characteristics of Neonatal Deaths in Ohio Linked to 2020 Pregnancy-Related COVID-19 Infections (PRIs)

| | | |
|--|-----------------------------------|----|
| Age at Death | 1 minute-1 hour | 3 |
| | More than 1 hour, less than 1 day | 11 |
| | More than 1 day, less than 1 week | 5 |
| | 1-2 weeks | 2 |
| Maternal Race | White | 9 |
| | Black | 9 |
| | Asian/Pacific Islander | 1 |
| | Unknown | 2 |
| Maternal Ethnicity | Non-Hispanic | 20 |
| | Hispanic | 1 |
| COVID-19 as Cause of Death or Listed Condition | No | 21 |
| | Yes | 0 |

From March 2020 to August 2021, nine Ohio infants whose mother had a confirmed PRI died during the postneonatal period, after the 27th day of life but prior to the first birthday. Since the postneonatal period extends to 364 days of life, we are not able to determine a postneonatal mortality rate, though the current number of postneonatal deaths is not higher than the expected number in the general population. Characteristics of these postneonatal deaths are shown in Figure 13.

- The majority of these deaths (8) occurred during the first four months of life.
- Seven of the deaths were infants with Black mothers and two were infants with white mothers, all of whom were non-Hispanic.
- None had COVID-19 listed as a cause of death or a listed condition on the death certificate (Figure 13).

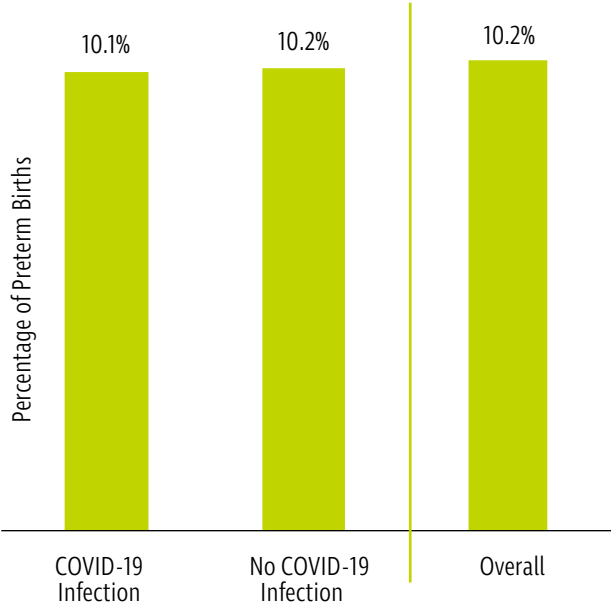
Figure 13: Characteristics of Postneonatal Deaths in Ohio Linked to 2020 Pregnancy-Related COVID-19 Infections (PRIs)

| | | |
|--|--------------|---|
| Age at Death | 1-4 months | 8 |
| | 5-8 months | 1 |
| Maternal Race | White | 2 |
| | Black | 7 |
| Maternal Ethnicity | Non-Hispanic | 9 |
| | Hispanic | 0 |
| COVID-19 as Cause of Death or Listed Condition | No | 9 |
| | Yes | 0 |

The CDC has advised that women infected with COVID-19 during pregnancy have increased risk for preterm birth and stillbirth and might be at risk for other pregnancy complications. Published data so far has shown mixed results on the association of COVID-19 infection in pregnancy and preterm birth. Most studies that have shown no association between COVID-19 infection in pregnancy and preterm birth included a large number of asymptomatic infections in their analyses.³⁻⁵ Multiple studies have found an association between women who experienced severe-to-critical infections and preterm birth, but no association between mild-to-moderate cases and preterm birth.⁶⁻⁹ No significant association between a 2020 PRI and preterm birth was observed in our data (Figure 14). This may be due to the fact that our analysis included all pregnant women with a confirmed COVID-19 test, regardless of symptoms.

ODH is currently collecting data to restrict analyses of preterm birth to symptomatic or severe COVID-19 cases, as the association between PRI and preterm birth may differ between symptomatic and asymptomatic maternal infections.

Figure 14: Prevalence of Preterm Births to Ohio Mothers by Pregnancy-Related COVID-19 Infection (PRI) Status, March 2020-February 2021



SECTION 3: A DEEPER LOOK

Throughout this section, Hispanic infant mortality rates and percentages are combined for 2016-2020. This is because there are many instances in which there are fewer than 10 Hispanic infant deaths in a particular subgroup (e.g., smoking in the third trimester) in a single year. This can cause high variability in percentages or rates and may not reflect real changes in characteristics associated with infant mortality. Combining years of data increases the reliability of these numbers and diminishes the impact of year-to-year variation. Non-Hispanic infant deaths are also combined across five years so they are directly comparable to the five-year Hispanic rates.

Infant Mortality by Gestational Age and Birth Weight

Preterm birth is one of the largest risk factors for infant mortality. About two-thirds (65.7%) of infants who died in 2020 were born preterm (less than 37 weeks gestation). In comparison, just 10.3% of all infants born in 2020 were preterm (Figure 15). Similarly, while infants born at less than 24 weeks gestation made up just 0.2% of births, they made up 30.3% of infant deaths.

Figure 15: Ohio Preterm Infants Die at a Much Higher Rate Than Infants Born Full Term

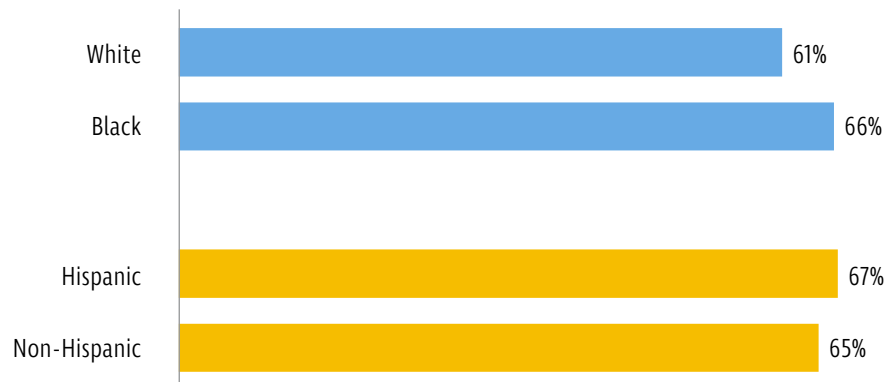


Data Source: Period Linked Infant Death and Resident Birth File from the Ohio Department of Health, Bureau of Vital Statistics.

Among Black infants who died, 43% were born at less than 24 weeks gestation. Among white infants who died, 23% were born at less than 24 weeks gestation. Among Hispanic infants who died, 40% (versus 34% non-Hispanic) were born at less than 24 weeks gestation.

Low birth weight (less than 2,500 grams, or about 5.5 pounds) is highly associated with preterm birth, but it can also be related to infection during pregnancy, maternal smoking, alcohol or drug abuse, and maternal age. Sixty-four percent of infants who died were born with low birth weights, and this was more common among Black infants than white infants, 66% and 61% respectively (Figure 16).

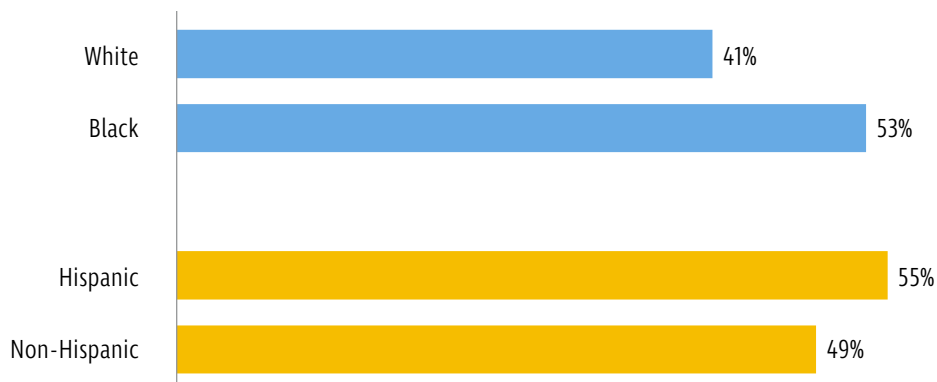
Figure 16: *Low Birth Weight Was More Common Among Black Infants who Died



Data Source: Period Linked Infant Death File from the Ohio Department of Health, Bureau of Vital Statistics.
* Low birth weight: Less than 5.5 pounds (2,500 grams)

Overall, 45% of infants who died had very low birth weights (less than 1,500 grams, or about 3.3 pounds). Compared with low birth weight, disparities in very low birth weight by race and ethnicity are more apparent. More than half of Black infants who died (53%) were born with very low birth weights, compared with 41% of white infants who died (Figure 17). Hispanic infants who died were more likely to be born with very low birth weights, compared to non-Hispanic infants who died, 55% vs. 49%, respectively (Figure 17).

Figure 17: *Very Low Birth Weight Was More Common Among Black and Hispanic Infants who Died

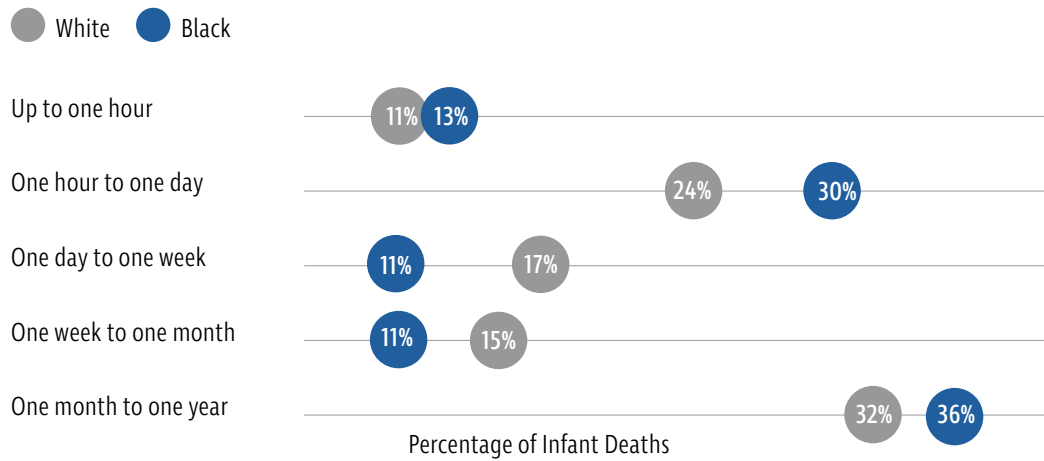


Data Source: Period Linked Infant Death File from the Ohio Department of Health, Bureau of Vital Statistics.
* Very low birth weight: Less than 3.3 pounds (1,500 grams)

Almost one in four infants who died (23%) was born small for gestational age, meaning those infants had a birth weight at or below the 10th percentile, considering the infant's gestational age and sex.

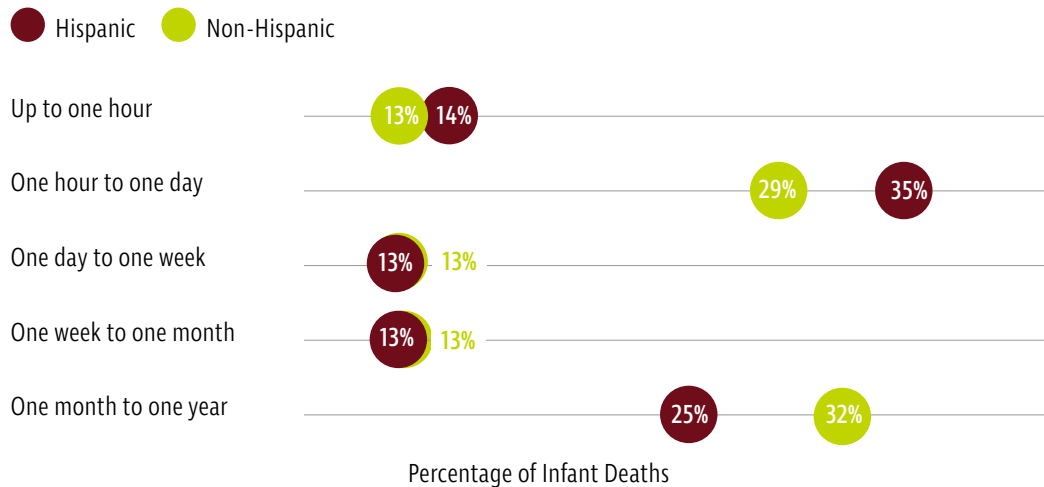
Among all infants who died in 2020, about half (53%) did not survive beyond one week. Thirteen percent died in their first hour of life, an additional 26% died within their first day, and an additional 14% died during their first week. Black infants and Hispanic infants were more likely to die within their first day of life, compared with white infants and non-Hispanic infants, respectively (Figure 18, Figure 19).

Figure 18: Black Infants Were More Likely to Die in the First Day of Life



Data Source: Period Linked Infant Death File from the Ohio Department of Health, Bureau of Vital Statistics.

Figure 19: Hispanic Infants Were More Likely to Die Within the First Day of Life



Data Source: Period Linked Infant Death File from the Ohio Department of Health, Bureau of Vital Statistics.

Leading Causes of Infant Death

The Ohio Department of Health uses the Modified Dollfus classification system to monitor the leading causes of infant deaths.¹⁰ This system groups the underlying causes of death into the following categories: birth asphyxia, congenital anomalies (birth defects), external injuries, obstetric (OB) conditions, perinatal infections, other infections, prematurity related conditions, and sudden infant death syndrome (SIDS).^{*} Causes of death that do not fall into these classifications are classified as "other."

Among all infant deaths, prematurity related conditions were the most common cause of death (29%), followed by congenital anomalies (20%) and external injuries (10%). Eight percent of deaths were due to SIDS (Figure 20, Table 3). For the first time in the past decade, the leading cause of death among white infants was congenital anomalies, not prematurity related conditions.

Figure 20: Prematurity-related Conditions are the Leading Cause of Infant Death

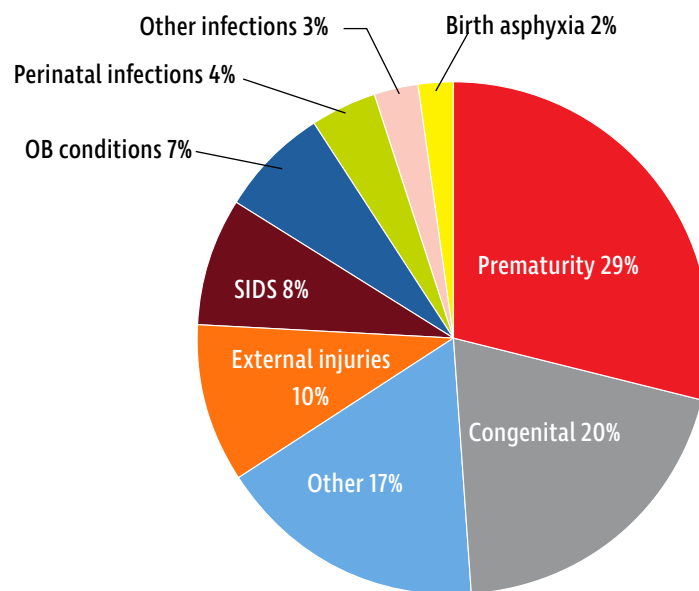


Table 3: Top 5 Causes of Infant Death by Race, Ohio (2020)

| Rank | Overall | White | Black |
|------|--------------------------------|---|---------------------------------|
| 1 | Prematurity related conditions | Congenital anomalies | Prematurity related conditions |
| 2 | Congenital anomalies | Prematurity related conditions | Obstetric conditions |
| 3 | External injuries | External injuries | Congenital anomalies/SIDS (tie) |
| 4 | SIDS | SIDS | External injuries |
| 5 | Obstetric conditions | Obstetric conditions/perinatal infections (tie) | Perinatal infections |

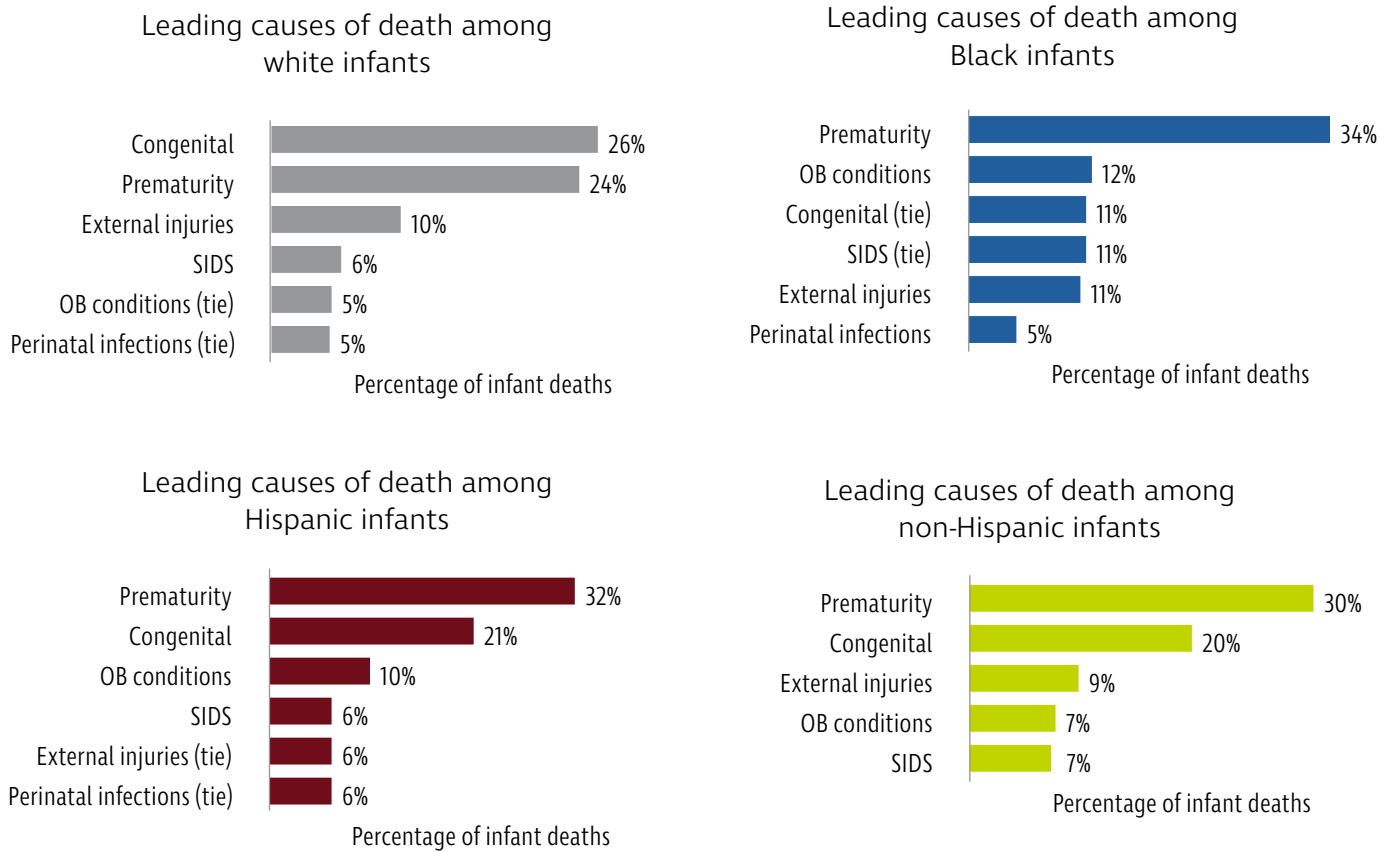
Table 4: Top 5 Causes of Infant Death by Ethnicity, Ohio (2016-2020*)

| Rank | Overall | Hispanic | Non-Hispanic |
|------|--------------------------------|--|--------------------------------|
| 1 | Prematurity related conditions | Prematurity related conditions | Prematurity related conditions |
| 2 | Congenital anomalies | Congenital anomalies | Congenital anomalies |
| 3 | External injuries | Obstetric conditions | External injuries |
| 4 | SIDS | SIDS | Obstetric conditions |
| 5 | Obstetric conditions | External injuries/perinatal infections (tie) | SIDS |

*Multiple years of data are combined for the Hispanic population due to high variability based on small numbers.
 Data Source: Period Linked Infant Death File from the Ohio Department of Health, Bureau of Vital Statistics.

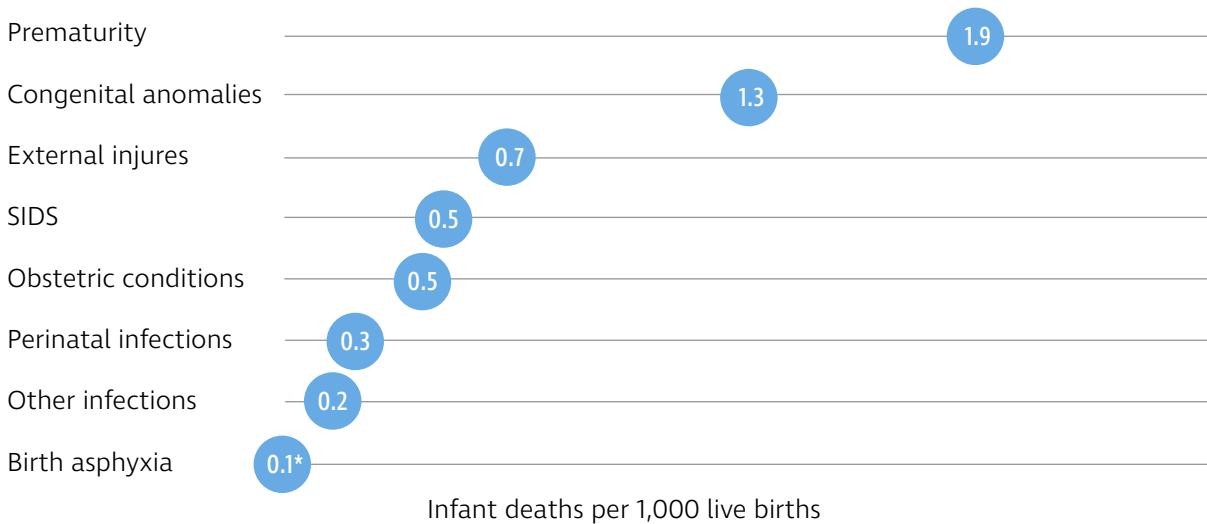
Note: Sleep-related deaths do not fall within a specific cause of death. Often, sleep-related infant deaths are approximated by sudden unexpected infant deaths (SUID), which include SIDS, a portion of deaths due to external injury, and undetermined deaths. Case reviews conducted by county-level child fatality review boards determine whether an infant death was related to the sleep environment.

Figure 21: Leading Causes of Infant Death by Race and Ethnicity, Ohio (2020)



The infant mortality rate from prematurity related conditions decreased slightly from 2.0 per 1,000 live births in 2019 to 1.9 in 2020, and the infant mortality rate due to external injury fell from 0.8 in 2019 to 0.7 in 2020 (Figure 22). The infant mortality rate from SIDS increased slightly from 0.4 in 2019 to 0.5 in 2020 (Figure 22). The infant mortality rates due to congenital anomalies and obstetric conditions did not change from 2019.

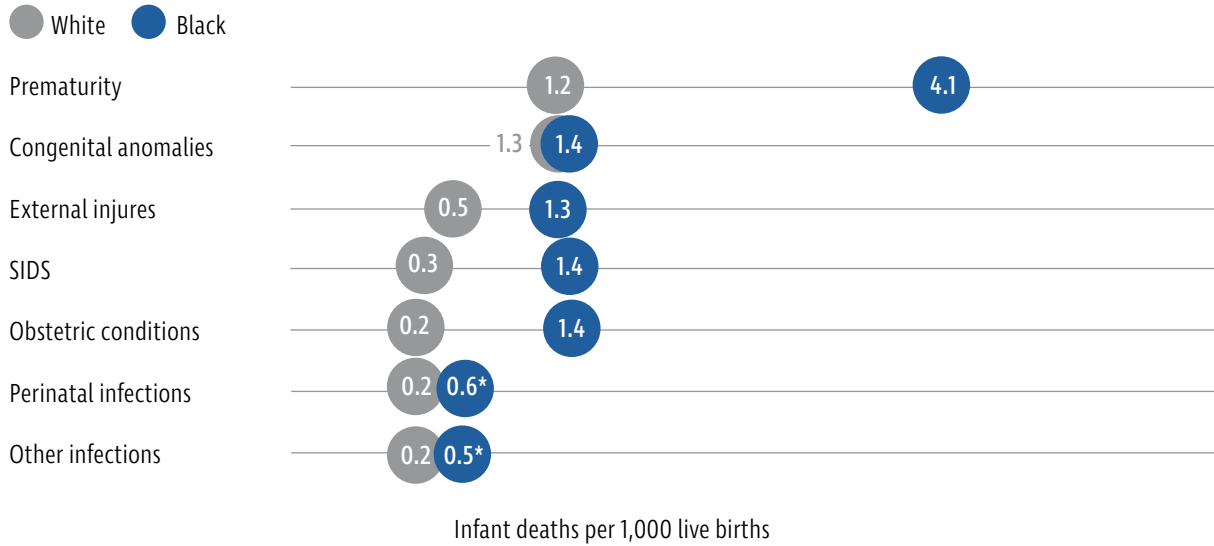
Figure 22: Prematurity is The Leading Cause of Infant Mortality



Data Source: Period Linked Infant Death File from the Ohio Department of Health, Bureau of Vital Statistics.
 *Rates based on fewer than 20 infant deaths should be interpreted with caution.

Although there are disparities between Black and white infants across all causes of death, the disparity varies by specific cause (Figure 23). Black infants were more likely to die from every cause of death and were more than three times as likely to die from prematurity related conditions, compared with white infants. There are also large racial differences in infant deaths from external injuries, SIDS, and obstetric conditions (Figure 23).

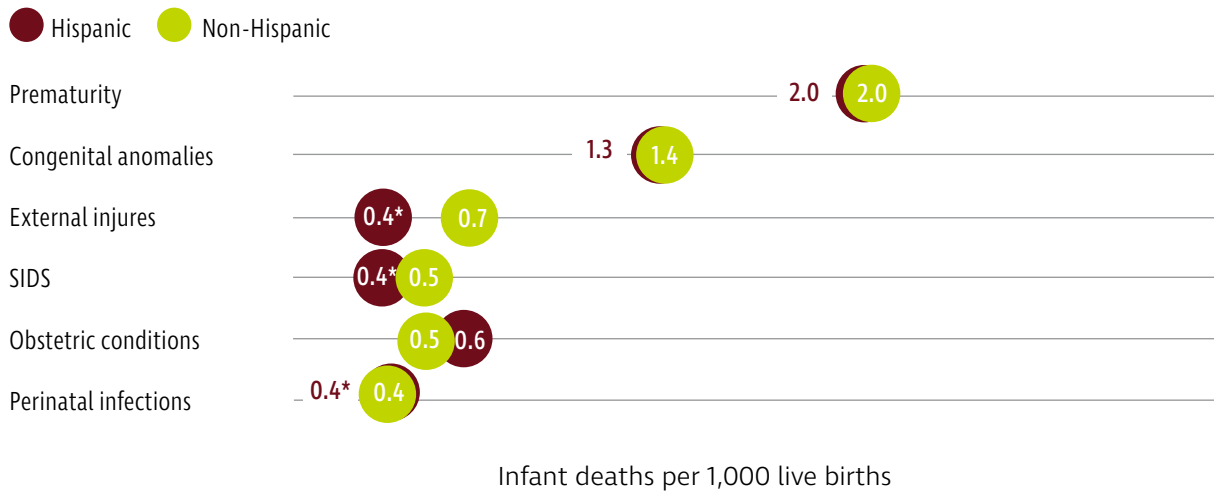
Figure 23: Black Infants Were More Likely to Die From Every Cause of Death



Data Source: Period Linked Infant Death File from the Ohio Department of Health, Bureau of Vital Statistics.

* Rates based on fewer than 20 infant deaths should be interpreted with caution.

Figure 24: Hispanic Infants Had Similar Rates of Death Compared With Non-Hispanic Infants



Data Source: Period Linked Infant Death File from the Ohio Department of Health, Bureau of Vital Statistics.

The Hispanic mortality rate for other infections and the mortality rates for birth asphyxia are suppressed due to a numerator less than 10.

* Rates based on fewer than 20 infant deaths should be interpreted with caution.

Congenital Syphilis

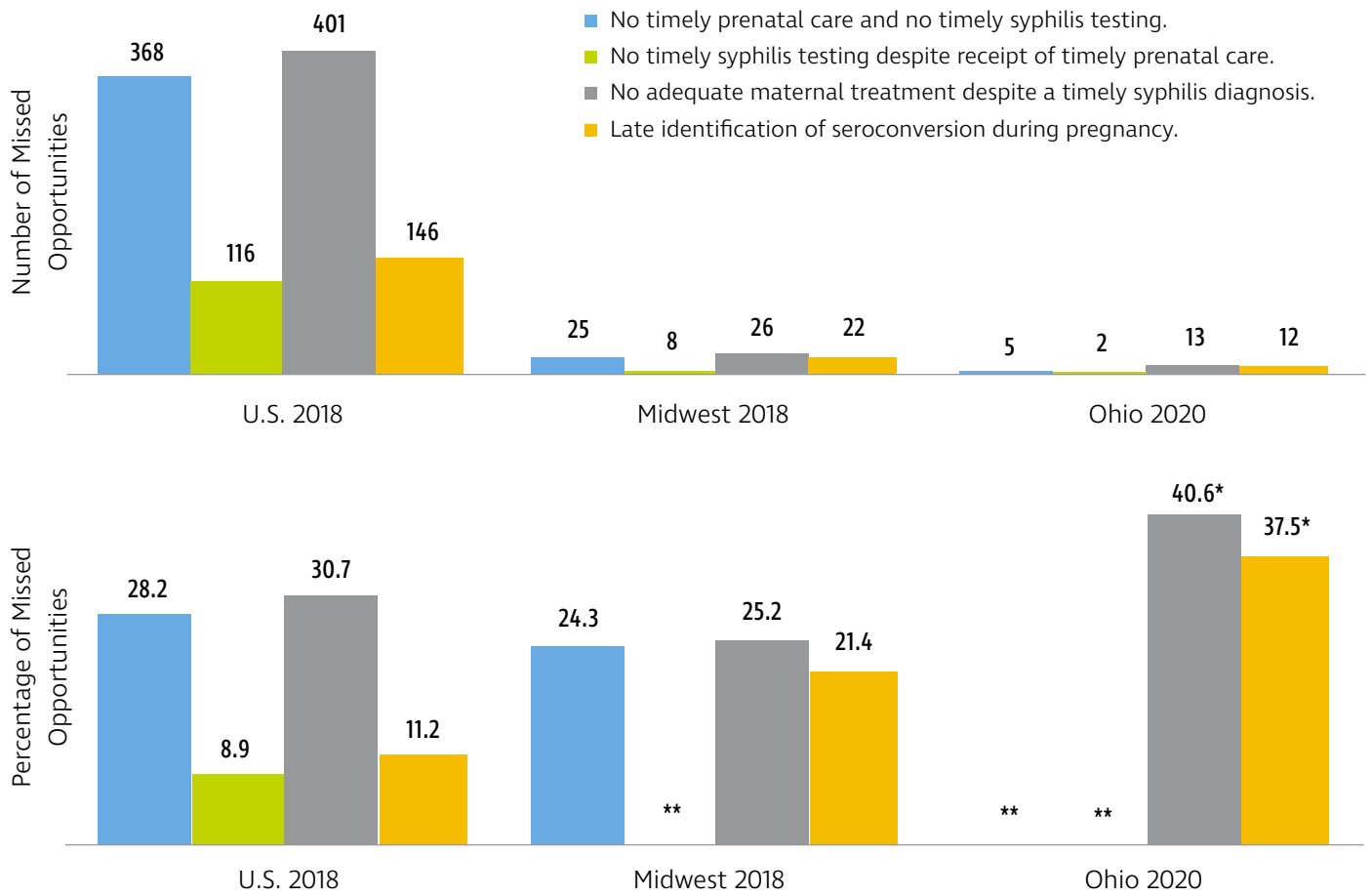
Congenital syphilis (CS) occurs when the sexually transmitted pathogen *Treponema pallidum* is spread to a fetus in pregnancy. CS can cause skin rashes, low birth weight, prematurity, bone deformities, severe anemia, enlarged liver and spleen, jaundice, brain and nerve damage, meningitis, miscarriage, stillbirth, and death shortly after birth. Prior to childbirth, the risk for fetal infection is related to the stage of syphilis during pregnancy. Primary and secondary syphilis have the highest risk of fetal infection, though risk is still significant in pregnant women with late syphilis.

In Ohio, CS cases have recently increased 146% from 13 cases in 2016 to 32 cases in 2020, including two syphilitic stillbirths. While CS cases represent less than 2% of total syphilis cases reported in Ohio, rising incidence is especially concerning for this preventable but potentially life-threatening condition. At both the state and national levels, the increase in CS cases parallels the increase in cases of infectious syphilis among women of reproductive age. This upward trend continued through the remainder of 2021*, surpassing the number of Ohio CS cases reported in 2020. As of July 14, 2022, 49 CS cases have been reported for 2021, five of which were stillbirths.

Common missed prevention opportunities for CS are shown in Figure 25 (on page 27). The greatest difference between Ohio and national trends is in late identifications of seroconversion during pregnancy, which represented 11.2% of CS cases nationally in 2018 and 37.5% of Ohio CS cases in 2020. Seroconversion during pregnancy is classified as having a negative syphilis test early in pregnancy and a positive syphilis test less than 30 days before delivery, on the day of delivery, or up to 90 days after delivery. This discrepancy can be at least partially attributed to differing prenatal screening requirements across states. While most states — including Ohio — require syphilis screening at the first prenatal visit, 14 states also require that all pregnant women are retested in the third trimester, with another five states requiring third trimester testing for women at high risk. These requirements allow healthcare providers to identify women who are infected with syphilis during pregnancy with enough time to treat adequately to avert congenital syphilis.

*2021 data is preliminary.

Figure 25: Missed Congenital Syphilis Prevention Opportunities Among Mothers of Infants with Congenital Syphilis



Source: Ohio Department of Health, STD Surveillance Program. Data reported as of Nov. 19, 2021.

Provisional data. Numbers subject to change when additional information is gained.

*Rates based on fewer than 20 infant deaths should be interpreted with caution.

**Rates based on fewer than 10 infant deaths do not meet standards of reliability or precision and are suppressed.

Missed prevention opportunity not identified: U.S. 2018 (275 cases), Midwest 2018 (22 cases), Ohio 2020 (one case).

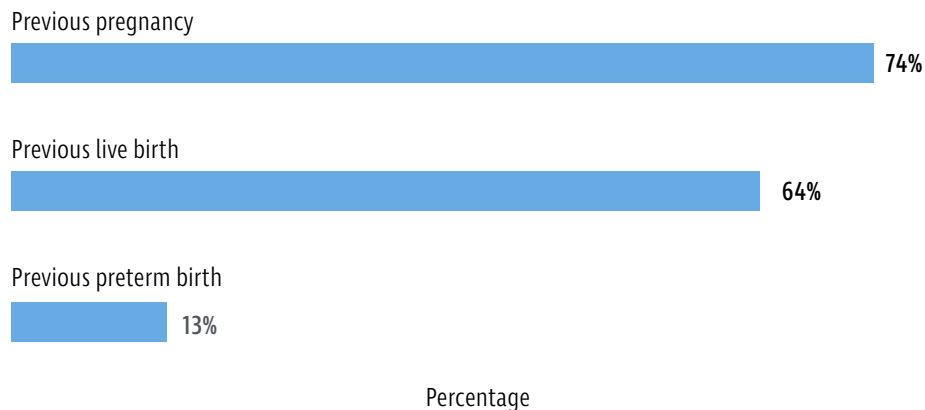
Midwest: Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin.

Pre-pregnancy Maternal Characteristics Associated With Infant Death

Certain maternal health behaviors, characteristics, and health conditions are associated with increased risk of infant death. It is important that these issues be addressed in the preconception or interconception period (postpartum period and between pregnancies). Culturally appropriate care and counseling is vital for modifying health behaviors and controlling health conditions. It is also vital to identify the underlying institutional and societal factors that contribute to these behaviors and conditions.

Three-quarters (74%) of Ohio infants who died in 2020 were born to mothers who had a previous pregnancy (Figure 26). Sixty-four percent were born to mothers with a previous live birth, and 13% were born to mothers with a previous preterm birth. Previous preterm birth was more common among Black mothers (17%) than white mothers (11%).

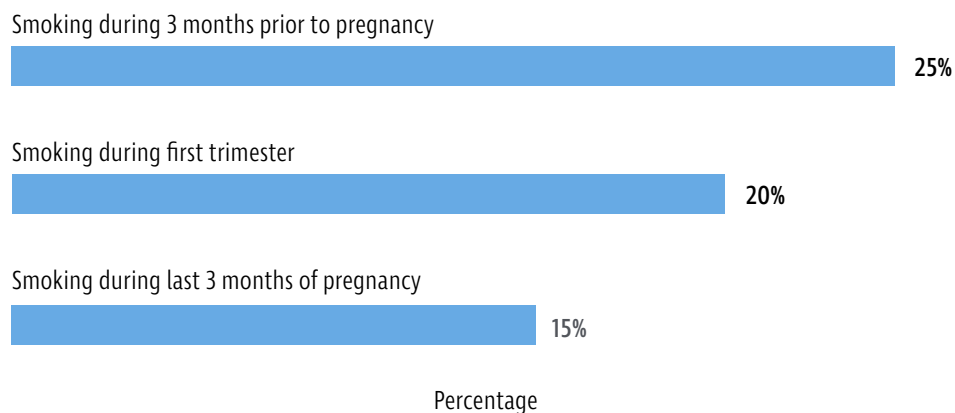
Figure 26: Most Mothers of Infants Who Died Had at Least One Prior Pregnancy



Maternal Smoking

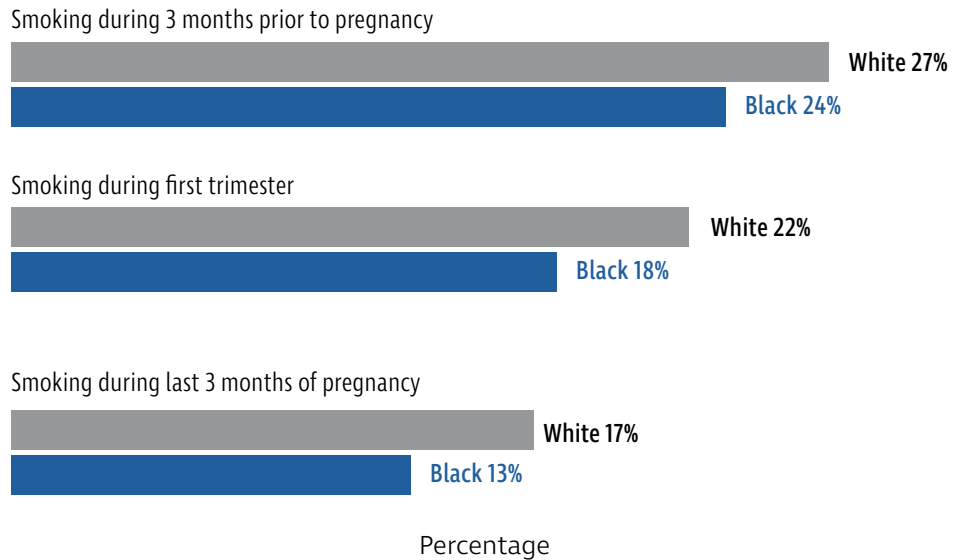
One-quarter of infants who died (25%) were born to mothers who reported smoking during the three months prior to pregnancy. One-fifth of infants who died (20%) were born to mothers who reported smoking during the first trimester of pregnancy, and 15% were born to mothers who smoked during the last three months of pregnancy. (Figure 27).

Figure 27: Smoking Was Common Before and During Pregnancy Among Mothers Whose Infants Died



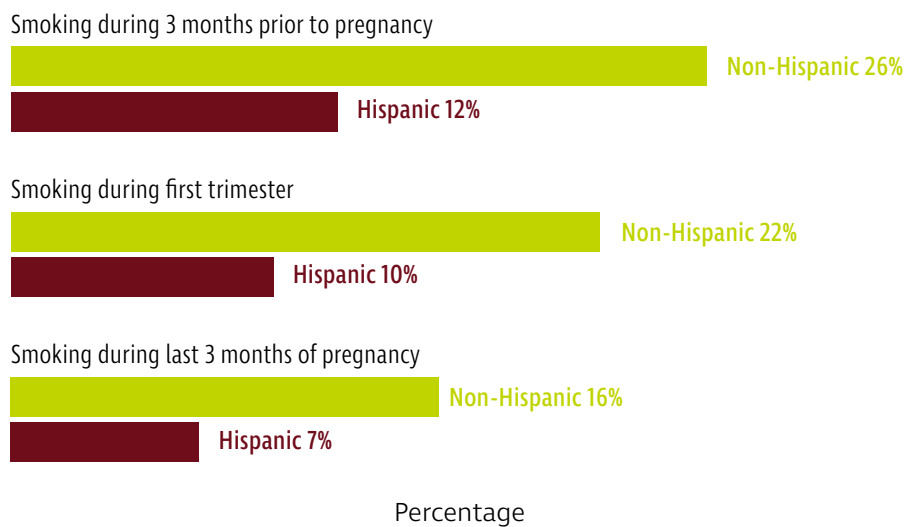
Smoking, both before and during the first trimester, was slightly more common among white mothers, compared with Black mothers. Twenty-seven percent of infants who were born to white mothers and died had a mother who smoked before pregnancy, compared with 24% of those who were born to Black mothers (Figure 28). Similarly, 22% of white infants who died had mothers who smoked during the first trimester, compared with 18% of those born to Black mothers (Figure 28).

Figure 28: White Mothers Were More Likely to Smoke Cigarettes Before and During Pregnancy



Hispanic mothers of infants who died were much less likely to smoke before and during pregnancy than non-Hispanic mothers of infants who died (data are combined from 2016-2020) (Figure 29).

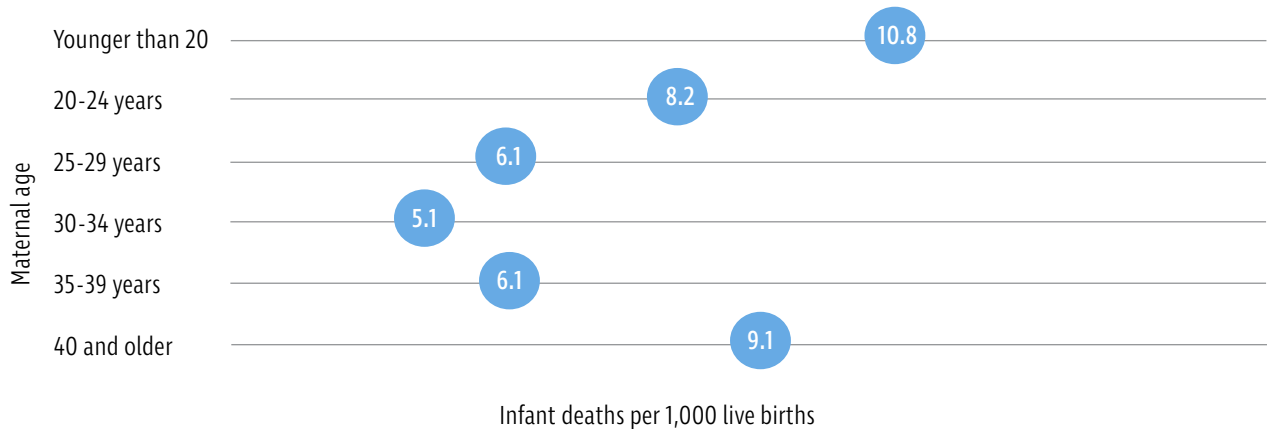
Figure 29: Hispanic Mothers Were Much Less Likely to Smoke Cigarettes Before and During Pregnancy



Maternal Age

Infant mortality rates varied by maternal age group (Figure 30). Infants with mothers younger than 20 experienced the highest infant mortality rate (10.8 deaths per 1,000 live births), followed by those with mothers aged 40 and older (9.1 deaths per 1,000 live births). The lowest infant mortality rate was for infants whose mothers were between the ages of 30 and 34 (5.1 deaths per 1,000 live births).

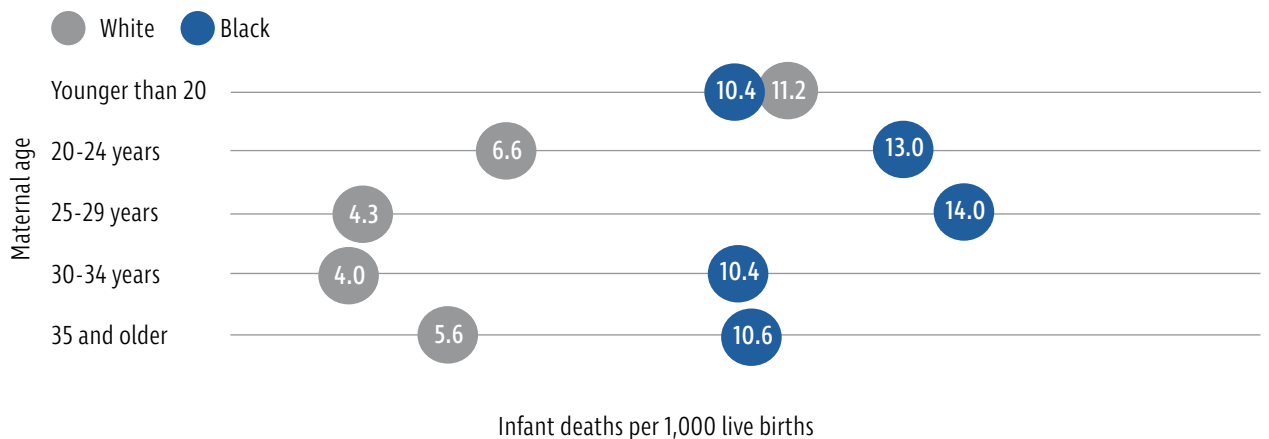
Figure 30: Infants Born to Mothers Between the Ages of 30 and 34 Years Experienced the Lowest Infant Mortality Rates



Data Source: Resident Birth and Mortality Files from the Ohio Department of Health Bureau of Vital Statistics.

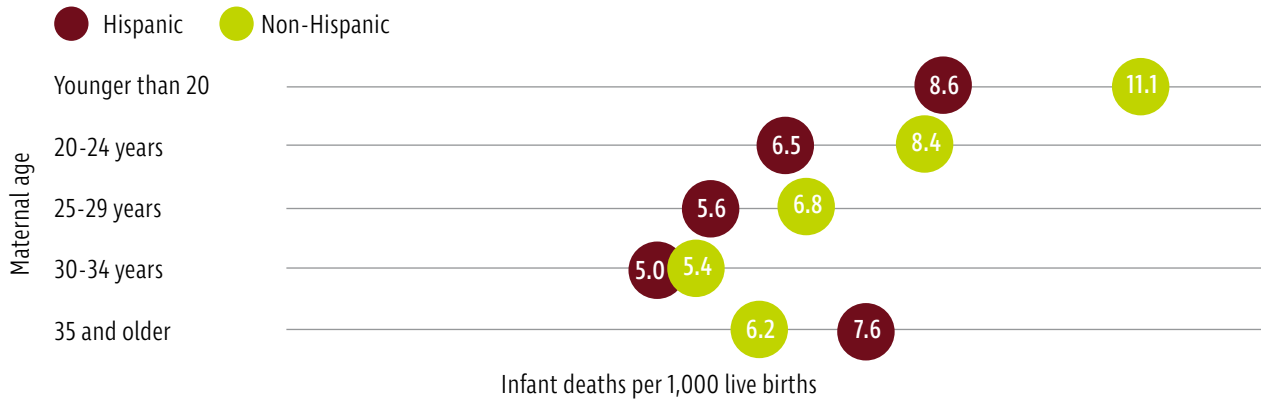
The age group with the greatest disparity between Black and white infant mortality was 25-29 years. The Black infant mortality rate for infants with mothers aged 25-29 years was 14.0 per 1,000 live births, more than three times greater than the white infant mortality rate of 4.3 for the same maternal age group. In contrast, while infants born to mothers younger than age 20 had the highest mortality rate overall (10.8), Black infants had a slightly lower infant mortality rate compared with white infants. The mortality rate for infants born to Black mothers younger than age 20 was 11.2, compared with 10.4 for infants born to white mothers younger than age 20 (Figure 31).

Figure 31: Infants Born to Black Mothers Experienced Higher Infant Mortality Rates in Every Age Group Except Those Younger Than 20 Years



Data Source: Resident Birth and Mortality Files from the Ohio Department of Health Bureau of Vital Statistics.

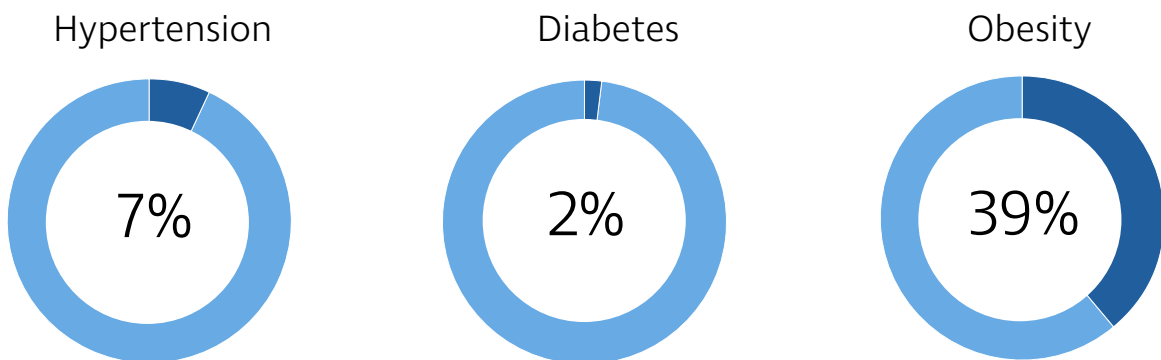
Figure 32: Hispanic Mothers Experienced Lower Infant Mortality Rates in Every Age Group Except for Those Aged 35 and Older



Data Source: Resident Birth and Mortality Files from the Ohio Department of Health Bureau of Vital Statistics.

Pre-pregnancy Maternal Health Conditions

Among infants who died, 7% had mothers with pre-pregnancy hypertension, 2% had mothers with pre-pregnancy diabetes, and 39% had mothers who were obese prior to pregnancy.



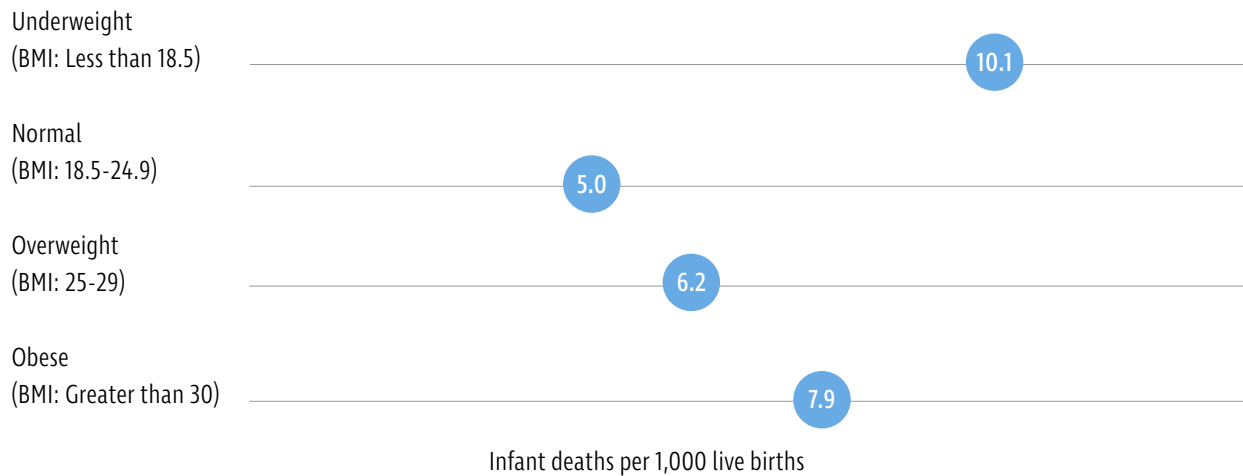
Maternal Weight

Thirty-nine percent of infants who died had mothers who were obese (body mass index greater than 30kg/m²) prior to pregnancy. Among infants who died, obesity was more common in infants born to Black mothers (50%) compared with those born to white mothers (34%) and in those born to non-Hispanic mothers (38%) compared with Hispanic mothers (34%). For reference, 35% of women ages 19-44 in Ohio are considered obese, according to the 2019 Ohio Medicaid Assessment Survey.

Mortality rates were highest among infants whose mothers were underweight (10.1 per 1,000 live births), compared with mothers who were obese (7.9), overweight (6.2), or at normal weight (5.0).

Causes of death varied by mother's body mass index (BMI) category. Prematurity-related conditions were the most common cause of death for every category.

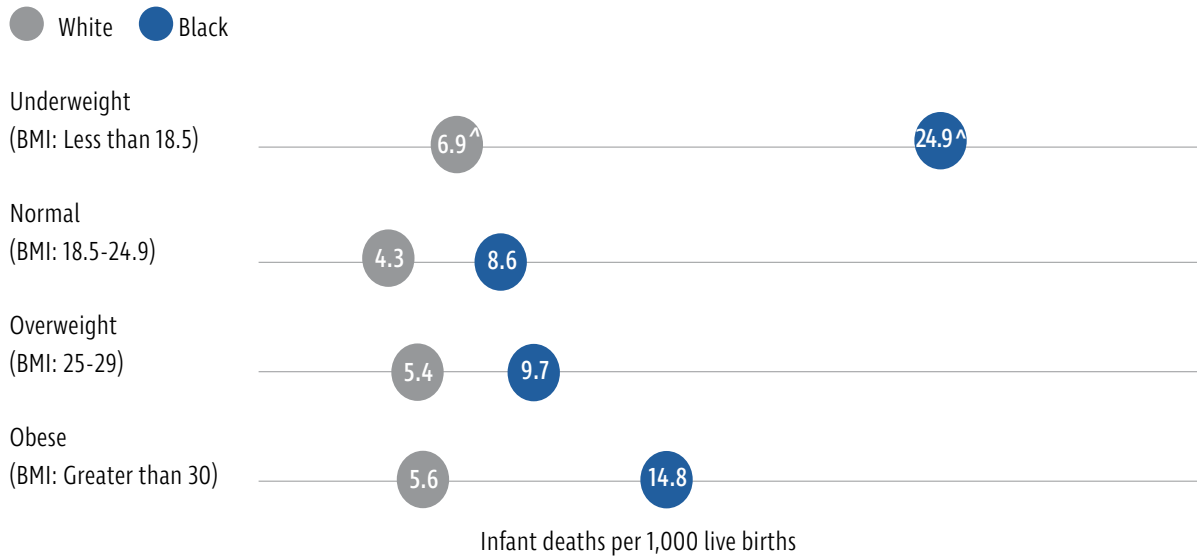
Figure 33: Mothers With Normal BMI* Had The Lowest Rate of Infant Mortality



*Normal BMI = Body mass index between 18.5 and 24.9.

Data Source: Resident Birth and Mortality Files from the Ohio Department of Health Bureau of Vital Statistics.

Figure 34: Within Every BMI* Category, Black Mothers Experienced Higher Infant Mortality Rates



*BMI = Body mass index.

[^]Rates based on fewer than 20 infant deaths should be interpreted with caution.

Data Source: Resident Birth and Mortality Files from the Ohio Department of Health Bureau of Vital Statistics.

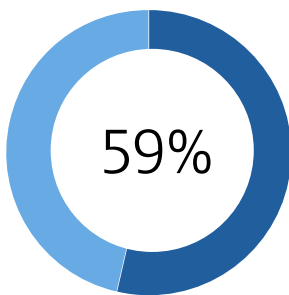
Access to Care

More than half of infant deaths (59%) were to mothers reporting Medicaid[‡] as their source of insurance. This is higher than the percentage of births that were paid for by Medicaid (41%).

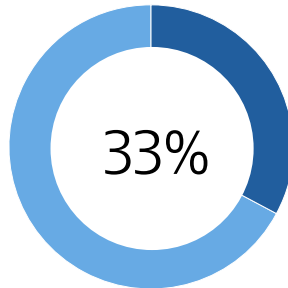
Thirty-two percent of infants who died had mothers who reported Medicaid insurance but did not participate in the Supplemental Nutrition Program for Women, Infants, and Children (WIC). The program aims to reduce infant mortality by reducing the incidence of babies born at low birth weights, and provides support services necessary for full-term pregnancies. This suggests that these women may have been eligible for WIC but did not or could not access the program.

Lack of prenatal care in the first trimester was common. Overall, about two in five infants who died (39%) were born to mothers who did not receive first trimester prenatal care. This was more common among infants born to Black mothers (41%), compared with those born to white mothers (29%). For comparison, 27% of Ohio infants born in 2020 did not have first trimester prenatal care.

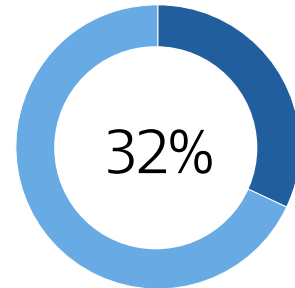
Presumed Medicaid



WIC participation



Presumed Medicaid, no WIC



[‡] Determined by payer of birth as indicated on the birth record.

The Ohio Department of Health (ODH) is leveraging datasets on the Innovate Ohio Platform (IOP) to establish cross-program and cross-agency strategic initiatives that lead to better health outcomes.

- **Cross-Program Eligibility:** ODH is working with the Ohio Department of Job and Family Services (ODJFS) on a portal to confirm financial eligibility for WIC participation. With a WIC applicant's permission, local WIC staff can search the name and date of birth to find out if the applicant is enrolled in Medicaid, and/or receives Supplemental Nutrition Assistance Program (SNAP) benefits, and/or Temporary Assistance for Needy Families (TANF). Participation in these programs automatically qualifies an applicant financially for WIC services.
- **Home Visiting Referral Portal:** The Help Me Grow Web Referral Form is an online form that can be used to refer a pregnant woman/new parent to Home Visiting, Early Intervention, and/or WIC. Once completed, the form is automatically sent to the appropriate party, and follow-ups are made. The form is available at www.helpmegrow.org under the "Sign Up or Refer" section.

WIC offices will work with ODH to document and report outreach attempts in order to secure enrollment.

Infants Born at Less Than 24 Weeks Gestation

Thirty percent of infants who died in 2020 were born before reaching 24 weeks of gestation despite accounting for just 0.2% of births. From the 1950s through 1980, newborn deaths almost always occurred with delivery of an infant at or before 24 weeks of gestation. Even today, delivery before 23 weeks of gestation typically results in neonatal death (5-6% chance of survival), and among rare survivors, significant morbidity is universal (98-100%).¹¹ Black infants made up a higher proportion of deaths occurring before 24 weeks gestation than white infants (49% compared with 44%, respectively) (Figure 35).

Prior to pregnancy

- Forty-five percent of these infants had mothers who were obese prior to pregnancy.
- Nineteen percent of infants who died and were born before 24 weeks gestation had mothers who smoked during the three months prior to becoming pregnant.
- One-third of these infants were conceived less than 18 months after a previous live birth.
- Seventeen percent of these infants were born to mothers who had a previous preterm birth.

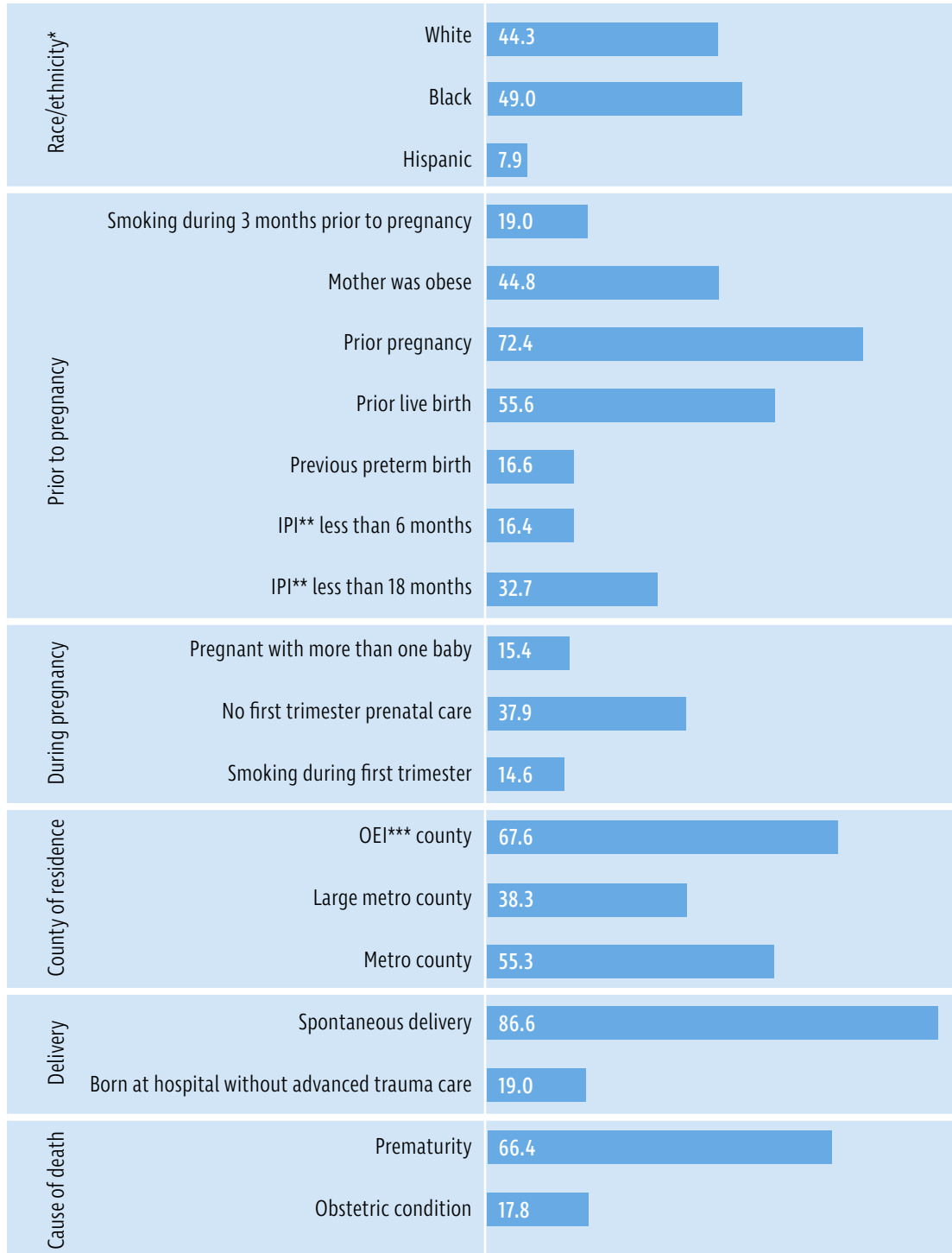
During pregnancy

- Thirty-eight percent of infants who died and were born before 24 weeks gestation were born to mothers who did not have first trimester prenatal care.
- Fifteen percent of infants who died and were born before 24 weeks gestation were part of multiple births (e.g., twin or triplet births).
- Fifteen percent of these infants had mothers who smoked during the first trimester of pregnancy.

Cause of Death

Among infants who died and were born before 24 weeks gestation, 66% died of prematurity and related conditions, and 18% died of obstetric conditions.

Figure 35: Maternal and Infant Attributes of Ohio Infants Who Were Born Before 24 Weeks Gestation and Died (2020)



Data Source: Resident Birth and Mortality Files from the Ohio Department of Health Bureau of Vital Statistics.

*There were 17 infant deaths born to mothers of unknown race or a race other than white or Black.

**Interpregnancy interval.

***Ohio Equity Institute: During 2020, OEI counties included the nine Ohio counties with the greatest racial disparities in infant mortality. (See Appendix A.)

METHODS

This report contains data from the Birth Resident, Mortality, and Infant Mortality Period data sets that are part of Ohio's Vital Statistics System. The numerator for rates (deaths) is calculated from the Mortality data set, while the denominator (live births) is calculated from the Birth Resident data set. Therefore, for race and ethnicity specific rates, the numerator is based on infant race or ethnicity as reported on the death certificate, while the denominator is based on the mother's race or ethnicity as reported on the birth certificate. Rates and percentages for subcategories with fewer than 10 infant deaths are suppressed due to insufficient reliability or confidentiality requirements. Causes of infant death were categorized using modified Dollfus criteria, which organizes infant deaths by cause and amenability to prevention efforts.²

For "Section 2: A Deeper Look," race and ethnicity are defined as the mother's self-reported race and ethnicity on the birth certificate.

Trend analyses were conducted using Joinpoint software, which tests for significant trends over time and identifies time points when changes in trends occur. References to rates increasing, decreasing, or being different from one another indicate that differences that are not or changes are statistically significant at the $p < 0.05$ level. Observed differences between categories or over time that are not statistically significant are not mentioned in the text.

The Jenks natural breaks classification method was used to group counties by infant mortality rate for the map on page 10. This data-clustering method creates classes or groups based on natural groupings. This is done by reducing the variance within classes and maximizing the variance between classes.

COVID-19 Section Methodology

ODH is collecting data on women who were infected with SARS-CoV-2, the virus that causes coronavirus disease 2019 (COVID-19), during pregnancy with the goal of investigating the effect of pregnancy-related COVID-19 infections (PRIs) on the health-related outcomes of both mothers and infants. This is achieved by linking completed pregnancies from ODH Vital Statistics (VS) to confirmed cases of COVID-19 in the Ohio Disease Reporting System (ODRS) using Link Plus Version 2.0 software. Analyses were limited to laboratory-confirmed PRIs that occurred in 2020 to better align with the CDC's sampling method and ODH data submissions to CDC.

From March 2020 through August 2021 there were 189,164 live births in Ohio, 3,130 of which were linked to a 2021 PRI and were excluded from analysis. Of the remaining 186,034 live births, 7,126 (3.8%) were linked to a 2020 COVID-19 infection that occurred during the pregnancy.

During the March 2020 through August 2021 period there were 1,091 fetal deaths in Ohio, 15 of which were linked to a 2021 PRI. Of the remaining 1,076 fetal deaths, 42 (3.8%) were linked to a 2020 COVID-19 infection.

Perinatal COVID-19 infections were defined per CDC recommendation as laboratory-confirmed SARS-CoV-2 infection occurring during the first 14 days of life among infants whose mothers experienced a PRI.

The above data is current as of Sept. 7, 2021. The findings are preliminary and subject to change.

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Ohio Department of Health. 2020.

APPENDIX A: Resources for Additional Data

Medicaid Report on Pregnant Women, Infants and Children

This report is provided in compliance with Section 5162.13 of the Ohio Revised Code requiring the Ohio Department of Medicaid (ODM) to report annually about the effectiveness of the Medicaid program meeting the healthcare needs of low-income pregnant women, infants, and children. In addition, this report focuses on infant mortality, preterm births, and low birthweight infants.

Link: <https://medicaid.ohio.gov/static/Stakeholders%2C+Partners/ReportsandResearch/Ohio+Medicaid+2020+Pregnant+Women+Infants+and+Children+Report.pdf>.

Ohio Equity Institute Annual Report

The Ohio Equity Institute (OEI): Working to Achieve Equity in Birth Outcomes is a grant-funded collaboration between the Ohio Department of Health and local partners created in 2012 to address racial inequities in birth outcomes. Population data is used to target areas for outreach and services in the nine counties with the largest disparities.

Link: <https://odh.ohio.gov/wps/portal/gov/odh/know-our-programs/infant-vitality/oei/2019-oei-annual-report>.

Ohio Fetal Mortality Brief

The Ohio Fetal Mortality Brief is an investigation of fetal deaths using Vital Statistics records. The brief explains fetal death terminology, describes trends over time, and contextualizes rates by race, ethnicity, and other risk factors.

Link: https://odh.ohio.gov/wps/wcm/connect/gov/e03d82ab-be30-4fc6-a90f-f5156ea270cd/Ohio+Fetal+Mortality+Brief%2C+2019.pdf?MOD=AJPERES&CONVERT_TO=url&CACHEID=ROOTWORKSPACE.Z18_K9I401S01H7F40QBNJU3SO1F56-e03d82ab-be30-4fc6-a90f-f5156ea270cd-nFEoe2P.

Ohio Medicaid Assessment Survey (OMAS)

The Ohio Medicaid Assessment Survey (OMAS) is an Ohio-specific assessment that provides healthcare access, utilization, and health status information about residential Ohioans at the state, regional, and county levels, with a concentration on Ohio's Medicaid, Medicaid-eligible, and non-Medicaid populations. The OMAS mission is to assist the efficient and effective administration of Ohio's Medicaid program.

Link: <https://grc.osu.edu/OMAS>.

Ohio Pregnancy Assessment Survey (OPAS)

The Ohio Pregnancy Assessment Survey (OPAS) is a statewide, ongoing, targeted population-based survey that utilizes the Centers for Disease Control and Prevention (CDC) Pregnancy Risk Assessment Monitoring System (PRAMS) methodology to collect information on and attitudes of residential women who had live births in Ohio.

ODH Webpage Link: <https://odh.ohio.gov/wps/portal/gov/odh/know-our-programs/ohio-pregnancy-assessment-survey-opas/welcome>.

OPAS Data Dashboard 2016-2019: <https://grc.osu.edu/OPAS>.

Quarterly Scorecard and Appendices

These preliminary birth outcome reports use Vital Statistics data available at the time of the analyses. With preliminary data, there may be changes in the results from report to report. The analyses are conducted on rolling 12-month periods that overlap by three months.

Link: <https://odh.ohio.gov/wps/portal/gov/odh/know-our-programs/infant-and-fetal-mortality/reports>.

APPENDIX B: Summary of Ohio Department of Health Birth Outcome Improvement Strategies

It's important to recognize that many families, parents, or caregivers have lost infants through no fault of their own. Social factors, such as where they live, how much money or education they have, and how they are treated because of their racial or ethnic backgrounds, can also contribute to child deaths.

Segregation impacts access to high-quality education, employment opportunities, healthy foods, and healthcare.

Combined, the economic injustices associated with residential, educational, and occupational segregation have lasting health impacts that include adverse birth outcomes and infant mortality.

— Adapted from the National Center for Fatality Review and Prevention's
Structural Inequity Statement

Within the Ohio Department of Health, there are several intersecting sets of priorities to address infant mortality. They are described below.

Reducing infant mortality and related risk factors is a focus of the **State Health Improvement Plan (SHIP)**. The SHIP is a tool to strengthen state and local efforts to improve health, well-being, and economic vitality and takes a comprehensive approach to achieving equity and addressing the many factors that shape our health. The SHIP was developed with input received through a **State Health Assessment (SHA)** that included regional forums, an online survey, a steering committee with representatives from state agencies, and an advisory committee with subject matter experts from around the state. Strategies identified within the SHIP to address infant mortality include smoke-free policies, early childhood home visiting, and group prenatal care, as well as strategies that affect community conditions, health behaviors, and access to care. The SHIP provides state and local partners with a menu of these and other strategies to align efforts to improve infant health. For more information on the SHIP, see <https://odh.ohio.gov/wps/portal/gov/odh/about-us/sha-ship>.

Similar to the SHA, the Bureau of Maternal, Child, and Family Health (BMCFH) conducts a needs assessment specific to priority populations in alignment with funding received from the federal Title V Maternal and Child Health Services Block Grant Program ("Title V"). The goal is to address and prevent health issues faced by women, infants, children, youth, including children with special healthcare needs, and families. The SHA and the **Title V Needs Assessment** ensure a strong foundation for identifying and addressing maternal and child health issues. This collaboration between state and federal funders leverages shared goals and creates collective action to improve health outcomes and eliminate health disparities. In addition to providing funding and vital infrastructure, Title V provides a framework for identifying maternal and child health needs, selecting priorities, developing a state action plan, engaging partners, and measuring progress toward improving health outcomes. Efforts to address maternal and child health are organized around five key populations: women, children, children and youth with special healthcare needs, adolescents, and infants. Title V population activities emphasize developing a system and environment that supports health throughout the life course by coordinating across populations and addressing cross-cutting/systems issues. In the current five-year grant cycle, the infant workgroup aims to work with partners to support healthy pregnancies and improve birth and infant outcomes by addressing breastfeeding,

safe sleep, pregnancy and postpartum supports, and well-baby visits, focusing specifically on Black infant mortality. In addition, the women/maternal workgroup is focused on supporting women's health before pregnancy, decreasing risk factors for maternal morbidity and preterm birth, and increasing mental health support for women. Cross-cutting priorities to prevent and mitigate the effects of adverse childhood experiences and improve health equity are being addressed within each population and also at the systems level. Guiding principles for all Title V work include recognizing the importance of health in all stages of life, prioritizing equity within health improvement strategies, engaging families and communities, and using data to drive decisions and ensure accountability. For more information, see <https://odh.ohio.gov/wps/portal/gov/odh/know-our-programs/title-v-maternal-and-child-health-block-grant/title-v>.

Addressing the health of women and infants within their communities to achieve a statewide, population-level impact on reducing racial disparities and improving Black maternal and infant health is a priority for the BMCFH. Reducing infant mortality, and addressing factors that disproportionately impact Black infants, is also a priority of Governor Mike DeWine. By leveraging resources, relationships, and the expertise of local organizations and families, Ohio aims to reduce racial disparities in infant mortality. In December 2020, Governor DeWine announced the establishment of the [Eliminating Racial Disparities in Infant Mortality Task Force](#). The goal of the Task Force is to develop a statewide shared vision and strategy for reducing infant mortality and racial disparities by 2030. Members work with local, state, and national leaders to identify needed changes to address Ohio's racial disparities in infant mortality. The Task Force is creating a roadmap for change with actionable, practical, and ambitious recommendations to the Governor aimed at accelerating the rate of change needed to overcome decades of disparities in birth outcomes. A state team including Governor DeWine's Cabinet agencies will be responsible for the design of activities, implementation, monitoring, evaluation, and accountability to Task Force recommendations.

Another impactful and modifiable predictor of a baby's health is the health of the mother. A healthy mom increases the likelihood of healthy infant outcomes. The [Ohio Council to Advance Maternal Health \(OH-CAMH\)](#) is Ohio's maternal health task force that strives to bring together partners from across Ohio to improve maternal health outcomes. OH-CAMH is composed of more than 150 individuals from 84 organizations. Collectively, OH-CAMH also aims to eliminate health disparities through the implementation of policies and programs that support equity, dignity, and continuity of health care for women and all pregnant and parenting people before, during, and beyond the perinatal window. OH-CAMH will accomplish this mission to advance maternal health in Ohio by promoting multidisciplinary collaboration, streamlining and coordinating efforts, providing data transparency and data-driven decision making, fostering a culture of equity, and eliciting structural and systemic culture change.

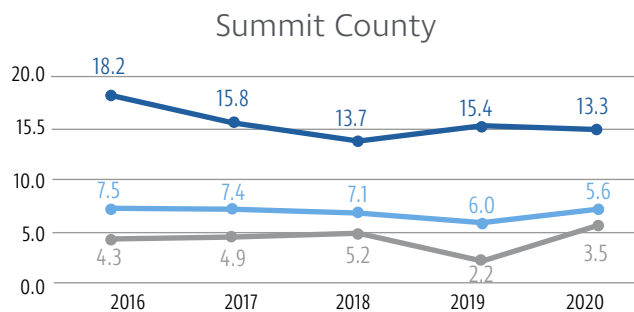
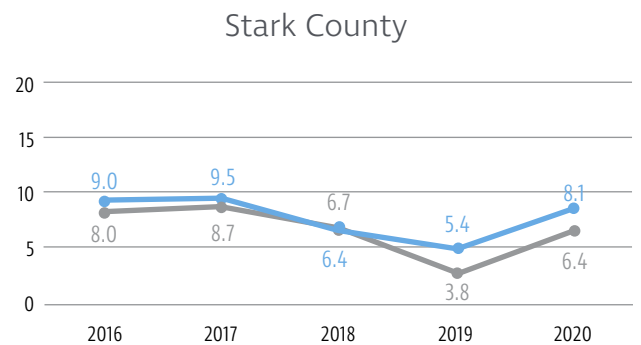
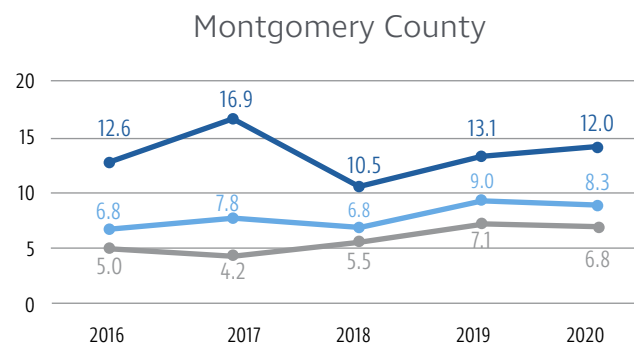
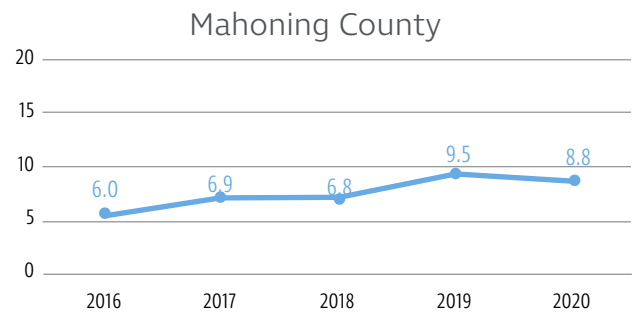
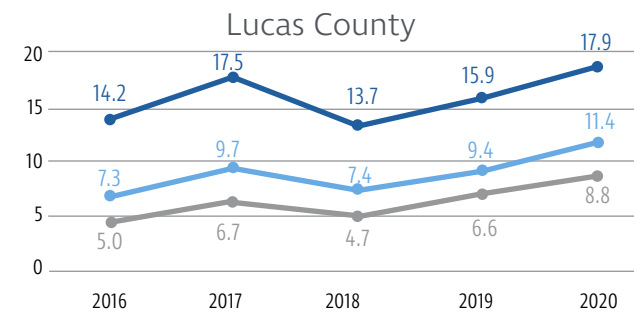
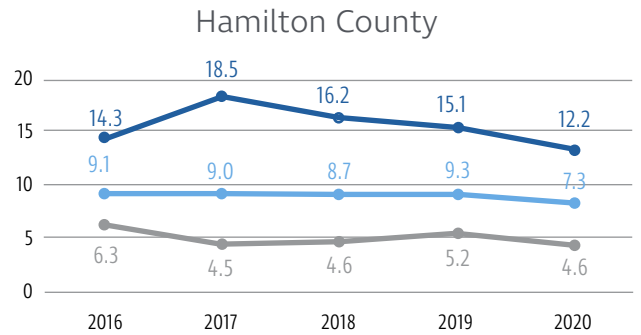
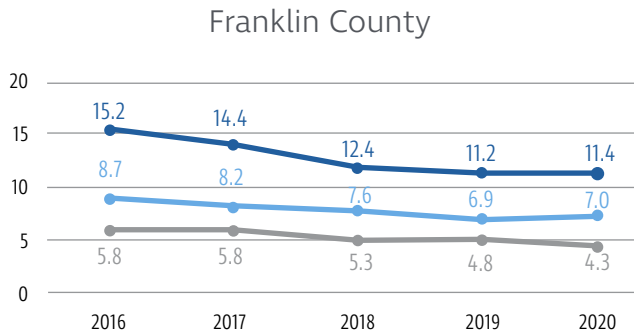
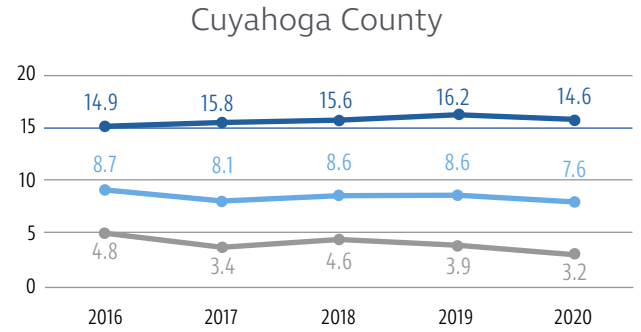
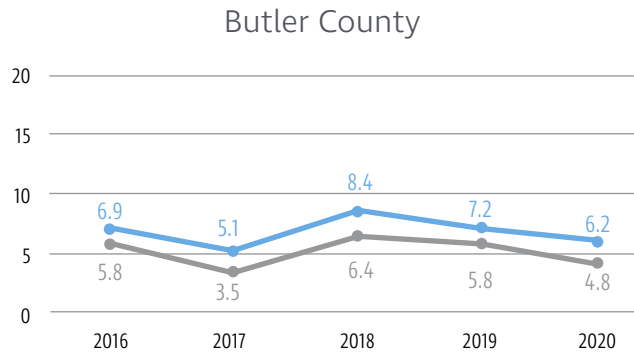
OH-CAMH and the Eliminating Racial Disparities in Infant Mortality Task Force have independently identified common areas of focus (e.g., provider education and accountability, prioritizing funding for community-based organizations, diversifying the perinatal workforce, investing in maternal mental and behavioral health services, etc). Working through the wide diversity of members who make up OH-CAMH, and through the Infant Mortality Task Force state team, efforts to leverage shared goals and take collective action will address common drivers of disparities in infant and maternal health.

Within the bureau, programs addressing Black infant mortality and improving infant vitality include the following:

- **Breastfeeding Friendly Child Care Designation** was created through a partnership among ODH, Ohio Breastfeeding Alliance, and Ohio Child Care Resource and Referral Association (OCCRRA) to provide early childhood education (ECE) professionals with the knowledge and tools to support breastfeeding children, families and employees in their settings. ECE programs can earn the designation by creating and implementing a breastfeeding policy that focuses on environment, support, and education.
- The **24/7 Breastfeeding Hotline** is a breastfeeding service operated by the Appalachian Breastfeeding Network. The hotline is available 24/7 — including weekends and holidays — and is operated by live, trained lactation professionals. The hotline is provided free of charge to all callers and offers a free texting service as well.
- **Children with Medical Handicaps (CMH)** provides assistance to children and young adults with special healthcare needs and their families based on medical and financial eligibility criteria. Assistance, which includes diagnostic testing and development of a plan of care for treatment, along with treatment services for qualifying conditions, is provided to children and adults younger than age 22 who are residents of Ohio.
- **Group prenatal care initiatives** bring together women more likely to experience poor birth outcomes to visit their providers privately, then gather together to learn about pregnancy-related topics. Participants also benefit from the social support of sharing pregnancy and birth experiences with other women.
- **Homeless youth programs** aim to address homelessness in Ohio youth and young adults aged 14-24 with a particular emphasis on homeless youth who are pregnant. Two grants concentrate on coordination or provision of housing services; behavioral and physical health services; education/employment opportunities; fostering community and social connections and outreach to youth experiencing homelessness.
- The **Metabolic Formula Program** within CMH provides metabolic formula at no cost to individuals with phenylketonuria (PKU), homocystinuria, and other metabolic disorders. Without special formula, these individuals, especially infants and children, may develop brain damage and pervasive developmental disabilities. Babies with confirmed disorders are referred to physicians and dietitians specializing in metabolic disorders in children's hospitals around the state.
- **Moms and Babies First** is an evidence-informed home visiting model that empowers Black families to access community resources and delivers parenting support and education through regular home visits that begin during pregnancy and continue through a baby's first birthday. In addition to Moms and Babies First, ODH supports the implementation of three national home visiting models throughout Ohio.
- **Moms Quit for Two**, a smoking cessation program that employs the Baby and Me Tobacco Free model for those who are pregnant, aims to reduce prematurity and low birth weight and achieve long-term positive outcomes for women, children, and their families.
- The **Newborn Screening for Critical Congenital Heart Disease Program** screens newborns for heart defects, which are the leading cause of birth defect-associated infant illness and death in the United States. Critical congenital heart defects usually require clinical intervention, often surgery, during the first year of life. Screening can lead to early diagnosis and treatment that can save newborns' lives.
- The **Ohio Equity Institute 2.0 – Working to Achieve Equity in Birth Outcomes (OEI)** supports policy change and local Neighborhood Navigators who connect Black pregnant people to needed services in the nine Ohio counties with the greatest burden of Black infant mortality. For additional information about OEI, see the [fiscal year 2019 OEI report](#).

- The Ohio **First Steps for Healthy Babies** breastfeeding program is a voluntary breastfeeding initiative, led by ODH and the Ohio Hospital Association, that recognizes maternity centers in Ohio that have taken steps to promote, protect, and support breastfeeding in their organizations. The program offers several opportunities for learning and networking in support of the Ten Steps to Successful Breastfeeding.
- The Ohio **Providing Lactation Upgrades and Support (PLUS)** toolkit was created through the partnership between ODH and Every Mother, Inc. This is a free, comprehensive resource for human resource professionals, supervisors, and employees that helps businesses establish or enhance existing lactation accommodations in the workplace.
- The **Reproductive Health and Wellness Program/Title X** helps women achieve healthy pregnancies by providing contraceptive education, health screenings, wellness education, and referrals to appropriate healthcare providers.
- **Safe Sleep and Cribs for Kids** provides families with safe sleep education and cribs to prevent sleep-related infant deaths, which disproportionately affect Black infants.
- The **Special Supplemental Nutrition Program for Women, Infants, and Children (WIC)** helps pregnant and breastfeeding women, women who recently had a baby, infants, and children up to 5 years of age. The program improves pregnancy outcomes by providing or referring to support services necessary for full-term pregnancies, which reduces the incidence of low birth weight, and provides infants and children with a healthy start in life.
- **Universal newborn screening for critical congenital heart diseases (CCHDs)** requires all newborns to be screened for CCHD using pulse oximetry prior to hospital discharge. The screening detects if any of the seven critical CCHDs are present in a baby. Early diagnosis of CCHDs improves health outcomes for babies and reduces healthcare costs.
- The **Women's Pre- and Inter-conception Health Program** seeks to address the social determinants of health that impact women's abilities to achieve optimal preconception and interconception health, therefore improving the chances of healthy pregnancies.

APPENDIX C: Trends in Infant Mortality Rates (per 1,000 live births), by Ohio Equity Institute County and Race (2016-2020)



—White —Black —All Races

Data Source: Ohio Department of Health Bureau of Vital Statistics. *Rates based on fewer than 10 deaths do not meet standards of reliability or precision and are suppressed.

Note: The number of Black infant deaths in Butler, Mahoning, and Stark counties were less than 10 in multiple years. For this reason, trends are not shown for Black infant mortality in these counties. Additionally, the number of white infant deaths in Mahoning County was less than 10 in multiple years; therefore, trends are not shown for white infant mortality in Mahoning County.

APPENDIX D: Supplementary Data Tables

Table D1: Ohio Neonatal, Postneonatal, and Infant Mortality, by County (2020) †

| County | Neonatal Deaths*** | Neonatal Mortality Rate | Postneonatal Deaths**** | Postneonatal Mortality Rate | Total Infant Deaths | Infant Mortality Rate | Total Births |
|------------|--------------------|-------------------------|-------------------------|-----------------------------|---------------------|-----------------------|--------------|
| Adams | 0 | * | 0 | * | 0 | * | 346 |
| Allen | 4 | * | 0 | * | 4 | * | 1,180 |
| Ashland | 0 | * | 3 | * | 3 | * | 528 |
| Ashtabula | 3 | * | 1 | * | 4 | * | 1,021 |
| Athens | 4 | * | 0 | * | 4 | * | 468 |
| Auglaize | 1 | * | 1 | * | 2 | * | 531 |
| Belmont | 2 | * | 1 | * | 3 | * | 600 |
| Brown | 3 | * | 2 | * | 5 | * | 473 |
| Butler | 20 | 4.6** | 9 | * | 29 | 6.6 | 4,375 |
| Carroll | 0 | * | 0 | * | 0 | * | 254 |
| Champaign | 1 | * | 1 | * | 2 | * | 412 |
| Clark | 6 | * | 5 | * | 11 | 7.4** | 1,495 |
| Clermont | 10 | 4.6** | 7 | * | 17 | 7.8** | 2,185 |
| Clinton | 2 | * | 2 | * | 4 | * | 471 |
| Columbiana | 3 | * | 3 | * | 6 | * | 997 |
| Coshocton | 1 | * | 0 | * | 1 | * | 431 |
| Crawford | 2 | * | 0 | * | 2 | * | 443 |
| Cuyahoga | 63 | 4.8 | 38 | 2.9 | 101 | 7.7 | 13,202 |
| Darke | 2 | * | 1 | * | 3 | * | 600 |
| Defiance | 2 | * | 0 | * | 2 | * | 421 |
| Delaware | 2 | * | 3 | * | 5 | * | 2,014 |
| Erie | 3 | * | 3 | * | 6 | * | 700 |
| Fairfield | 8 | * | 2 | * | 10 | 6.1** | 1,642 |
| Fayette | 2 | * | 1 | * | 3 | * | 338 |
| Franklin | 78 | 4.5 | 40 | 2.3 | 118 | 6.7 | 17,498 |
| Fulton | 2 | * | 2 | * | 4 | * | 446 |
| Gallia | 0 | * | 1 | * | 1 | * | 397 |
| Geauga | 0 | * | 2 | * | 2 | * | 937 |
| Greene | 5 | * | 4 | * | 9 | * | 1,692 |
| Guernsey | 2 | * | 0 | * | 2 | * | 448 |
| Hamilton | 50 | 4.8 | 27 | 2.6 | 77 | 7.5 | 10,329 |
| Hancock | 2 | * | 1 | * | 3 | * | 832 |
| Hardin | 2 | * | 2 | * | 4 | * | 389 |
| Harrison | 2 | * | 0 | * | 2 | * | 174 |
| Henry | 1 | * | 0 | * | 1 | * | 294 |
| Highland | 5 | * | 2 | * | 7 | * | 479 |
| Hocking | 1 | * | 1 | * | 2 | * | 286 |
| Holmes | 5 | * | 2 | * | 7 | * | 825 |
| Huron | 2 | * | 0 | * | 2 | * | 629 |
| Jackson | 0 | * | 0 | * | 2 | * | 382 |

† The methodology ODH uses for calculating infant mortality rates differs from the National Center for Health Statistics and some jurisdictions within Ohio. Therefore, the rates reported here may vary from other reports.

Table D1 Ohio Neonatal, Postneonatal, and Infant Mortality, by County (2020) † continued

| County | Neonatal Deaths*** | Neonatal Mortality Rate | Postneonatal Deaths**** | Postneonatal Mortality Rate | Total Infant Deaths | Infant Mortality Rate | Total Births |
|------------|--------------------|-------------------------|-------------------------|-----------------------------|---------------------|-----------------------|--------------|
| Jefferson | 4 | * | 0 | * | 4 | * | 639 |
| Knox | 4 | * | 0 | * | 4 | * | 716 |
| Lake | 5 | * | 3 | * | 8 | * | 2,022 |
| Lawrence | 2 | * | 1 | * | 3 | * | 621 |
| Licking | 10 | 5.4** | 3 | * | 13 | 7.0** | 1,848 |
| Logan | 0 | * | 1 | * | 1 | * | 486 |
| Lorain | 17 | 5.3** | 3 | * | 20 | 6.3 | 3,195 |
| Lucas | 43 | 8.3 | 15 | 2.9** | 58 | 11.2 | 5,173 |
| Madison | 0 | * | 0 | * | 0 | * | 433 |
| Mahoning | 13 | 5.6** | 7 | * | 20 | 8.7 | 2,310 |
| Marion | 2 | * | 0 | * | 2 | * | 683 |
| Medina | 3 | * | 4 | * | 7 | * | 1,590 |
| Meigs | 1 | * | 0 | * | 1 | * | 188 |
| Mercer | 3 | * | 1 | * | 4 | * | 622 |
| Miami | 3 | * | 2 | * | 5 | * | 1,149 |
| Monroe | 1 | * | 0 | * | 1 | * | 134 |
| Montgomery | 36 | 5.8 | 16 | 2.6** | 52 | 8.4 | 6,196 |
| Morgan | 1 | * | 0 | * | 1 | * | 150 |
| Morrow | 3 | * | 0 | * | 3 | * | 350 |
| Muskingum | 5 | * | 3 | * | 8 | * | 1,015 |
| Noble | 0 | * | 0 | * | 0 | * | 147 |
| Ottawa | 1 | * | 0 | * | 1 | * | 314 |
| Paulding | 0 | * | 0 | * | 0 | * | 235 |
| Perry | 0 | * | 1 | * | 1 | * | 416 |
| Pickaway | 6 | * | 0 | * | 6 | * | 633 |
| Pike | 0 | * | 1 | * | 1 | * | 343 |
| Portage | 5 | * | 1 | * | 6 | * | 1,295 |
| Preble | 3 | * | 1 | * | 4 | * | 415 |
| Putnam | 3 | * | 1 | * | 4 | * | 412 |
| Richland | 9 | * | 1 | * | 10 | 7.5** | 1,333 |
| Ross | 4 | * | 1 | * | 5 | * | 745 |
| Sandusky | 3 | * | 3 | * | 6 | * | 607 |
| Scioto | 5 | * | 5 | * | 10 | 12.7** | 788 |
| Seneca | 3 | * | 0 | * | 3 | * | 606 |
| Shelby | 3 | * | 0 | * | 3 | * | 594 |
| Stark | 20 | 5.1 | 11 | 2.8** | 31 | 7.9 | 3,919 |
| Summit | 20 | 3.6 | 10 | 1.8** | 30 | 5.5 | 5,502 |
| Trumbull | 4 | * | 7 | * | 11 | 5.5** | 1,992 |
| Tuscarawas | 5 | * | 1 | * | 6 | * | 1,063 |
| Union | 2 | * | 1 | * | 3 | * | 694 |
| Van Wert | 4 | * | 3 | * | 7 | * | 314 |

Table D1 Ohio Neonatal, Postneonatal, and Infant Mortality, by County (2020) † continued

| County | Neonatal Deaths*** | Neonatal Mortality Rate | Postneonatal Deaths**** | Postneonatal Mortality Rate | Total Infant Deaths | Infant Mortality Rate | Total Births |
|------------|--------------------|-------------------------|-------------------------|-----------------------------|---------------------|-----------------------|---------------|
| Vinton | 0 | * | 1 | * | 1 | * | 115 |
| Warren | 9 | * | 4 | * | 13 | 5.4** | 2,407 |
| Washington | 3 | * | 1 | * | 4 | * | 548 |
| Wayne | 1 | * | 3 | * | 4 | * | 1,402 |
| Williams | 2 | * | 3 | * | 5 | * | 392 |
| Wood | 2 | * | 2 | * | 4 | * | 1,186 |
| Wyandot | 0 | * | 0 | * | 0 | * | 208 |
| Total | 574 | 4.4 | 290 | 2.2 | 864 | 6.7 | 129,320 ***** |

Data Source: Ohio Department of Health, Bureau of Vital Statistics.

* Rates based on fewer than 10 deaths do not meet standards of reliability or precision and are suppressed.

** Rates based on fewer than 20 infant deaths should be interpreted with caution.

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

**** Postneonatal Death – Death of infant aged 28 days through 364 days of life.

***** The total for Ohio includes six births with unknown county of residence.

Table D2: All Deaths

| Attribute | Percentage | Numerator | Denominator |
|---|------------|-----------|-------------|
| Behavioral | | | |
| Mother smoked pre-pregnancy | 24.5 | 203 | 829 |
| Mother smoked first trimester | 19.7 | 163 | 829 |
| Mother smoked third trimester | 14.7 | 122 | 828 |
| Interpregnancy interval < 18 months | 36.8 | 125 | 340 |
| Interpregnancy interval < 6 months | 12.7 | 43 | 340 |
| Social | | | |
| Low income (presumed Medicaid) | 58.8 | 489 | 831 |
| Education less than high school | 18.8 | 154 | 820 |
| Father not on birth certificate | 34.6 | 299 | 864 |
| Medical: Pre-pregnancy | | | |
| Obesity | 39.4 | 322 | 818 |
| Hypertension | 7.4 | 63 | 854 |
| Diabetes | 1.9 | 16 | 854 |
| Medical: Pregnancy | | | |
| Gestational hypertension | 11 | 94 | 854 |
| Gestational diabetes | 5.4 | 46 | 854 |
| Twin or higher order pregnancy | 11.4 | 97 | 854 |
| Healthcare and services | | | |
| No first trimester prenatal care | 38.6 | 289 | 748 |
| Born in wrong level hospital *** | 9 | 73 | 811 |
| WIC during pregnancy | 32.5 | 267 | 821 |
| No WIC but probably eligible | 31.7 | 258 | 814 |
| Maternal pregnancy history | | | |
| Prior pregnancy | 73.7 | 615 | 835 |
| Prior live birth | 64 | 534 | 835 |
| Prior preterm birth | 13 | 111 | 854 |
| Demographic: Mother's race | | | |
| Black | 33.9 | 293 | 864 |
| White | 57.9 | 500 | 864 |
| Demographic: Mother's Ethnicity | | | |
| Hispanic | 5.9 | 50 | 842 |
| Non-Hispanic ** | 94.1 | 792 | 842 |
| Demographic: Mother's age (years) | | | |
| < 18 | 2.3 | 19 | 846 |
| 18-19 | 6 | 51 | 846 |
| 20-24 | 25.5 | 216 | 846 |
| 25-29 | 28.4 | 240 | 846 |
| 30-34 | 22.5 | 190 | 846 |
| 35-39 | 11.9 | 101 | 846 |
| 40 or more | 3.4 | 29 | 846 |
| Demographic: County of Residence at Death **** | | | |
| OEI county | 59.7 | 516 | 864 |
| Large metro county | 34.3 | 296 | 864 |
| Metro county | 54.4 | 470 | 864 |

Table D2: All Deaths continued

| Attribute | Percentage | Numerator | Denominator |
|--|------------|-----------|-------------|
| Micro county | 10.8 | 93 | 864 |
| Rural county | * | * | * |
| Delivery: Gestational age | | | |
| Before 20 weeks | 9.6 | 80 | 835 |
| 20-23 weeks | 20.7 | 173 | 835 |
| 24-27 weeks | 11.9 | 99 | 835 |
| 28-33 weeks | 10.5 | 88 | 835 |
| 34-36 weeks | 13.1 | 109 | 835 |
| 37 weeks or more | 34.3 | 286 | 835 |
| Delivery: Birth weight | | | |
| Less than 500 grams | 21 | 166 | 791 |
| 500-999 grams | 18.6 | 147 | 791 |
| 1,000-1,499 grams | 5.2 | 41 | 791 |
| 1,500-1,999 grams | 7.8 | 62 | 791 |
| 2,000-2,499 grams | 10.2 | 81 | 791 |
| 2,500 or more grams | 37.2 | 294 | 791 |
| Small for gestational age (SGA) | 22.6 | 178 | 787 |
| Death: Timing | | | |
| Within first hour of life | 12.5 | 108 | 864 |
| By end of first day | 26.3 | 227 | 864 |
| By end of first week | 14.2 | 123 | 864 |
| By end of first month | 13.4 | 116 | 864 |
| Before first birthday | 33.6 | 290 | 864 |
| Death: Location | | | |
| Within hospital as inpatient | 74.4 | 643 | 864 |
| ER or outpatient setting | 14.6 | 126 | 864 |
| Dead on arrival | * | * | * |
| Home | 8.3 | 72 | 864 |
| Hospice/nursing home/long-term care facility | * | * | * |
| Other | 1.6 | 14 | 864 |
| Dollfus cause of death category | | | |
| Prematurity | 28.8 | 249 | 864 |
| Congenital anomaly | 20 | 173 | 864 |
| External injuries | 10.3 | 89 | 864 |
| SIDS | 7.8 | 67 | 864 |
| Obstetric conditions | 7.1 | 61 | 864 |
| Perinatal infections | 4.4 | 38 | 864 |
| Other infections | 3.4 | 29 | 864 |
| Birth asphyxia | 1.5 | 13 | 864 |
| Other | 16.8 | 145 | 864 |

*Figure does not meet standards of reliability or precision, based on fewer than 10 deaths in the numerator. **Non-Hispanic deaths include those of unknown or missing ethnicity. ***An infant born in a hospital without the appropriate level of care given the infant's gestational age and/or birth weight. Denominator includes infants born in a facility. ****County designations: **Large metro** (Cuyahoga, Franklin, Hamilton); **Metro** (Allen, Ashland, Ashtabula, Athens, Belmont, Butler, Clark, Clermont, Columbiana, Delaware, Erie, Fairfield, Geauga, Greene, Hancock, Huron, Jefferson, Knox, Lake, Lawrence, Licking, Lorain, Lucas, Mahoning, Marion, Medina, Miami, Montgomery, Muskingum, Pickaway, Portage, Richland, Ross, Sandusky, Scioto, Seneca, Stark, Summit, Trumbull, Tuscarawas, Union, Warren, Wayne, Wood); **Micro** (Auglaize, Brown, Carroll, Champaign, Clinton, Coshocton, Crawford, Darke, Defiance, Fayette, Fulton, Gallia, Guernsey, Hardin, Henry, Highland, Hocking, Holmes, Jackson, Logan, Madison, Meigs, Mercer, Morrow, Ottawa, Pery, Pike, Preble, Putnam, Shelby, Van Wert, Washington, Williams, Wyandot); **Rural** (Adams, Harrison, Monroe, Morgan, Noble, Paulding, Vinton); **OEI** (Butler, Cuyahoga, Franklin, Hamilton, Lucas, Mahoning, Montgomery, Stark, Summit).

Table D3: Deaths Among Infants Born < 24 Weeks Gestation

| Attribute | Percentage | Numerator | Denominator |
|--|------------|-----------|-------------|
| Behavioral | | | |
| Mother smoked pre-pregnancy | 19 | 47 | 247 |
| Mother smoked first trimester | 14.6 | 36 | 247 |
| Interpregnancy interval < 18 months | 32.7 | 18 | 55 |
| Interpregnancy interval < 6 months | * | * | * |
| Social | | | |
| Low income (presumed Medicaid) | 60.1 | 149 | 248 |
| Education less than high school | 19.5 | 48 | 246 |
| Father not on birth certificate | 41.1 | 104 | 253 |
| Medical: Pre-pregnancy | | | |
| Obesity | 44.8 | 111 | 248 |
| Hypertension | 9.5 | 24 | 253 |
| Diabetes | * | * | * |
| Medical: Pregnancy | | | |
| Gestational hypertension | * | * | * |
| Gestational diabetes | * | * | * |
| Twin or higher order pregnancy | 15.4 | 39 | 253 |
| Healthcare and services | | | |
| No first trimester prenatal care | 37.9 | 86 | 227 |
| Born in wrong level hospital*** | 19 | 47 | 248 |
| WIC during pregnancy | 26.8 | 65 | 243 |
| No WIC but probably eligible | 38.5 | 92 | 239 |
| Maternal pregnancy history | | | |
| Prior pregnancy | 72.4 | 181 | 250 |
| Prior live birth | 55.6 | 139 | 250 |
| Prior preterm birth | 16.6 | 42 | 253 |
| Demographic: Mother's race | | | |
| Black | 49 | 124 | 253 |
| White | 44.3 | 112 | 253 |
| Demographic: Mother's ethnicity | | | |
| Hispanic | 8 | 20 | 251 |
| Non-Hispanic** | 92 | 231 | 251 |
| Demographic: Mother's age (years) | | | |
| < 18 | * | * | * |
| 18-19 | 8.3 | 21 | 252 |
| 20-24 | 25 | 63 | 252 |
| 25-29 | 27.4 | 69 | 252 |
| 30-34 | 21.4 | 54 | 252 |
| 35-39 | 13.1 | 33 | 252 |
| 40 or more | * | * | * |
| Demographic: County of residence at death**** | | | |
| OEI county | 67.6 | 171 | 253 |
| Large metro county | 38.3 | 97 | 253 |

Table D3: Deaths Among Infants Born < 24 Weeks Gestation continued

| Attribute | Percentage | Numerator | Denominator |
|--|------------|-----------|-------------|
| Metro county | 55.3 | 140 | 253 |
| Micro county | 5.9 | 15 | 253 |
| Rural county | * | * | * |
| Delivery: Gestational age | | | |
| Before 20 weeks | 31.6 | 80 | 253 |
| 20-23 weeks | 68.4 | 173 | 253 |
| Delivery: Birth weight | | | |
| Less than 500 grams | 72 | 149 | 253 |
| 500-999 grams | 28.0 | 58 | 253 |
| 1,000-1,499 grams | * | * | * |
| 1,500-1,999 grams | * | * | * |
| 2,000-2,499 grams | * | * | * |
| 2,500 or more grams | * | * | * |
| Small for gestational age (SGA) | * | * | * |
| Death: Timing | | | |
| Within first hour of life | 24.5 | 62 | 253 |
| By end of first day | 53 | 134 | 253 |
| By end of first week | 11.1 | 28 | 253 |
| By end of first month | 7.5 | 19 | 253 |
| Before first birthday | 4 | 10 | 253 |
| Death: Location | | | |
| Within hospital as inpatient | 96.8 | 245 | 253 |
| ER or outpatient setting | * | * | * |
| Dead on arrival | * | * | * |
| Home | * | * | * |
| Hospice/nursing home/long-term care facility | * | * | * |
| Other | * | * | * |
| Dollfus cause of death category | | | |
| Prematurity | 66.4 | 168 | 253 |
| Congenital anomaly | * | * | * |
| Obstetric condition | 17.8 | 45 | 253 |
| SIDS | * | * | * |
| External injuries | * | * | * |
| Perinatal infections | 5.9 | 15 | 253 |
| Birth asphyxia | * | * | * |
| Other infections | * | * | * |
| Other | 5.9 | 15 | 253 |

*Figure does not meet standards of reliability or precision, based on fewer than 10 deaths in the numerator. **Non-Hispanic deaths include those of unknown or missing ethnicity. ***An infant born in a hospital without the appropriate level of care given the infant's gestational age and/or birth weight. Denominator includes infants born in a facility. ****County designations: **Large metro** (Cuyahoga, Franklin, Hamilton); **Metro** (Allen, Ashland, Ashtabula, Athens, Belmont, Butler, Clark, Clermont, Columbiana, Delaware, Erie, Fairfield, Geauga, Greene, Hancock, Huron, Jefferson, Knox, Lake, Lawrence, Licking, Lorain, Lucas, Mahoning, Marion, Medina, Miami, Montgomery, Muskingum, Pickaway, Portage, Richland, Ross, Sandusky, Scioto, Seneca, Stark, Summit, Trumbull, Tuscarawas, Union, Warren, Wayne, Wood); **Micro** (Auglaize, Brown, Carroll, Champaign, Clinton, Coshocton, Crawford, Darke, Defiance, Fayette, Fulton, Gallia, Guernsey, Hardin, Henry, Highland, Hocking, Holmes, Jackson, Logan, Madison, Meigs, Mercer, Morrow, Ottawa, Perry, Pike, Preble, Putnam, Shelby, Van Wert, Washington, Williams, Wyandot); **Rural** (Adams, Harrison, Monroe, Morgan, Noble, Paulding, Vinton); **OEI** (Butler, Cuyahoga, Franklin, Hamilton, Lucas, Mahoning, Montgomery, Stark, Summit).

Table D4: Cause of Death

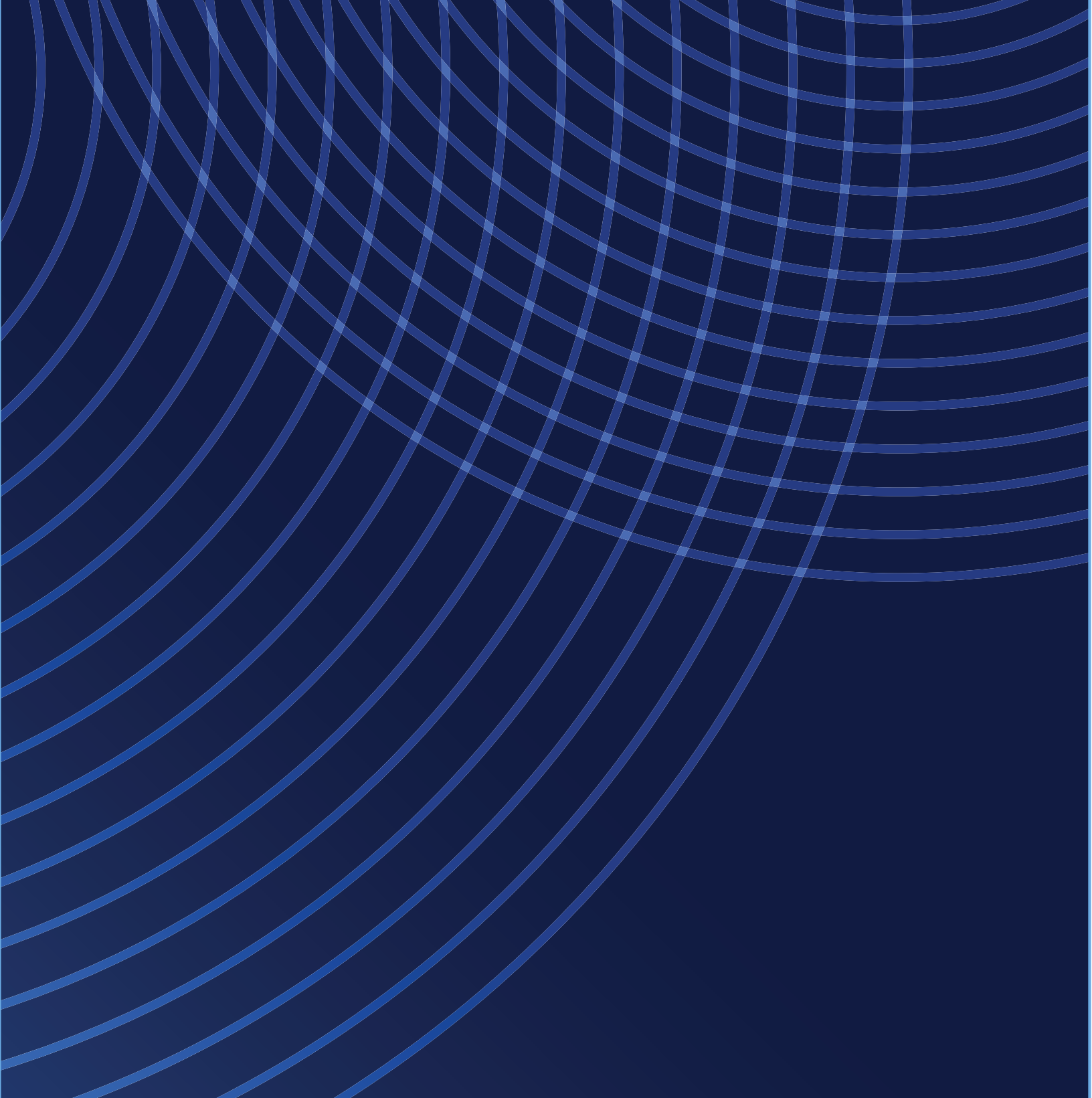
| Attribute | Due to prematurity | | | Due to congenital anomaly | | | Due to obstetric condition | | | Due to external injury | | | Due to Sudden Infant Death Syndrome | | |
|--|--------------------|------|-------|---------------------------|------|-------|----------------------------|------|-------|------------------------|------|-------|-------------------------------------|------|-------|
| | % | Num. | Deno. | % | Num. | Deno. | % | Num. | Deno. | % | Num. | Deno. | % | Num. | Deno. |
| Behavioral | | | | | | | | | | | | | | | |
| Mother smoked pre-pregnancy | 20.9 | 49 | 235 | 18.7 | 32 | 171 | 19 | 11 | 58 | 36.1 | 31 | 86 | 40.6 | 26 | 64 |
| Mother smoked first trimester | 17 | 40 | 235 | 13.5 | 23 | 171 | * | * | * | 32.6 | 28 | 86 | 29.7 | 19 | 64 |
| Mother smoked last trimester | 9.4 | 22 | 234 | 11.7 | 20 | 171 | * | * | * | 26.7 | 23 | 86 | 23.4 | 15 | 64 |
| Interpregnancy interval < 18 months | 39.1 | 27 | 69 | 29.2 | 26 | 89 | * | * | * | 45.2 | 19 | 42 | 42.1 | 16 | 38 |
| Interpregnancy interval < 6 months | * | * | * | * | * | * | * | * | * | 26.2 | 11 | 42 | * | * | * |
| Social | | | | | | | | | | | | | | | |
| Low income (presumed Medicaid) | 57.6 | 136 | 236 | 48.2 | 82 | 170 | 55.2 | 32 | 58 | 73.6 | 64 | 87 | 75 | 48 | 64 |
| Education less than high school | 17.3 | 40 | 231 | 16.5 | 28 | 170 | * | * | * | 23.8 | 20 | 84 | 20.3 | 13 | 64 |
| Father not on birth certificate | 37.4 | 93 | 249 | 23.1 | 40 | 173 | 47.5 | 29 | 61 | 41.6 | 37 | 89 | 43.3 | 29 | 67 |
| Medical: Pre-pregnancy | | | | | | | | | | | | | | | |
| Obesity | 41.9 | 98 | 234 | 38 | 63 | 166 | 45.8 | 27 | 59 | 30.2 | 26 | 86 | 45.3 | 29 | 64 |
| Hypertension | 8.1 | 20 | 246 | * | * | * | * | * | * | * | * | * | * | * | * |
| Diabetes | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| Medical: Pregnancy | | | | | | | | | | | | | | | |
| Gestational hypertension | 6.5 | 16 | 246 | 12.1 | 21 | 173 | * | * | * | 12.5 | 11 | 88 | 15.4 | 10 | 65 |
| Gestational diabetes | * | * | * | 7.5 | 13 | 173 | * | * | * | * | * | * | * | * | * |
| Twin or higher order pregnancy | 16.7 | 41 | 246 | * | * | * | * | * | * | * | * | * | * | * | * |
| Healthcare and services | | | | | | | | | | | | | | | |
| No first trimester prenatal care | 34.7 | 75 | 216 | 37.5 | 57 | 152 | 51.9 | 27 | 52 | 32.9 | 25 | 76 | 46.7 | 28 | 60 |
| Born in wrong level hospital*** | 16.3 | 38 | 233 | * | * | * | * | * | * | * | * | * | * | * | * |
| WIC during pregnancy | 22.5 | 52 | 231 | 23.5 | 40 | 170 | 14 | 25 | 56 | 46.5 | 40 | 86 | 64.1 | 41 | 64 |
| No WIC but probably eligible | 38.4 | 88 | 229 | 30.4 | 51 | 168 | 35.2 | 19 | 54 | 34.9 | 30 | 86 | 25 | 16 | 64 |
| Maternal pregnancy history | | | | | | | | | | | | | | | |
| Prior pregnancy | 73.3 | 173 | 236 | 77.2 | 132 | 171 | 71.7 | 43 | 60 | 67.8 | 59 | 87 | 81.3 | 52 | 64 |
| Prior live birth | 58.9 | 139 | 236 | 72.5 | 124 | 171 | 58.3 | 35 | 60 | 65.5 | 57 | 87 | 75 | 48 | 64 |
| Prior preterm birth | 16.7 | 41 | 246 | 9.3 | 16 | 173 | 16.4 | 10 | 61 | 11.4 | 10 | 78 | * | * | * |
| Demographic: Mother's race | | | | | | | | | | | | | | | |
| Black | 39.8 | 99 | 249 | 19.1 | 33 | 173 | 55.7 | 34 | 61 | 34.8 | 31 | 89 | 49.3 | 33 | 67 |
| White | 48.6 | 121 | 249 | 74 | 128 | 173 | 39.3 | 24 | 61 | 57.3 | 51 | 89 | 41.8 | 28 | 67 |
| Demographic: Mother's Ethnicity | | | | | | | | | | | | | | | |
| Hispanic | 8.4 | 20 | 238 | * | * | * | * | * | * | * | * | * | * | * | * |
| Non-Hispanic** | 91.6 | 218 | 238 | 96.5 | 166 | 172 | 98.4 | 60 | 61 | 93 | 80 | 86 | 93.9 | 61 | 65 |
| Demographic: Mother's age (years) | | | | | | | | | | | | | | | |
| < 18 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| 18-19 | 6.6 | 16 | 241 | * | * | * | * | * | * | * | * | * | * | * | * |
| 20-24 | 24.5 | 59 | 241 | 18 | 31 | 172 | 24.6 | 15 | 61 | 32.2 | 28 | 87 | 33.9 | 22 | 65 |
| 25-29 | 29.9 | 72 | 241 | 29.1 | 50 | 172 | 34.4 | 21 | 61 | 24.1 | 21 | 87 | 24.6 | 16 | 65 |
| 30-34 | 19.5 | 47 | 241 | 29.1 | 50 | 172 | 21.3 | 13 | 61 | 20.7 | 18 | 87 | 20 | 13 | 65 |
| 35-39 | 14.9 | 36 | 241 | 11.6 | 20 | 172 | * | * | * | * | * | * | * | * | * |
| 40 or more | * | * | * | 9.3 | 16 | 172 | * | * | * | * | * | * | * | * | * |

Table D4: Cause of Death continued

| Attribute | Due to prematurity | | | Due to congenital anomaly | | | Due to obstetric condition | | | Due to external injury | | | Due to Sudden Infant Death Syndrome | | |
|--|--------------------|------|-------|---------------------------|------|-------|----------------------------|------|-------|------------------------|------|-------|-------------------------------------|------|-------|
| | % | Num. | Deno. | % | Num. | Deno. | % | Num. | Deno. | % | Num. | Deno. | % | Num. | Deno. |
| OEI county | 65.5 | 163 | 249 | 49.1 | 85 | 173 | 75.4 | 46 | 61 | 61.8 | 55 | 89 | 74.6 | 50 | 67 |
| Large metro county | 35.7 | 89 | 249 | 27.8 | 48 | 173 | 52.5 | 32 | 61 | 32.6 | 29 | 89 | 47.8 | 32 | 67 |
| Metro county | 57 | 142 | 249 | 52.6 | 91 | 173 | 41.0 | 25 | 61 | 56.2 | 50 | 89 | 46.3 | 31 | 67 |
| Micro county | 6 | 15 | 249 | 18.5 | 32 | 173 | * | * | 61 | 11.2 | 10 | 89 | * | * | * |
| Rural county | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| Delivery: Gestational age | | | | | | | | | | | | | | | |
| Before 20 weeks | 22.7 | 54 | 238 | * | * | * | 28.3 | 17 | 60 | * | * | * | * | * | * |
| 20-23 weeks | 47.9 | 114 | 238 | * | * | * | 46.7 | 28 | 60 | * | * | * | * | * | * |
| 24-27 weeks | 19.8 | 47 | 238 | * | * | * | * | * | * | * | * | * | * | * | * |
| 28-33 weeks | * | * | * | 23.1 | 39 | 169 | * | * | * | * | * | * | * | * | * |
| 34-36 weeks | * | * | * | 27.2 | 46 | 169 | * | * | * | 18.4 | 16 | 87 | 17.2 | 11 | 64 |
| 37 weeks or more | 4.2 | 10 | 238 | 44.4 | 75 | 169 | * | * | * | 77 | 67 | 87 | 78.1 | 50 | 64 |
| Delivery: Birth weight | | | | | | | | | | | | | | | |
| Less than 500 grams | 51.5 | 104 | 202 | * | * | * | 65.5 | 36 | 55 | * | * | * | * | * | * |
| 500-999 grams | 38.1 | 77 | 202 | 7.7 | 13 | 170 | 18.2 | 10 | 55 | * | * | * | * | * | * |
| 1,000-1,499 grams | * | * | * | 7.1 | 12 | 170 | * | * | * | * | * | * | * | * | * |
| 1,500-1,999 grams | * | * | * | 20.0 | 34 | 170 | * | * | * | * | * | * | * | * | * |
| 2,000-2,499 grams | * | * | * | 22.4 | 38 | 170 | * | * | * | * | * | * | * | * | * |
| 2,500 or more grams | 5.0 | 10 | 202 | 41.8 | 71 | 170 | * | * | * | 80.5 | 70 | 87 | 80 | 52 | 65 |
| Small for gestational age (SGA) | 10.4 | 21 | 202 | 41.7 | 70 | 168 | * | * | * | 25.3 | 22 | 87 | 21.9 | 14 | 64 |
| Death: Timing | | | | | | | | | | | | | | | |
| Within first hour of life | 21.3 | 53 | 249 | 7.5 | 13 | 173 | 27.9 | 17 | 61 | * | * | * | * | * | * |
| By end of first day | 42.2 | 105 | 249 | 33 | 57 | 173 | 60.7 | 37 | 61 | * | * | * | * | * | * |
| By end of first week | 20.9 | 52 | 249 | 14.5 | 25 | 173 | * | * | * | * | * | * | * | * | * |
| By end of first month | 10.0 | 25 | 249 | 17.9 | 31 | 173 | * | * | * | * | * | * | * | * | * |
| Before first birthday | 5.6 | 14 | 249 | 27.2 | 47 | 173 | * | * | * | 84.3 | 75 | 89 | 91 | 61 | 67 |
| Death: Location | | | | | | | | | | | | | | | |
| Within hospital as inpatient | 96.4 | 240 | 249 | 83.2 | 144 | 173 | 93.4 | 57 | 61 | 23.6 | 21 | 89 | * | * | * |
| ER or outpatient setting | * | * | * | * | * | * | * | * | * | 51.7 | 46 | 89 | 61.2 | 41 | 67 |
| Dead on arrival | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| Home | * | * | * | 13.9 | 24 | 173 | * | * | * | 18 | 16 | 89 | 17.9 | 12 | 67 |
| Hospice/nursing home/long term care facility | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| Other | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |

Table D5: Ohio Infant Mortality Rates (per 1,000 live births) by Cause of Death (2011-2020)

| Year | Prematurity | Congenital anomaly | Obstetric condition | External injury | Sudden infant death syndrome |
|------|-------------|--------------------|---------------------|-----------------|------------------------------|
| 2011 | 2.2 | 1.6 | 0.8 | 0.6 | 0.7 |
| 2012 | 2.3 | 1.6 | 0.7 | 0.6 | 0.6 |
| 2013 | 2.1 | 1.5 | 0.6 | 0.5 | 0.6 |
| 2014 | 2.1 | 1.4 | 0.6 | 0.4 | 0.5 |
| 2015 | 2.0 | 1.3 | 0.7 | 0.7 | 0.6 |
| 2016 | 2.3 | 1.4 | 0.6 | 0.5 | 0.5 |
| 2017 | 2.3 | 1.3 | 0.7 | 0.6 | 0.5 |
| 2018 | 2.0 | 1.5 | 0.4 | 0.7 | 0.6 |
| 2019 | 2.0 | 1.3 | 0.5 | 0.8 | 0.4 |
| 2020 | 1.9 | 1.3 | 0.5 | 0.7 | 0.5 |



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