2022

Infant Mortality Annual Report

Ohio Department of Children & Youth

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EXECUTIVE SUMMARY

Infant mortality is the death of an infant before his or her first birthday. The infant mortality rate (IMR) is the number of infant deaths per 1,000 live births. While 2022 Ohio infant mortality data shows that inequities by race and socio-economic status persist, the gap decreased slightly from the previous year. Non-Hispanic Black infants die at a rate 2.4 times higher than that of non-Hispanic White infants. In 2021, this number was 2.5.

In 2022, the IMR rose slightly to 7.1 from 7.0 in 2021 for all races. The rate among non-Hispanic Black infants decreased to 13.4 in 2022 from 13.9 in 2021. While the Black neonatal (0 through 27 days) mortality rate went down (7.6 in 2022 compared with 8.8 in 2021) the postneonatal (28 days through 364 days of life) mortality rate increased (5.8 in 2022 compared with 5.2 in 2021).

Reducing infant mortality is a priority in the Ohio 2020-2022 State Health Improvement Plan (SHIP).[1] Within the Ohio State Health Improvement Plan is the goal to achieve 6.0 or fewer infant deaths per 1,000 live births in every racial and ethnic group by 2028. The IMR 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. The following report presents results of analyses performed on Ohio infant deaths that occurred in 2022.

Section 1: General Findings

⬆ **914** Ohio infants died before their first birthday in 2022

    519 Non- Hispanic White infant deaths   **273** Non- Hispanic Black infant deaths

⬆ **7.1** Overall infant mortality rate (IMR)

    5.7 Non- Hispanic White IMR   **13.4** Non- Hispanic Black IMR

⬇ **4.6** Overall neonatal mortality rate (NMR)

    3.9 Non- Hispanic White NMR   **7.6** Non- Hispanic Black NMR

        The NH Black neonatal mortality rate has decreased an average of 2.8% per year.

⬆ **2.6** Overall postneonatal mortality rate (PMR)

    1.9 Non- Hispanic White PMR   **5.8** Non- Hispanic Black PMR

        The NH Black postneonatal mortality rate has increased an average of 4.5% per year.

⬇ **2.4** Black/white Infant Mortality Ratio

Note: Each arrow indicates an increase or decrease from 2021

Section 2: A Deeper Look

- Prematurity remains the leading cause of death among all infants.
- Almost one-third (31%) of infants who died in 2022 were born before 24 weeks gestation despite only accounting for 0.3% of all live births.
- Non-Hispanic Black infants died from all causes of death at a higher rate than non-Hispanic White infants. They died from prematurity-related causes at nearly three times the rate of non-Hispanic White infants, from Sudden Infant Death Syndrome (SIDS) at nearly four times the rate of non-Hispanic White infants, and from external injuries at more than four times the rate of non-Hispanic White infants.
- More than half (57%) of infants who died in 2022 were born to mothers who reported Medicaid as their source of insurance during the birth hospitalization.

Methodology Changes for the 2022 Report

In alignment with the current national infant mortality reporting, via the Centers for Disease Control and Prevention (CDC), Ohio Department of Health (ODH) and Department of Children and Youth (DCY) made two methodological rate changes in the 2022 report. All IMRs in this report use recalculated numbers. As a result, previous reports may have different rates from the information included in this report (See page 21 for a detailed discussion of these methodological changes).

PUBLIC HEALTH SURVEILLANCE 101

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, problems are identified 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, this report acknowledges that the data included here does not fully explain the numerous and complex causes of infant mortality. Embedded within the persistent disparities in infant deaths is a history of inequities and social, economic, and environmental conditions.

How do we use surveillance data?

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.
- Inform development and assess effectiveness of programs and control measures.
- Develop hypotheses and stimulate research.

SECTION 1: GENERAL FINDINGS

Ohio Infant Mortality by Race and Ethnicity

In 2022, 914 Ohio infants died before their first birthday, an increase of two from 2021 (Table 1, Figure 1). There were 519 non-Hispanic White infant deaths in 2022, an increase of 12 from 2021. There were 273 non-Hispanic Black infant deaths in 2022, a decrease of 16 from 2021. Fifty-five Hispanic infants died in 2022 compared with 49 in 2021 (Table 1, Figure 1).

Table 1: Ohio Infant Mortality* by Race and Ethnicity (2018 – 2022)

Race and Ethnicity	2018		2019		2020		2021		2022	
	Infant Deaths	IMR	Infant Deaths	IMR	Infant Deaths	IMR	Infant Deaths	IMR	Infant Deaths	IMR
Overall**	938	6.9	929	6.9	864	6.7	912	7.0	914	7.1
White, non-Hispanic	550	5.7	515	5.4	484	5.3	507	5.5	519	5.7
Black, non-Hispanic	304	13.7	314	14.0	273	12.8	289	13.9	273	13.4
American Indian/ Alaskan Native, non-Hispanic	0	***	2	***	3	***	1	***	0	***
Asian, non-Hispanic	19	4.5^	22	5.1	15	3.8^	23	6.0	13	3.3^
Native Hawaiian/Pacific Islander, non-Hispanic	1	***	1	***	0	***	2	***	2	***
Multiracial, non-Hispanic‡	28	7.6	28	7.0	34	8.7	33	8.4	48	12.2
Hispanic	34	4.6	46	6.0	50	6.5	49	6.0	55	6.1

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

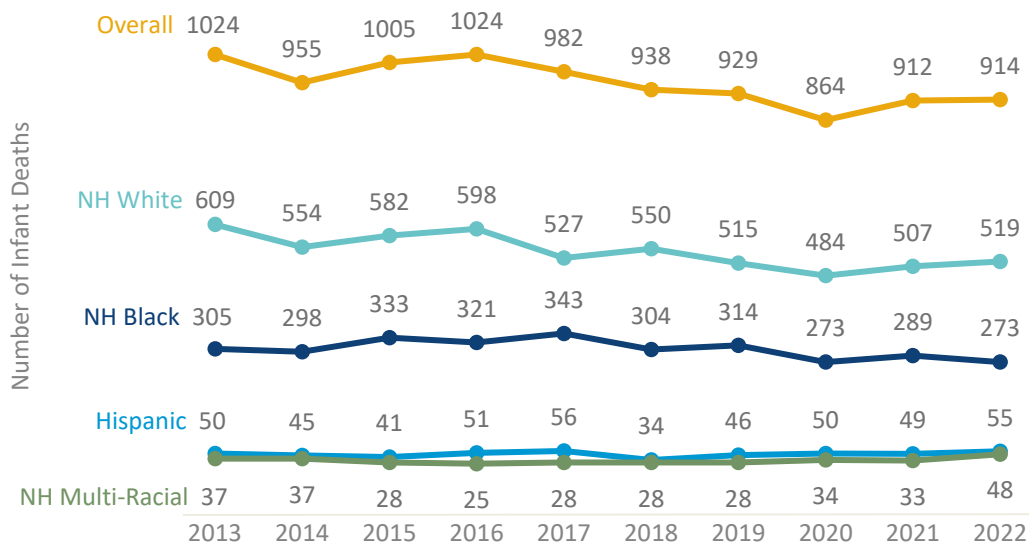**Infant mortality rate per 1,000 live births.*

**The total for all races includes deaths of unknown race and 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 multi-race group includes infant deaths whose mother identified as combination of any two or more races. Due to different multiracial categories, which vary from year to year, inferences should be made with caution.

Figure 1: In 2022, the number of **Non-Hispanic Black** infant deaths decreased, while the number of all other race/ethnicity groups increased.

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 overall infant mortality rate was 7.1 per 1,000 live births in 2022 (Table 1, Figure 2). The non-Hispanic Black infant mortality rate decreased from 13.9 in 2021 to 13.4 in 2022, while the non-Hispanic White infant mortality rate increased from 5.5 to 5.7 respectively (Table 1, Figure 3). Ohio's Hispanic infant mortality rate was 6.1 infant deaths per 1,000 live births in 2022 compared with 6.0 in 2021 (Table 1, Figure 3). Ohio's State Health Improvement Plan (SHIP), coordinated by the Ohio Department of Health, has set a 2028 overall infant mortality rate target of 6.0 infant deaths per 1,000 live births, in addition to target rates for specific populations.[1]

Figure 2: The **Overall** infant Mortality Rate (IMR) Increased in 2022
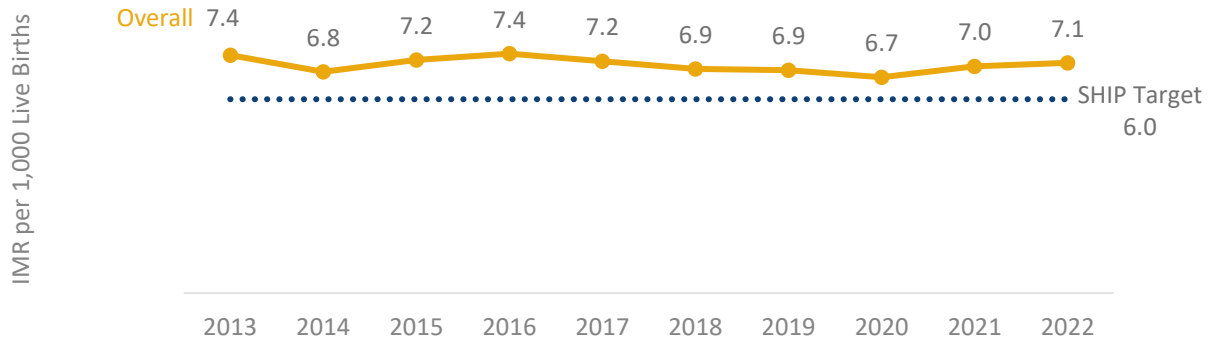
Data Source: Resident Birth and Mortality Files from the Ohio Department of Health Bureau of Vital Statistics.

Figure 3: The **Hispanic** and **Non-Hispanic White** IMR increased, while the **Non-Hispanic Black** IMR decreased in 2022.
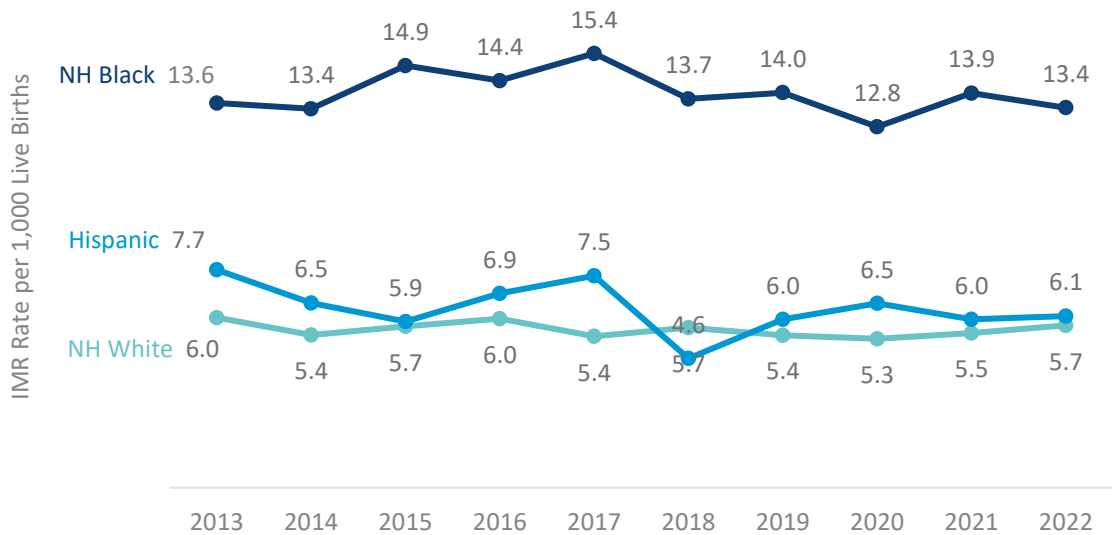
Data Source: Resident Birth and Mortality Files from the Ohio Department of Health Bureau of Vital Statistics.
Note: American Indian/Alaskan Native, Asian, and Pacific Islander rates are suppressed because rates based on fewer than 10 infant deaths do not meet standards of reliability or precision and are suppressed.

There is a large disparity in infant mortality rates among non-Hispanic Black and non-Hispanic White infants. The Black/White infant mortality ratio was 2.4 in 2022 compared with 2.5 in 2021. This means that non-Hispanic Black infants are 2.4 times more likely to die than non-Hispanic White infants in Ohio (Figure 4). Since 2013, the Black/White infant mortality ratio has remained stable.

Figure 4: The **NH Black/NH White infant mortality ratio*** decreased in 2022

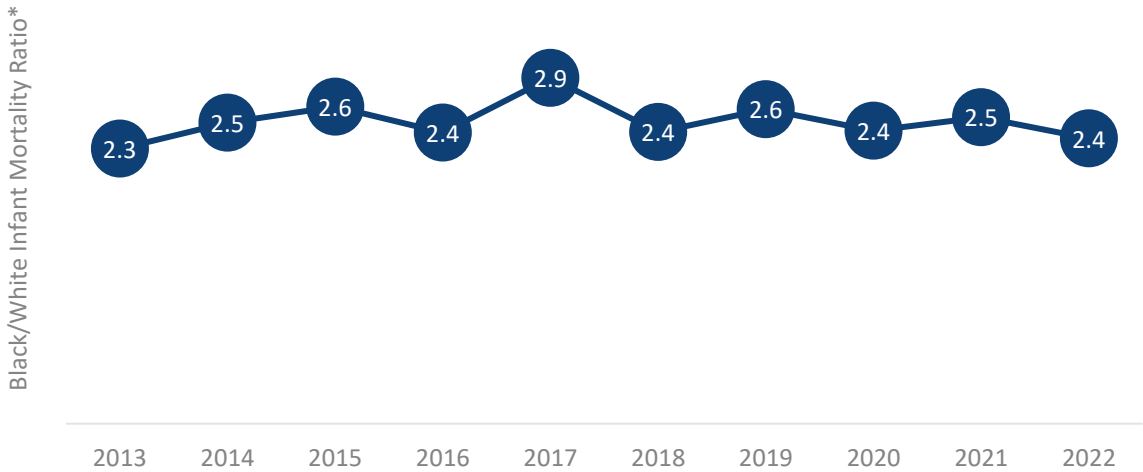*Data Source: Resident Birth and Mortality Files from the Ohio Department of Health Bureau of Vital Statistics.*
*Black infant mortality rate divided by the white infant mortality rate.

Ohio Five-Year Infant Mortality Rate by County (2018 – 2022)

See Appendix A for Ohio five-year infant mortality rates by county and race.

Infant Mortality Rate per 1,000 Live Births

- 3.1 - 5.2
- 5.3 - 6.5
- 6.6 - 7.6
- 7.7 - 8.6
- 8.7 - 16.1
- Data Suppressed*
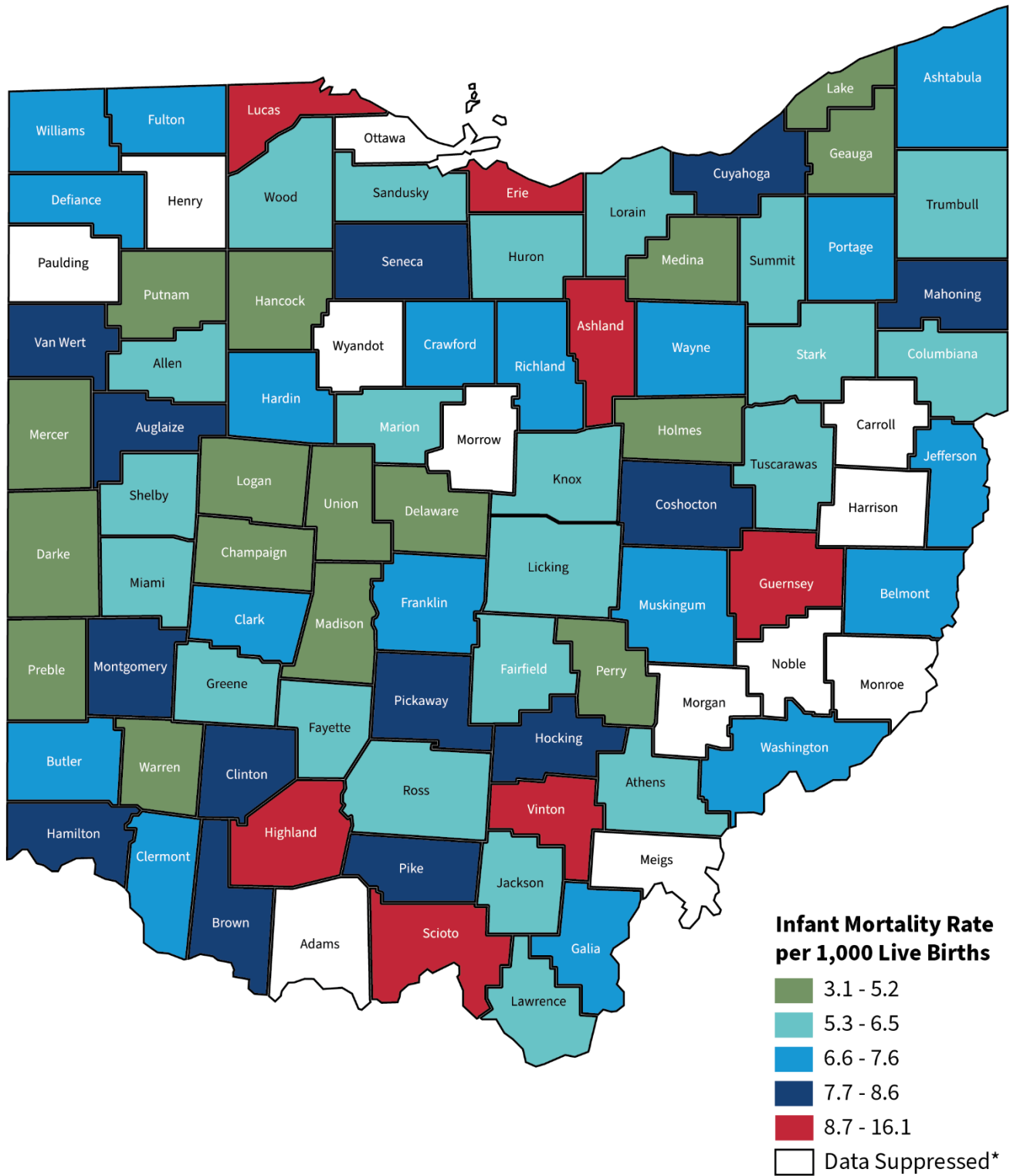
Data for counties with less than 10 infant deaths in the five-year period (2017-2021) is suppressed due to insufficient reliability or confidentiality requirements.

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 in Ohio. 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. See page 13 for cause-specific rates contributing to neonatal and postneonatal deaths in Ohio.

The overall and non-Hispanic Black neonatal mortality rates decreased in 2022 —from 4.7 to 4.6 and 8.8 to 7.6, respectively. However, the non-Hispanic White and Hispanic neonatal mortality rates increased—from 3.8 to 3.9 and 3.9 to 4.9, respectively (Table 2, Figure 5). The non-Hispanic Black neonatal mortality rate is lower than any time between 2013 and 2022.

From 2013 through 2022, the overall neonatal mortality rate decreased by an average of 1.5% per year. Additionally, the neonatal mortality rate for non-Hispanic Black infants decreased an average of 2.8% per year (Figure 5). There has not been a statistically significant[1] change in the neonatal mortality rate among the Hispanic and non-Hispanic White populations.

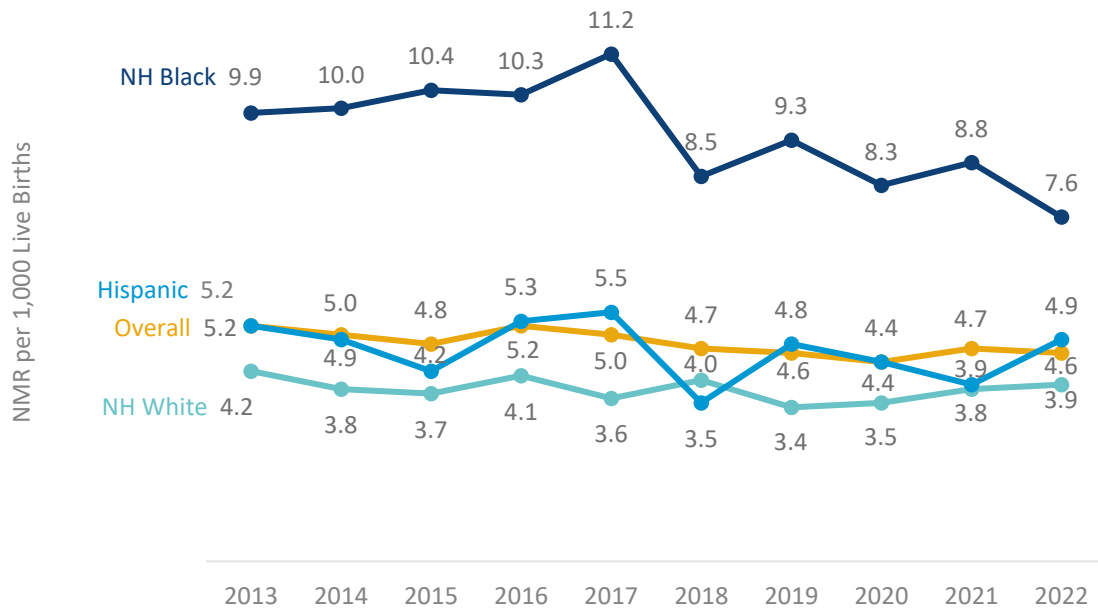Figure 5: In 2022, the **Overall** and **Non-Hispanic Black** neonatal mortality rate (NMR) decreased, while the **Hispanic** and **Non-Hispanic White** NMR increased

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

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[1] Statistical significance is a mathematical measure of the difference between groups. It's a way to determine if a result is likely due to chance or to a specific factor. A statistically significant result is unlikely to be explained by chance or random factors.

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 injuries. In 2022, the SUID rate for Black infants was 3.4 deaths per 1,000 live births compared with 0.9 among White infants.

The Hispanic postneonatal mortality rate decreased from 2.1 to 1.2 in 2022 (Table 2, Figure 6). The non-Hispanic Black and Non-Hispanic White postneonatal mortality rates increased in 2022 — from 5.2 to 5.8 and 1.6 to 1.9, respectively (Table 2, Figure 6). Additionally, the overall postneonatal mortality increased from 2.3 in 2021 to 2.6 in 2022 (Table 2, Figure 6).

From 2013 through 2022, the non-Hispanic Black postneonatal mortality rate has increased an average of 4.5% per year. During the postneonatal period non-Hispanic Black infants are three times more likely to die than non-Hispanic White infants. There has not been a statistically significant change in the postneonatal mortality rate overall and among the Hispanic and non-Hispanic White populations.

Figure 6: In 2022, the **Hispanic** postneonatal mortality rate (PMR) decreased, while the **Overall**, **Non-Hispanic Black**, and **Non-Hispanic White** PMR increased
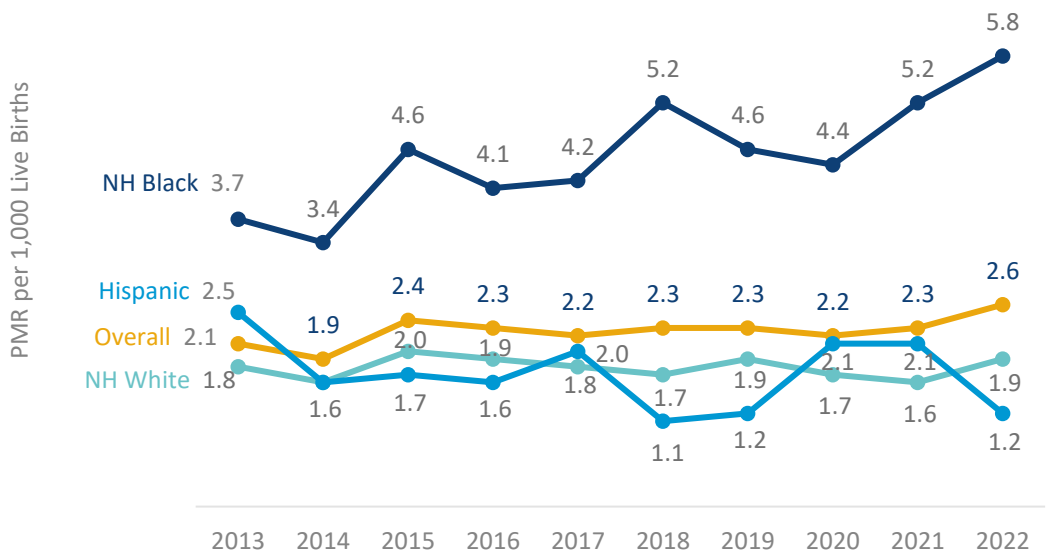
Data Source: Resident Birth and Mortality Files from the Ohio Department of Health Bureau of Vital Statistics.

Table 2: Ohio Neonatal, Postneonatal, and Overall Infant Mortality (per 1,000 live births), by Race and Ethnicity (2018 – 2022)

Race/Ethnicity	Year	Neonatal Deaths	Neonatal Mortality Rate	Postneonatal Deaths	Postneonatal Mortality Rate	Total Infant Deaths	Infant Mortality Rate	Births
Overall	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
	2021	616	4.7	296	2.3	912	7.0	129,925
	2022	585	4.6	329	2.6	914	7.1	128,315
NH White	2018	384	4.0	166	1.7	550	5.7	97,207
	2019	329	3.4	186	1.9	515	5.4	95,482
	2020	324	3.5	160	1.7	484	5.3	91,874
	2021	355	3.8	152	1.6	507	5.5	92,633
	2022	349	3.9	170	1.9	519	5.7	90,501
NH Black	2018	189	8.5	115	5.2	304	13.7	22,115
	2019	210	9.3	104	4.6	314	14.0	22,481
	2020	178	8.3	95	4.4	273	12.8	21,395
	2021	182	8.8	107	5.2	289	13.9	20,720
	2022	155	7.6	118	5.8	273	13.4	20,322
Hispanic	2018	26	3.5	8	*	34	4.6	7,434
	2019	37	4.8	9	*	46	6.0	7,729
	2020	34	4.4	16	**2.1	50	6.5	7,672
	2021	32	3.9	17	**2.1	49	6.0	8,229
	2022	44	4.9	11	**1.2	55	6.1	9,058

Data Source: Resident Birth and Mortality Files from the Ohio Department of Health Bureau of Vital Statistics.
* 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.
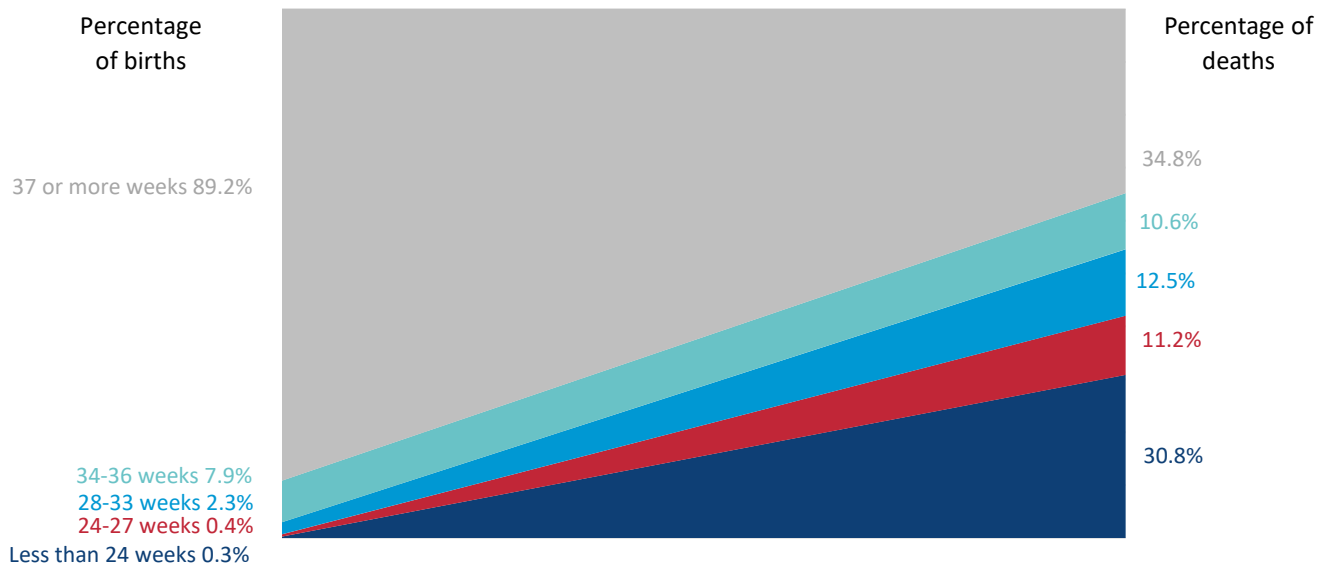
SECTION 2: A DEEPER LOOK

Infant Mortality by Gestational Age and Birthweight

Preterm birth is one of the most significant risk factors for infant mortality. While only 10.8% of all infants born to Ohio residents in 2022 were preterm (less than 37 weeks gestation), nearly two-thirds (65.2%) of infants who died in 2022 were born preterm (Figure 7). Among infants born preterm, those born at less than 24 weeks gestation made up only 0.3% of infants born to Ohio residents in 2021 yet made up almost one-third (30.8%) of infant deaths in 2022 (Figure 7).

Figure 7. Ohio preterm infants die at a much higher rate than infants born full term

Percentage of births

Percentage of deaths

37 or more weeks 89.2%

34.8%

10.6%

12.5%

11.2%

34-36 weeks 7.9%
28-33 weeks 2.3%
24-27 weeks 0.4%
Less than 24 weeks 0.3%

30.8%

Data source: Period Linked Infant Mortality File and Resident Birth File from the Ohio Department of Health, Bureau of Vital Statistics, 2022

Among non-Hispanic Black infants who died in 2022, more than one-third (35.4%) were born at less than 24 weeks gestation. Among non-Hispanic White infants who died, 27.9% 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. In 2022, more than half (58%) of infants who died were born with low birth weights. Low birth weight was more common among non-Hispanic Black infants who died (59%) when compared to non-Hispanic White infants who died (56%) in 2022 (Figure 8).

Figure 8. Low birth weight* was more common among **non-Hispanic 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, 42% of infants who died in 2022 had very low birth weights (less than 1,500 grams, or about 3.3 pounds). Compared with low birth weight, the disparity that exists between non-Hispanic White and non-Hispanic Black infants is even more apparent. Nearly half (48%) of non-Hispanic Black infants who died in 2022 were born with very low births weights, compared to slightly more than a third (38%) of non-Hispanic White infants (Figure 9).

Figure 9. Very low birth weight* was more common among **non-Hispanic Black** infants who died
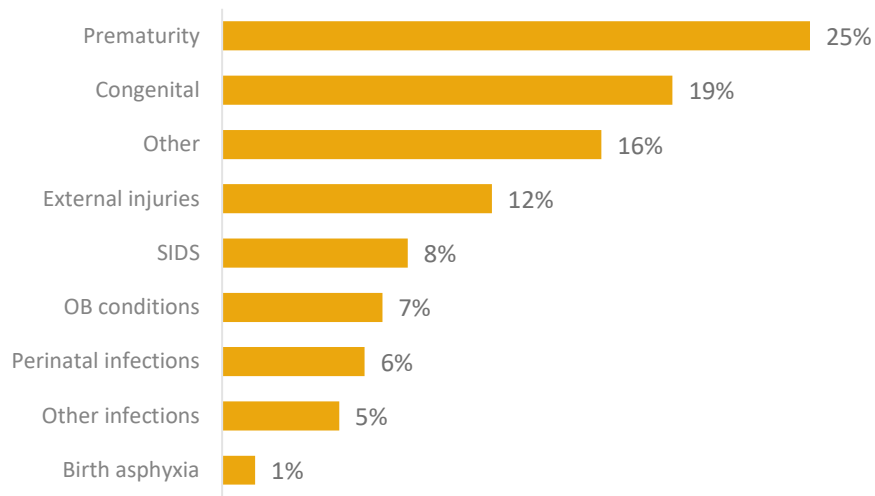
Data Source: Period Linked Infant Death File from the Ohio Department of Health, Bureau of Vital Statistics.
* Very low birth weight: Less than 3.3 pounds (1,500 grams)

Leading Causes of Infant Death

The Ohio Department of Health and Ohio Department of Children and Youth use the Modified Dollfuss classification system to monitor the leading causes of infant deaths.[2] This system groups the underlying causes of death into the following categories: birth asphyxia, congenital anomalies (birth defects), external injuries, obstetric conditions, perinatal infections, other infections, prematurity-related conditions, and Sudden Infant Death Syndrome (SIDS). Causes of death that do not fall into these classifications, such as neoplasms, anemias or other conditions are classified as "other," and inferences regarding this category should be made with caution. Among all infant deaths in 2022, prematurity-related conditions were the most common cause of death (25%), followed by congenital anomalies (16%) and external injuries (12%). Eight percent (8%) of deaths were due to SIDS (Figure 10).

Figure 10. Prematurity-related conditions are the leading cause of infant death

Data Source: Period Linked Infant Mortality File from the Ohio Department of Health, Bureau of Vital Statistics, 2022

In 2022, prematurity-related conditions were the leading cause of infant death among non-Hispanic White (23%) and non-Hispanic Black infants (28%). The remaining leading causes of death among non-Hispanic White infants were congenital anomalies (20%), external injuries (9%), SIDS (7%) and obstetric conditions (7%). After prematurity-related conditions, the leading causes of death among non-Hispanic Black infants were external injuries (16%), SIDS (11%), congenital anomalies (10%), obstetric conditions (7%) and perinatal infections (7%) (Figure 11).

Figure 11. Leading causes of death among **non-Hispanic White** and **non-Hispanic Black** infants in Ohio
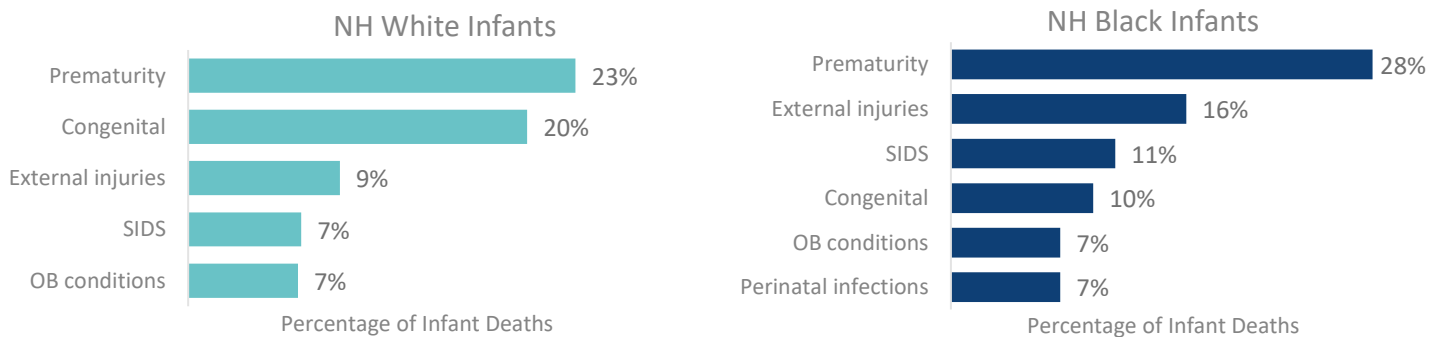
Data Source: Period Linked Infant Mortality File from the Ohio Department of Health, Bureau of Vital Statistics, 2022.

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 includes SIDS (a Dollfuss Classification). SUID is a term used to describe the sudden and unexpected death of a baby less than 1 year old in which the cause was not obvious before investigation. These deaths often happen during sleep or in the baby's sleep area. Case reviews conducted by county-level child fatality review boards determine whether an infant death was related to the sleep environment.

From 2021 to 2022 there were slight decreases in the infant mortality rate for prematurity-related conditions (1.9 in 2021 to 1.8 in 2022). However, prematurity-related conditions continue to be the greatest contributor to the overall infant mortality rate (7.1 per 1,000 live births). Congenital anomalies and obstetric conditions also decreased from 2021 to 2022 – 1.3 to 1.2 and 0.7 to 0.5, respectively. Additionally, there were increases observed from 2021 to 2022 for external injuries (0.7 in 2021 to 0.8 in 2022), SIDS (0.5 to 0.6), perinatal infections (0.3 to 0.4), other infections (0.3 to 0.4) as well as causes of death classified as "other" (1.2 to 1.4). Birth asphyxia saw no change in the infant mortality rate from 2021 to 2022 (Figure 12).

Figure 12. Prematurity-related conditions is the greatest contributor to the infant mortality rate
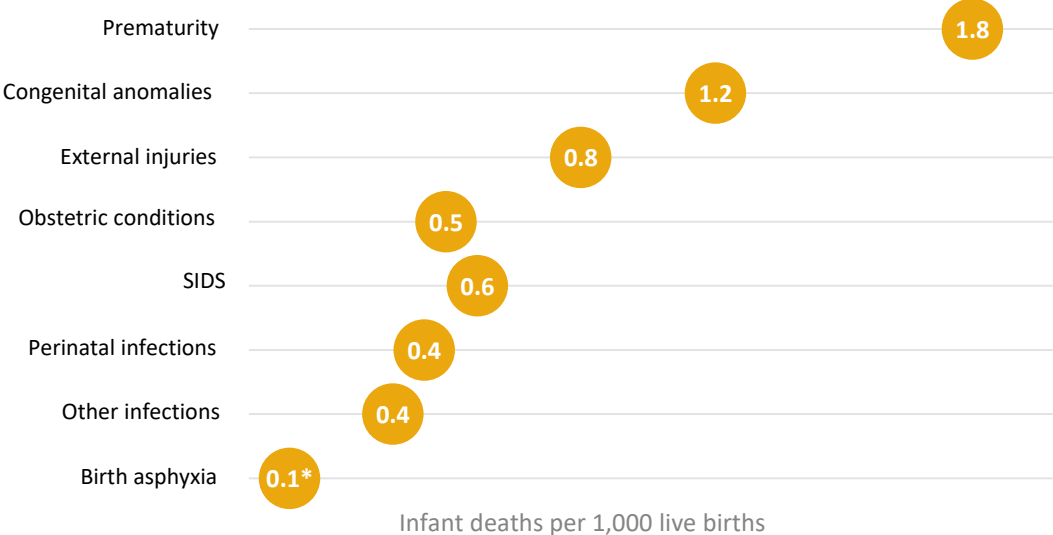
Data Source: Period Linked Infant Mortality File and Resident Birth File from the Ohio Department of Health, Bureau of Vital Statistics, 2022
*Rates based on fewer than 20 infant deaths should be interpreted with caution.

Prematurity-related conditions, the leading cause of death for both non-Hispanic White and non-Hispanic Black infants saw decreases in infant mortality rates from 2021 for both groups. While the decrease among non-Hispanic White infants was slight 1.4 in 2021 to 1.3 in 2022, there was a greater decrease among non-Hispanic Black infants – from 4.5 in 2021 to 3.8 in 2022 (Figure 13). This decrease in deaths due to prematurity-related conditions is the main driver for the decrease in neonatal infant mortality among non-Hispanic Black infants.

External injuries, the second and third leading cause of death among non-Hispanic Black and non-Hispanic White infants respectively, includes infants who died from accidental suffocation and strangulation in bed (ASSB). Of the 43 non-Hispanic Black infant deaths due to external injuries, 32 (74.4%) were due to ASSB. Of the 47 non-Hispanic White infant deaths due to external injury, 30 (63.8%) were due to ASSB. The rate of external injuries among non-Hispanic Black infants increased from 1.7 in 2021 to 2.1 in 2022, though the rate did not change among non-Hispanic White infants (Figure 13).

SIDS is the third and fourth leading cause of death for non-Hispanic Black and non-Hispanic White infants. Both saw slight increases in rates of SIDS; 1.4 in 2021 to 1.5 in 2022 among non-Hispanic Black infants, and 0.3 in 2021 to 0.4 in 2022 for non-Hispanic White infants. The increases in deaths due to external injuries – particularly ASSB – and SIDS were the main drivers for the increase in postneonatal mortality among non-Hispanic Black infants (Figure 13).

Figure 13. From 2021 to 2022, the rate of **prematurity-related conditions** decreased for both NH White and NH Black infants. However, NH Black infants have higher IMRs among the top 5 leading causes of death compared with NH White infants
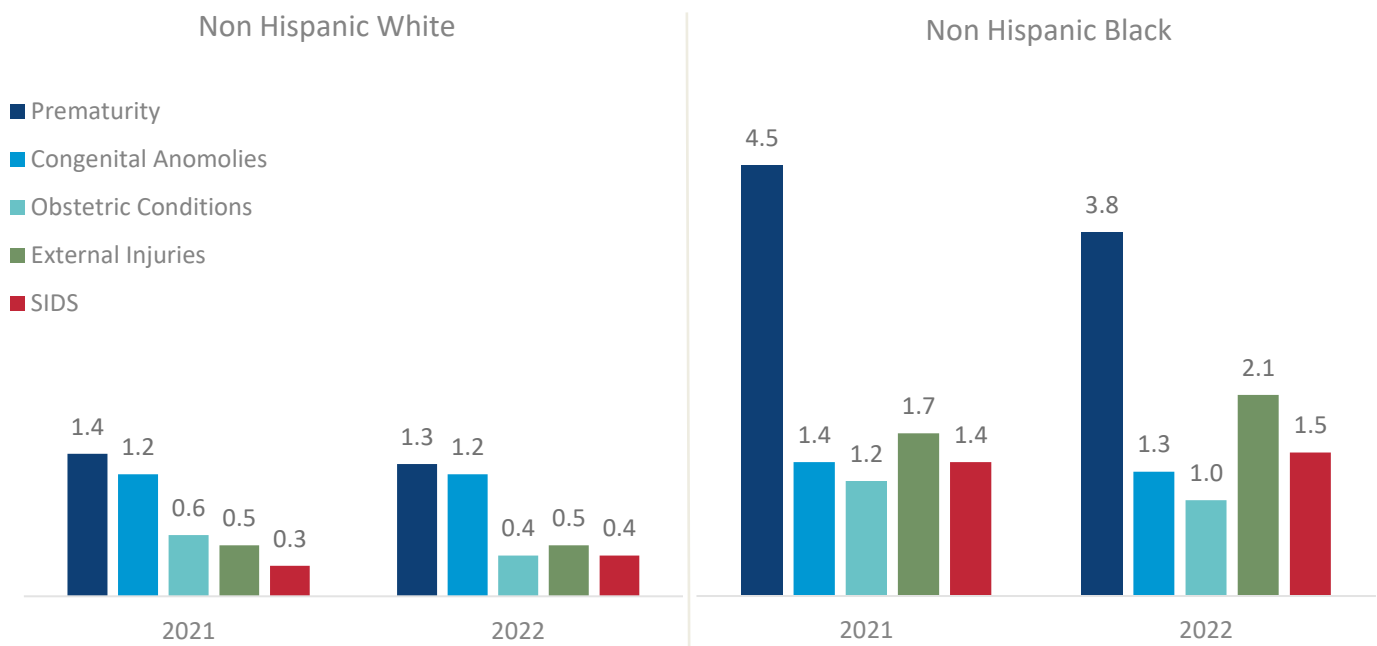

Data Source: Period Linked Infant Mortality File and Resident Birth File from the Ohio Department of Health, Bureau of Vital Statistics, 2022

Non-Hispanic Black infants were more likely to die from every cause of death when compared to non-Hispanic White infants, though the disparity varies by specific cause. Non-Hispanic Black infants were nearly three times (B/W IMR: 2.9) as likely to die from prematurity-related conditions. The greatest disparities were observed amongst infants who died of external injuries (B/W IMR: 4.1), SIDS (B/W IMR: 3.8), perinatal infections (B/W IMR: 3.2) and other infections (B/W IMR: 3.2) (Figure 14).

Figure 14. **Non-Hispanic Black** infants were more likely to die from every cause of death compared with **non-Hispanic White** infants
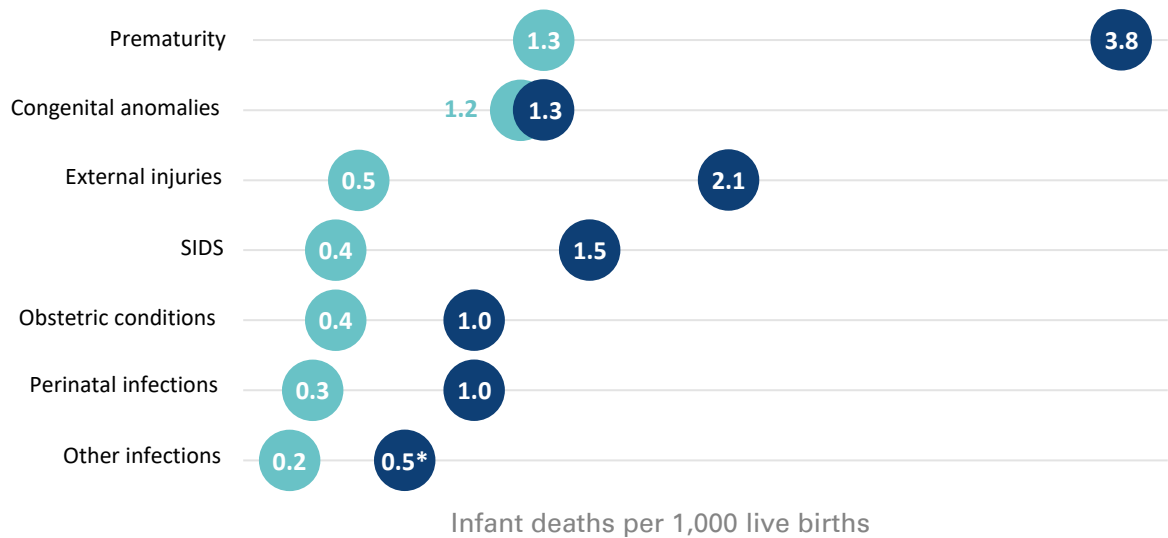
Infant deaths per 1,000 live births

Data Source: Period Linked Infant Mortality File and Resident Birth File from the Ohio Department of Health, Bureau of Vital Statistics, 2022.
Due to small numbers, rates for birth asphyxia are not shown here.
*Rates based on fewer than 20 infant deaths should be interpreted with caution.

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 pre-conception or inter-conception period. 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.[3] See appendix C for additional data on maternal characteristics.

Pre-pregnancy Maternal Health Conditions

Among infants who died in 2023, 7% had mothers with pre-pregnancy hypertension, 2% had mothers with pre-pregnancy diabetes and 39% had mothers who were obese prior to pregnancy (Figure 15).

Figure 15. Pre-Pregnancy Maternal Health Conditions among Infants who Died
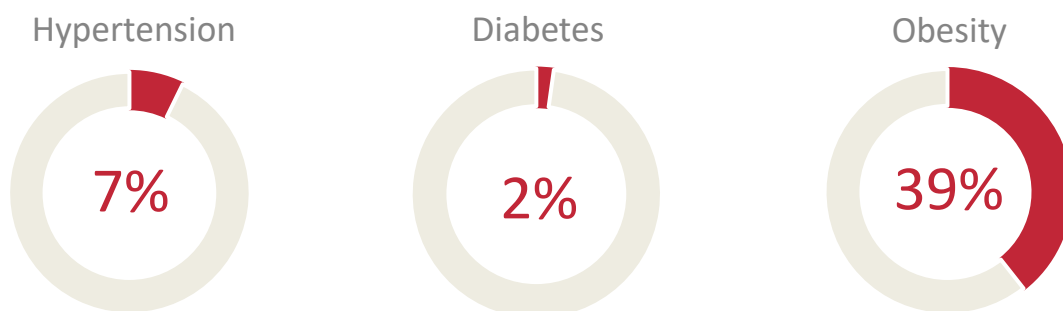
Data Source: Period Linked Infant Mortality File from the Ohio Department of Health, Bureau of Vital Statistics, 2022

Maternal Weight

Thirty-nine percent (39%) of infants who died had mothers who were obese (body mass index greater than 30kg/m2) prior to pregnancy. Among infants who died, pre-pregnancy obesity was more common in infants born to non-Hispanic Black mothers (44%) compared with those born to non-Hispanic White mothers (38%). For reference, 41% of women ages 19-44 in Ohio are considered obese, according to the 2021 Ohio Medicaid Assessment Survey.

Infant mortality rates were highest among infants born to mothers who were underweight (body mass index (BMI) less than 18.5) prior to pregnancy (10.0 infant deaths per 1,000 live births) and represented only 4.3% of infant deaths in 2022. The second highest infant mortality rate was among infants born to mothers who were obese prior to pregnancy at 8.0, followed by infants born to overweight mothers at 6.4 (Figure 16). Within every BMI category, non-Hispanic Black mothers experienced higher infant mortality rates than non-Hispanic White mothers (Figure 17).

Figure 16: Mothers with Normal BMI* Had the Lowest Rate of Infant Mortality

Underweight (BMI: Less than 18.5) — 10.0
Normal (BMI 18.5-24.9) — 5.7
Overweight (BMI: 25-29) — 6.4
Obese (BMI Greater than… — 8.0

Data Source: Period Linked Infant Mortality File and Resident Birth file from the Ohio Department of Health, Bureau of Vital Statistics, 2022
*Normal BMI = Body mass index between 18.5 and 24.9.

Figure 17. Within every BMI category*, non-Hispanic Black mothers experienced higher infant mortality rates than non-Hispanic White mothers.

Normal (BMI 18.5-24.9) — 4.9 / 9.3
Overweight (BMI: 25-29) — 4.9 / 11.0
Obese (BMI Greater than 30) — 6.5 / 12.2

*BMI = Body mass index.
Data Source: Period Linked Infant Mortality File from the Ohio Department of Health, Bureau of Vital Statistics, 2022
Note: Due to small numbers (<10) of non-Hispanic Black infant deaths to underweight mothers, these rates are suppressed and excluded from the figure.

Maternal Smoking

Seventeen percent (17%) of infants who died in 2022 were born to mothers who reported smoking during the three months prior to pregnancy. Fourteen percent (14%) of infants who died were born to mothers who reported smoking during the first trimester of pregnancy, and 9% were born to mothers who smoked during the last three months of pregnancy (Figure 18).

Figure 18. Smoking was common before and during pregnancy among mothers whose infants died

- 9% — Smoking during last 3 months of pregnancy
- 14% — Smoking during first trimester
- 17% — Smoking in 3 months prior to pregnancy

Percent

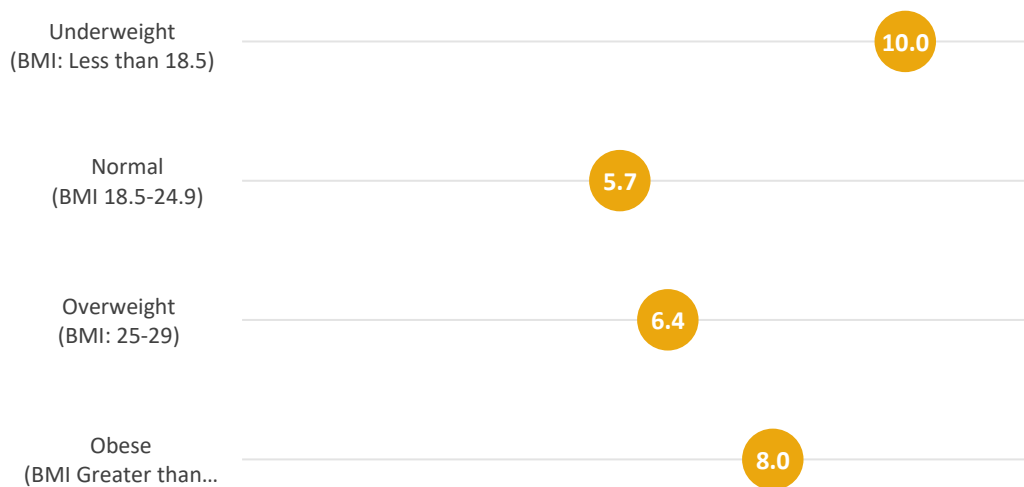*Data Source: Period Linked Infant Mortality File from the Ohio Department of Health, Bureau of Vital Statistics, 2022*

Smoking, both before and during the first trimester, was more common among non-Hispanic White mothers compared with non-Hispanic Black mothers. Twenty percent (20%) of infants who were born to non-Hispanic White mothers and died had a mother who smoked before pregnancy, compared with 12% of those who were born to non-Hispanic Black mothers (Figure 19). Similarly, 17% of non-Hispanic White infants who died had mothers who smoked during the first trimester, compared with 10% of those born to Black mothers (Figure 19). Smoking during the last three months of pregnancy was less common among both non-Hispanic White mothers and non-Hispanic Black mothers – 12% and 7% respectively (Figure 19).

Figure 19. Non-Hispanic White mothers were more likely to smoke cigarettes before and during pregnancy when compared to non-Hispanic Black mothers
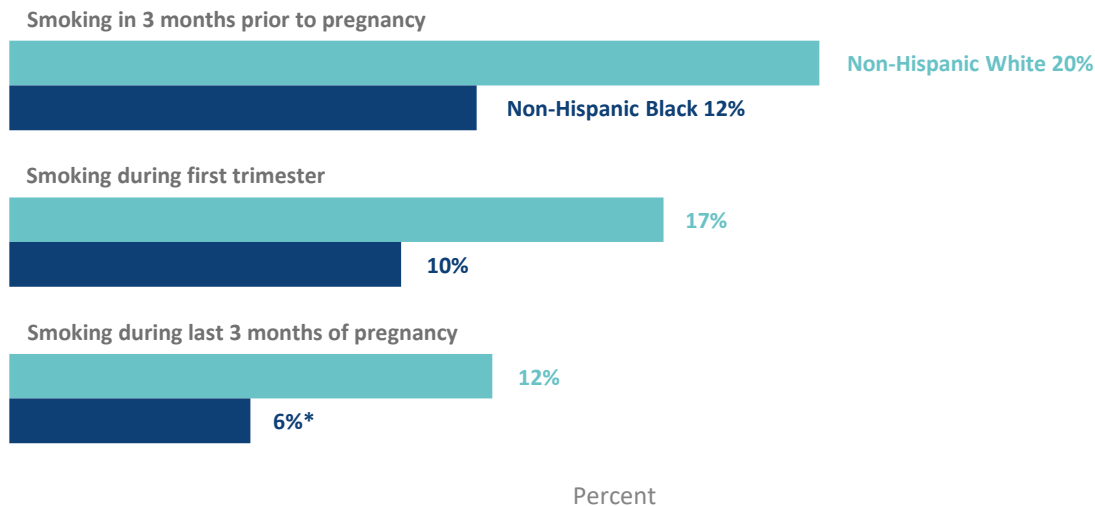
- Smoking in 3 months prior to pregnancy: Non-Hispanic White 20%, Non-Hispanic Black 12%
- Smoking during first trimester: 17%, 10%
- Smoking during last 3 months of pregnancy: 12%, 6%*

Percent
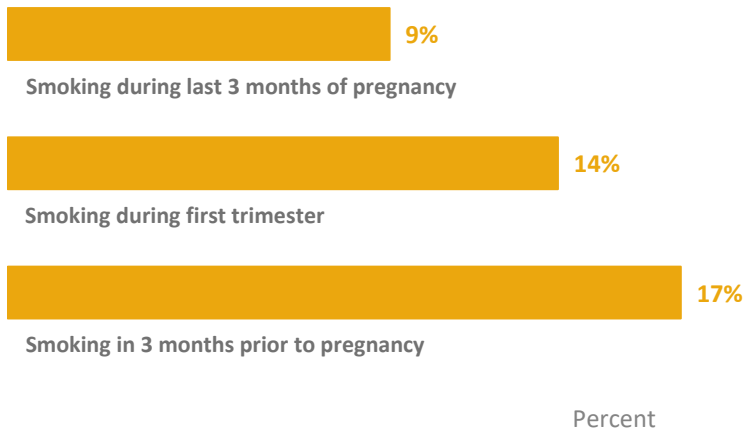
Data Source: Period Linked Infant Mortality File from the Ohio Department of Health, Bureau of Vital Statistics, 2022
*Percentages based on fewer than 20 infant deaths should be interpreted with caution.

Maternal Age

Infant mortality rates varied by maternal age group. As in previous years, infants born to mothers younger than 20 years old experienced the highest infant mortality rate – 12.8 deaths per 1,000 live births in 2022 and 11.9 in 2021. The second highest infant mortality rate was among infants born to mothers 40 and older (9.5) and the lowest was among infants born to mothers between the ages of 30 and 34 (5.6) (Figure 20).

Figure 20. Infants born to mothers younger than 20 years old experienced the highest infant mortality rate
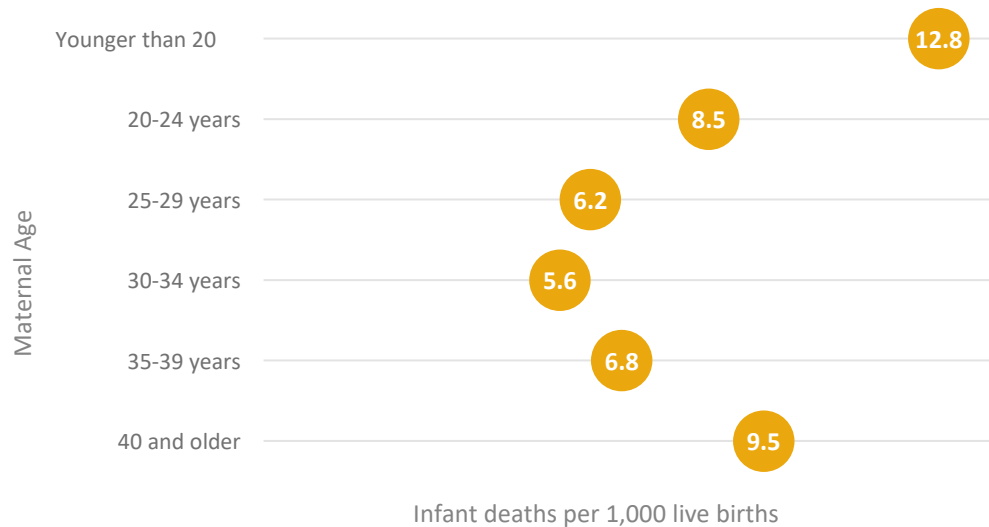
Data source: Period Linked Infant Mortality File and Resident Birth File from the Ohio Department of Health, Bureau of Vital Statistics, 2022.

Across all age groups, infants born to non-Hispanic Black mothers experienced higher infant mortality rates compared to infants born to non-Hispanic White mothers. Infants born to non-Hispanic Black mothers younger than 20 years old had the highest infant mortality rate at 17.2 infant deaths per 1,000 live births compared with 10.2 among non-Hispanic White mothers. The age group with the greatest disparity between non-Hispanic Black and non-Hispanic White infant mortality was 30-34 years old. The non-Hispanic Black infant mortality rate for infants with mothers ages 30-34 was 13.2– three times greater than the non-Hispanic White infant mortality (4.4) (Figure 21).

Figure 21: Infants born to **non-Hispanic Black** mothers experienced higher infant mortality rates in every age group when compared to infants born to **non-Hispanic White** mothers
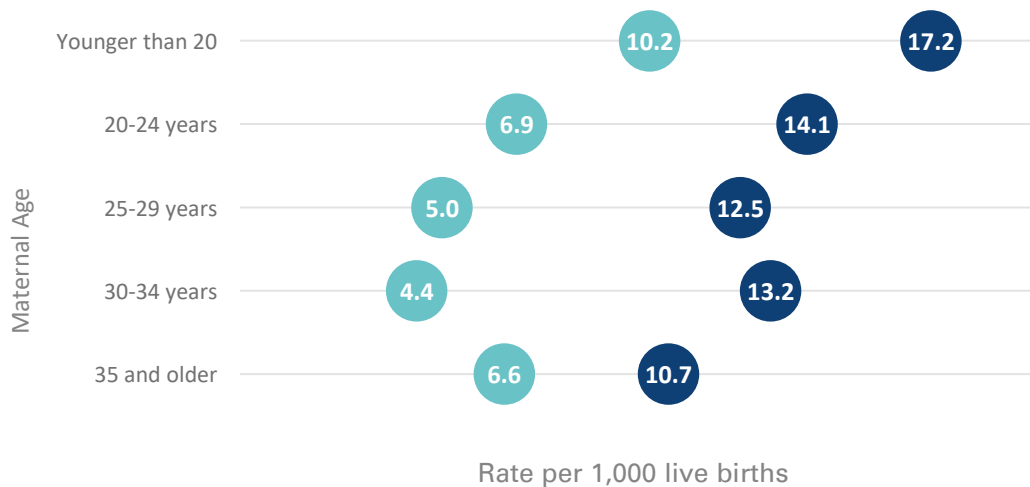
Data source: Period Linked Infant Mortality File and Resident Birth File from the Ohio Department of Health, Bureau of Vital Statistics, 2022.

Access to Care

More than half of infants who died (57%) were born to mothers who reported Medicaid as their source of insurance during the birth hospitalization (Figure 22). This is higher than the overall percentage of Ohio births in 2022 that reported Medicaid as their source of insurance[†] (40%).

One-third (33%) 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) during pregnancy (Figure 22). 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 the mothers of these infants may have been eligible for WIC, but did not, or could not easily, access the program.

Lack of prenatal care in the first trimester was common. Overall, two-in-five infants who died (40%) were born to mothers who did not receive prenatal care during the first trimester (Figure 22). From 2021 to 2022 there was little to no change in the percentage of non-Hispanic White (40% in both 2021 and 2022) and non-Hispanic Black mothers (40% in 2021 down to 38% in 2022) who did not receive prenatal care during the first trimester.

Figure 22. Access to Care at Time of Birth among Infants who Died

| Presumed Medicaid	WIC participation	Medicaid, no WIC	No 1st Trimester Prenatal Care
57%	28%	33%	40%

Data Source: Period Linked Infant Mortality File from the Ohio Department of Health, Bureau of Vital Statistics, 2022

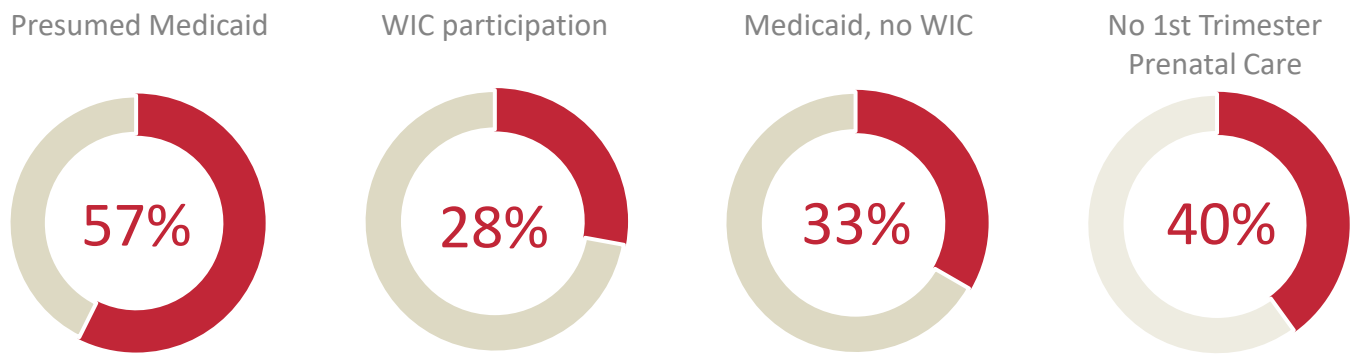[†] Medicaid insurance status as reported on the birth certificate.

SECTION 4: METHODS AND REFERENECES

Methodology Update for 2022 Regarding Race/Ethnicity Classification

Starting in 2022, the methodology in the Department of Children and Youth's (DCY) annual Infant Mortality reports will vary from previous reports published. Two key changes have been made. First, race classifications are based on single race as opposed to bridged race estimates used in the past. DCY is no longer able to access the bridged race variable in the Vital Statistics (VS) birth and death records because the National Center for Health Statistics (NCHS) discontinued the algorithm used to generate the bridged-race variable.[‡] Second, DCY has updated the infant mortality rate calculation to more closely align with the national methodology used by the Centers for Disease Control and Prevention (CDC). The 10-year trends presented in this report reflect the new methodology to allow for comparisons across years. However, rates for previous years presented in this report will differ from previous reports. Both changes, discussed in greater detail below, bring Ohio's infant mortality data into greater conformity with other state and national data collection methods and will allow for more meaningful comparisons to other jurisdictions.

Beginning in 2022, the NCHS ceased providing bridged-race variables for vital statistic records (i.e., birth and death certificates). Bridged race was provided to allow for race data collected from 2003 Revised Standard Certificates of Birth and Death to be comparable to race data collected previously. Among other differences, selection of multiple races was not allowed on birth and death certificates prior to the 2003 revision. As a result of no longer having access to the bridged race variables, DCY modified the 2022 Infant Mortality Report race/ethnicity methodology to align with other states and national infant mortality reporting methodology, which leverages mothers' self-reported race and ethnicity on the birth certificate. Updating the methods will allow greater comparability between rates and data included in the report. The race and Hispanic-origin groups included are single-race American Indian and Alaska Native non-Hispanic, single-race Asian non-Hispanic, single race Black non-Hispanic, single-race Native Hawaiian or Other Pacific Islander non-Hispanic, single-race White non-Hispanic, multiracial non-Hispanic, and Hispanic.

In alignment with the CDC, DCY also modified the method for calculating the infant mortality rate (IMR). The number of infant deaths (numerator) was previously calculated using the infant's race reported on the death certificate. Beginning in 2022, the number of infant deaths was determined using the mothers' single race as reported on the birth certificate, which is linked to the infants' death certificate. If mothers' race was not available, due to an unlinked birth certificate or missing information, then the infant's race was utilized. The number of births (denominator) remains based on the mothers' single race as reported on the birth certificate.

OLD METHOD

$$IMR = \frac{\text{(Infant's bridged-race on death certificate)}}{\text{(Mother's bridged-race on birth certificate)}} \times 1{,}000$$

NEW METHOD

$$IMR = \frac{\text{(Mother's single-race on birth certificate linked to the infant's death certificate)}}{\text{(Mother's single-race on birth certificate)}} \times 1{,}000$$

For more information on prior years' methodology, see the 2021 Ohio Infant Mortality Report (Page 39).

[‡] Race bridging refers to making data collected using one set of race categories consistent with data collected using a different set of race categories, to permit estimation and comparison of race-specific statistics at a point in time or over time. More specifically, race bridging is a method used to make multiple-race and single-race data collection systems sufficiently comparable to permit estimation and analysis of race-specific statistics. Source: https://www.cdc.gov/nchs/nvss/bridged_race.htm

A detailed explanation of the NCHS bridged-race variables can be found here.

Calculation of Rates and Trends

This report contains data from the Birth and Infant Mortality Linked Period datasets that are part of Ohio's Vital Statistics System. The datasets were downloaded from the Secure InnovateOhio Platform (IOP) DataOhio Portal (DOP), a self-service online tool that allows authorized users to obtain the most recent public health data available about Ohio. The numerator for rates (deaths) is calculated from the Infant Mortality Linked Period dataset while the denominator (live births) is calculated from the Birth dataset. Race and ethnic specific rates are determined using mothers' race and ethnicity. 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]

Trend analyses were conducted using Joinpoint software, which tests for significant trends over time and identifies time points where changes in trends occur. References to rates increasing, decreasing, or being different from one another indicate that differences or changes are statistically significant at the p<0.05 level. When there appear to be observed differences between categories or differences over a period of time, but these differences are not statistically significant, they are noted in the text.

References

1.   Health Policy Institute of Ohio. *Ohio 2020-2022 State Health Improvement Plan*.; 2020.
      https://odh.ohio.gov/static/SHIP/2020-2022/2020-2022-SHIP.pdf

2.   Nakamura AM, Melanie Dove MS, Archana Minnal M, Mark Damesyn M, Michael Curtis DP. Infant Mortality: Development of
      a Proposed Update to the Dollfus Classification of Infant Deaths. Public Health Reports 2015; 130;632-642.

3.   Office of the Surgeon General (OSG). (2020). *The Surgeon General's Call to Action to Improve Maternal Health.* US
      Department of Health and Human Services.

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APPENDIX A: OHIO FIVE YEAR OHIO NEONATAL, POSTNEONATAL, AND INFANT MORTALITY, BY COUNTY (2018 – 2022)

County	Neonatal Mortality		Postneonatal Mortality		Infant Mortality			
	Neonatal Deaths	NMR	Postneonatal Deaths	PMR	Infant Deaths	IMR	Births	Black/White Ratio
Adams County	5	*	3	*	8	*	1670	*
Allen County	23	3.8	12	**2.0	35	5.8	6080	2.7
Ashland County	16	**5.6	10	**3.5	26	9.0	2881	*
Ashtabula County	22	4.1	18	**3.4	40	7.5	5318	*
Athens County	8	*	5	*	13	**5.5	2361	*
Auglaize County	16	**6.0	6	*	22	8.3	2664	*
Belmont County	12	**3.9	9	*	21	6.8	3088	*
Brown County	8	*	11	**4.6	19	**7.9	2414	*
Butler County^	110	5.0	51	2.3	161	7.3	21956	1.9
Carroll County	3	*	5	*	8	*	1271	*
Champaign County	7	*	3	*	10	**4.8	2072	*
Clark County	37	4.8	18	**2.3	55	7.1	7714	*
Clermont County	46	4.1	31	2.8	77	6.9	11173	*
Clinton County	8	*	11	**4.7	19	**8.2	2330	*
Columbiana County	20	4.0	10	**2.0	30	6.0	4964	*
Coshocton County	8	*	10	**4.6	18	**8.2	2197	*
Crawford County	7	3.1	8	*	15	**6.7	2228	*
Cuyahoga County^	344	5.1	185	2.8	529	7.9	66986	3.0
Darke County	8	*	6	*	14	**4.7	3004	*
Defiance County	12	**5.9	2	*	14	**6.9	2038	*
Delaware County	26	2.4	8	*	34	3.2	10665	*
Erie County	28	7.9	7	*	35	9.8	3566	6.4
Fairfield County	38	4.4	16	**1.9	54	6.3	8605	2.5
Fayette County	8	*	2	*	10	**6.0	1674	*
Franklin County^	458	5.2	204	2.3	662	7.4	88908	2.5
Fulton County	14	**6.2	2	*	16	**7.1	2265	*
Gallia County	6	*	6	*	12	**6.7	1788	*
Geauga County	13	**2.8	7	*	20	4.3	4641	*
Greene County	36	4.3	13	**1.5	49	5.8	8431	*
Guernsey County	18	**8.3	6	*	24	11.1	2156	*
Hamilton County^	284	5.4	142	2.7	426	8.2	52136	3.0
Hancock County	16	**3.8	6	*	22	5.2	4253	*
Hardin County	10	**5.3	4	*	14	**7.4	1894	*
Harrison County	3	*	1	*	4	*	760	*
Henry County	8	*	0	*	8	*	1525	*
Highland County	16	**6.0	10	**3.7	26	9.7	2686	*

County	Neonatal Deaths	NMR	Postneonatal Deaths	PMR	Infant Deaths	IMR	Births	Black/White Ratio
Hocking County	4	*	8	*	12	**8.4	1433	*
Holmes County	12	**3.0	6	*	18	**4.5	4008	*
Huron County	16	**4.8	3	*	19	**5.7	3321	*
Jackson County	6	*	5	*	11	**5.7	1918	*
Jefferson County	14	**4.3	9	*	23	7.1	3247	*
Knox County	13	**3.5	7	*	20	5.4	3715	*
Lake County	27	2.6	12	**1.1	39	3.7	10572	*
Lawrence County	13	**4.2	4	*	17	**5.5	3098	*
Licking County	40	4.1	16	**1.6	56	5.8	9713	*
Logan County	8	*	4	*	12	**4.6	2625	*
Lorain County^	65	4.0	32	2.0	97	6.0	16055	2.8
Lucas County^	144	5.6	95	3.7	239	9.3	25688	2.7
Madison County	7	*	3	*	10	**4.5	2222	*
Mahoning County^	63	5.3	35	3.0	98	8.3	11842	4.1
Marion County	12	**3.3	9	*	21	5.8	3602	*
Medina County	16	**1.9	10	**1.2	26	3.1	8297	*
Meigs County	4	3.8	3	*	7	*	1047	*
Mercer County	11	**3.5	4	*	15	**4.7	3173	*
Miami County	30	5.1	8	*	38	6.5	5842	*
Monroe County	4	*	1	*	5	*	672	*
Montgomery County^	160	5.1	91	2.9	251	8.0	31234	2.0
Morgan County	3	*	1	*	4	*	692	*
Morrow County	7	*	1	*	8	*	1868	*
Muskingum County	22	4.4	13	**2.6	35	7.0	4972	*
Noble County	3	*	0	*	3	*	732	*
Ottawa County	6	*	2	*	8	*	1522	*
Paulding County	4	*	0	*	4	*	1085	*
Perry County	6	*	4	*	10	**5.0	1996	*
Pickaway County	17	**5.5	8	*	25	8.0	3110	*
Pike County	8	*	6	*	14	**8.3	1687	*
Portage County	39	5.8	7	*	46	6.8	6763	3.7
Preble County	7	*	3	*	10	**4.8	2075	*
Putnam County	8	*	2	*	10	**4.8	2089	*
Richland County	36	5.3	10	**1.5	46	6.7	6846	*
Ross County	17	**4.3	8	*	25	6.4	3921	*
Sandusky County	9	*	9	*	18	**5.9	3042	*
Scioto County	19	**4.9	21	5.5	40	10.4	3850	*
Seneca County	15	**5.0	10	**3.4	25	8.4	2979	*
Shelby County	12	**3.9	6	*	18	**5.9	3059	*
Stark County^	79	4.0	45	2.3	124	6.2	19884	2.3

County	Neonatal Deaths	NMR	Postneonatal Deaths	PMR	Infant Deaths	IMR	Births	Black/White Ratio
Summit County^	109	3.9	66	2.3	175	6.2	28222	2.8
Trumbull County	45	4.4	21	2.1	66	6.5	10176	*
Tuscarawas County	27	4.8	9	*	36	6.4	5645	*
Union County	12	**3.4	5	*	17	**4.8	3539	*
Van Wert County	5	*	8	*	13	**7.8	1675	*
Vinton County	9	*	2	*	11	**16.1	682	*
Warren County	36	2.9	16	**1.3	52	4.3	12206	*
Washington County	15	**5.3	5	*	20	7.1	2834	*
Wayne County	36	5.1	17	**2.4	53	7.4	7121	*
Williams County	10	**4.9	4	*	14	**6.9	2021	*
Wood County	26	4.2	12	**1.9	38	6.1	6243	*
Wyandot County	3	*	1	*	4	*	1089	*
Total	3021	4.6	1535	2.3	4556	6.9	657311	2.5

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.
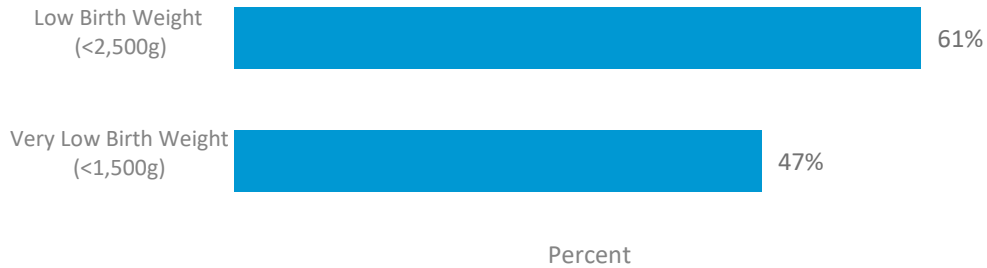** Rates based on fewer than 20 infant deaths should be interpreted with caution.
*** The total for Ohio includes 61 births with unknown county of residence.
^ Ohio Equity Initiative County.

APPENDIX B: 5-YEAR HISPANIC INFANT MORTALITY RATES, 2018-2022

Birth Weight

Figure A. Nearly half of Hispanic infants who died from 2018-2022 were born with very low birth weight

Low Birth Weight (<2,500g)	61%
Very Low Birth Weight (<1,500g)	47%

Percent

Data Source: Period Linked Infant Mortality File from the Ohio Department of Health, Bureau of Vital Statistics, 2022

Cause of Death

Figure B. Prematurity-related conditions and congenital anomalies account for more than half of all Hispanic infant deaths from 2018-2022
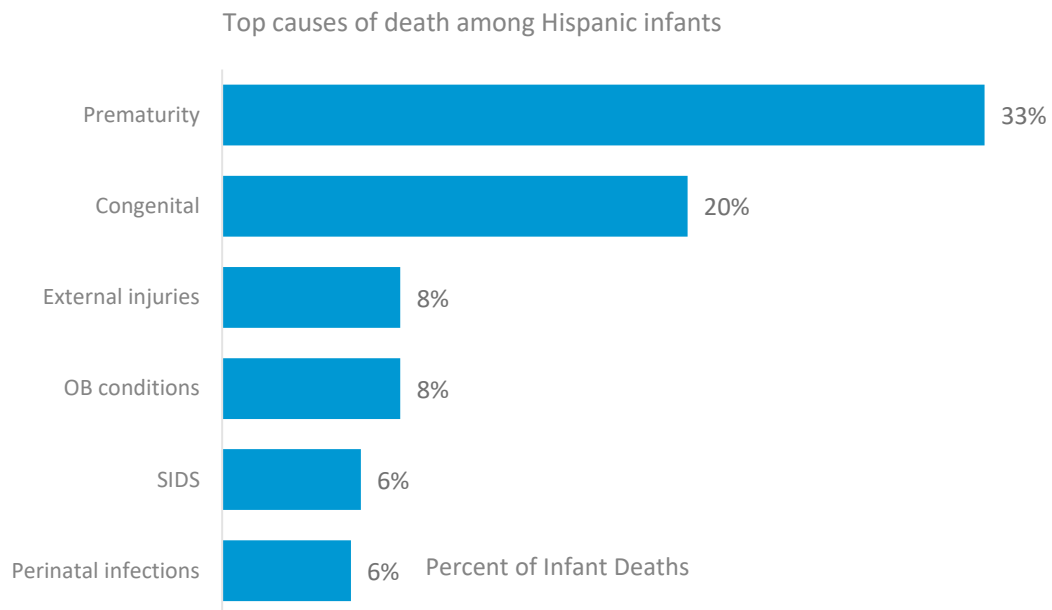
Top causes of death among Hispanic infants

Prematurity	33%
Congenital	20%
External injuries	8%
OB conditions	8%
SIDS	6%
Perinatal infections	6%

Percent of Infant Deaths

Data Source: Period Linked Infant Mortality File from the Ohio Department of Health, Bureau of Vital Statistics, 2022

Figure C. Prematurity-related conditions and congenital anomalies had the highest Hispanic infant mortality rates from 2018-2022

Cause-specific rates of Hispanic infant deaths

Cause	Rate
Prematurity	1.9
Congenital anomalies	1.2
External injuries	0.4*
SIDS	0.3*
Obstetric conditions	0.4*
Perinatal infections	0.3*

Infant deaths per 1,000 live births

Data Source: Period Linked Infant Mortality File and Resident Birth File from the Ohio Department of Health, Bureau of Vital Statistics, 2022.
*Rates based on fewer than 20 infant deaths should be interpreted with caution.

Maternal Weight

Figure D. Hispanic mothers with normal BMI experienced the lowest rates of infant mortality, 2018-2022

Category	Rate
Normal (BMI 18.5-24.9)	5.5
Overweight (BMI: 25-29)	5.7
Obese (BMI Greater than 30)	6.6

Rate per 1,000 live births

Data Source: Period Linked Infant Mortality File from the Ohio Department of Health, Bureau of Vital Statistics, 2022
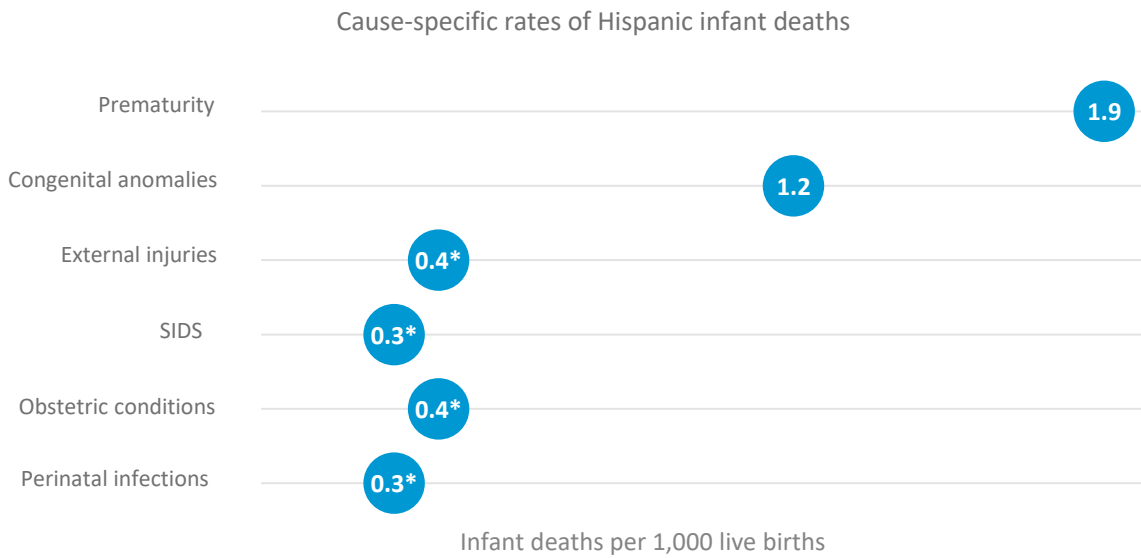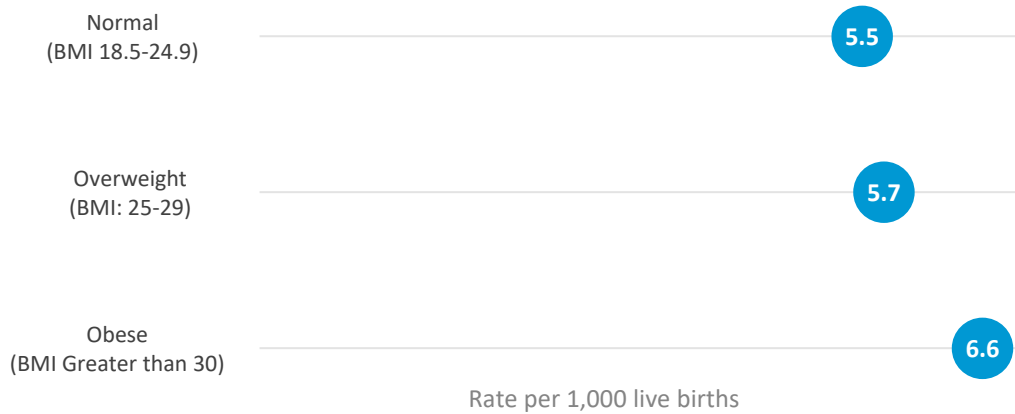*Note: Due to small numbers (<10) of Hispanic infant deaths to underweight mothers, these rates are suppressed and excluded from the figure.*

Figure E. Smoking in the 3 months prior to pregnancy was common among Hispanic mothers whose infants died from 2018-2022

Smoking in 3 months prior to pregnancy

10%

Smoking during first trimester

9%

Smoking during last 3 months of pregnancy

6%*

Percent

Data Source: Period Linked Infant Mortality File from the Ohio Department of Health, Bureau of Vital Statistics, 2022
*Percentages based on fewer than 20 infant deaths should be interpreted with caution.
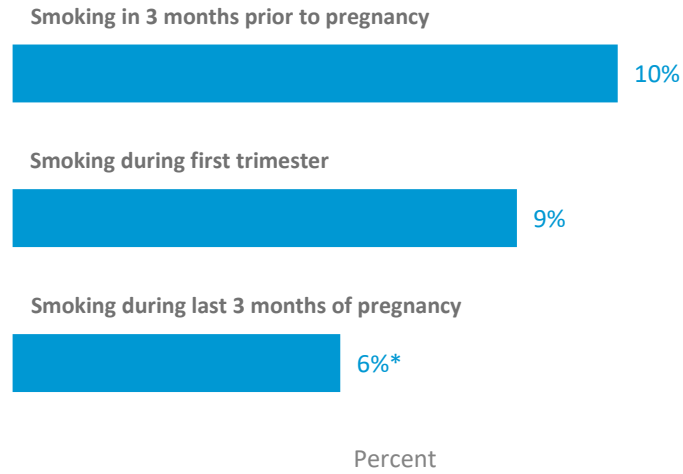
Maternal Age

Figure F. Hispanic mothers aged 20-34 experienced lower rates of infant mortality than mothers younger than 20 or 35 and older, 2018-2022
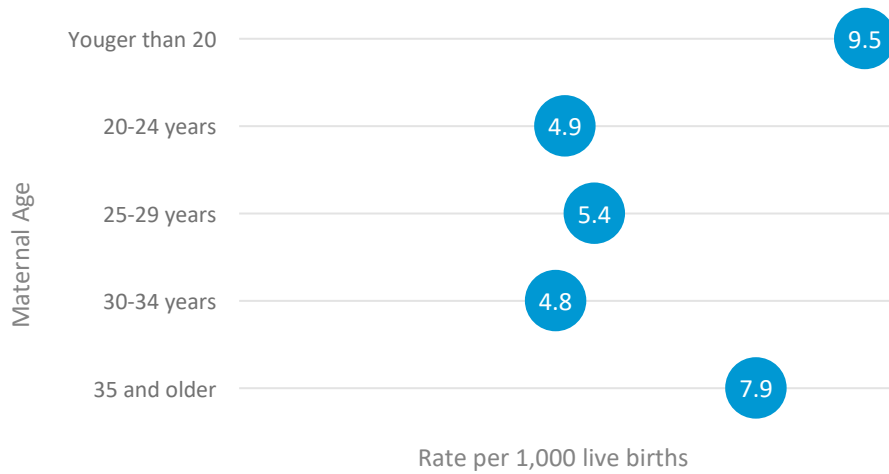
Younger than 20 — 9.5

20-24 years — 4.9

25-29 years — 5.4

30-34 years — 4.8

35 and older — 7.9

Maternal Age

Rate per 1,000 live births

Data Source: Period Linked Infant Mortality File from the Ohio Department of Health, Bureau of Vital Statistics, 2022

APPENDIX C: ATTRIBUTES OF ALL 2022 INFANT DEATHS

Attribute	Percent	Numerator	Denominator
Behavioral			
Mother smoked pre-pregnancy	16.7	148	888
Mother smoked first trimester	13.6	121	888
Mother smoked third trimester	9.5	84	888
Interpregnancy interval <18 months	42.1	149	354
Interpregnancy interval <6 months	10.2	36	354
Social			
Low income (presumed Medicaid)	57.4	507	884
Education less than high school	18.8	165	880
Father not on birth certificate	34.1	312	914
Medical: Pre-pregnancy			
Obesity	39.4	339	861
Hypertension	7.2	65	897
Diabetes	2.2	20	897
Medical: Pregnancy			
Gestational hypertension	11.5	103	897
Gestational diabetes	6.2	56	897
Twin or higher order pregnancy	15.6	140	897
Healthcare and services			
No first trimester prenatal care	40.2	314	781
Born in wrong level hospital ***	8.5	72	851
WIC during pregnancy	27.9	243	872
No WIC but probably eligible	33.3	288	864
Maternal pregnancy history			
Prior pregnancy	75.4	669	887
Prior live birth	63.4	563	888
Prior preterm birth	13.7	123	897
Demographic: Mother's race/ethnicity			
Non-Hispanic Black	29.9	273	914
Non-Hispanic White	56.8	519	914
Hispanic	6.0	55	914
Demographic: Mother's age (years)			
< 18	2.5	22	891
18-19	5.7	51	891
20-24	24.0	214	891
25-29	26.7	238	891
30-34	24.0	214	891
35-39	13.4	119	891
40 or more	3.7	33	891
Demographic: County of Residence at Death ****			
OEI County	58.5	535	914
Large metro county	35.2	322	914
Metro county	52.1	476	914
Micro county	11.5	105	914
Rural county	1.2**	11	914

Attribute	Percent	Numerator	Denominator
Delivery: Gestational age			
Before 20 weeks	8.7	77	885
20-23 weeks	22.1	196	885
24-27 weeks	11.2	99	885
28-33 weeks	12.5	111	885
34-36 weeks	10.6	94	885
37 weeks or more	34.8	308	885
Delivery: Birth weight			
Less than 500 grams	21.9	181	827
500-999 grams	16.3	135	827
1000-1499 grams	8.2	68	827
1500-1999 grams	5.9	49	827
2000-2499 grams	11.5	95	827
2500 or more grams	36.2	299	827
Small for gestational age (SGA)	19.2	158	821
Death: Timing			
Within first hour of life	11.1	101	914
By end of first day	26.9	246	914
By end of first week	13.0	119	914
By end of first month	13.0	119	914
Before first birthday	36.0	329	914
Death: Location			
Within hospital as inpatient	74.5	681	914
ER or outpatient	15.8	144	914
Dead on arrival	*	*	
Home	7.4	68	914
Hospice/nursing home/long term-care facility	*	*	
Other	*	*	
Dollfus cause of death category			
Prematurity	25.3	231	914
Congenital anomaly	16.3	149	914
External injuries	11.6	106	914
SIDS	8.0	73	914
Obstetric conditions	6.9	63	914
Perinatal infections	6.1	56	914
Other infections	5.0	46	914
Birth asphyxia	1.4**	13	914
Other	19.4	177	914

Note: The denominators for each attribute vary due to missing or unknown values in the Vital Statistics infant mortality period linked file.

*Figure does not meet standards of reliability or precision, based on fewer than 10 deaths in the numerator.

**Figures based on fewer than 20 deaths in the numerator should be interpreted with caution.

*** 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, Lorain, Lucas, Mahoning, Montgomery, Stark, Summit).