

# Ohio Infant Mortality Data Brief

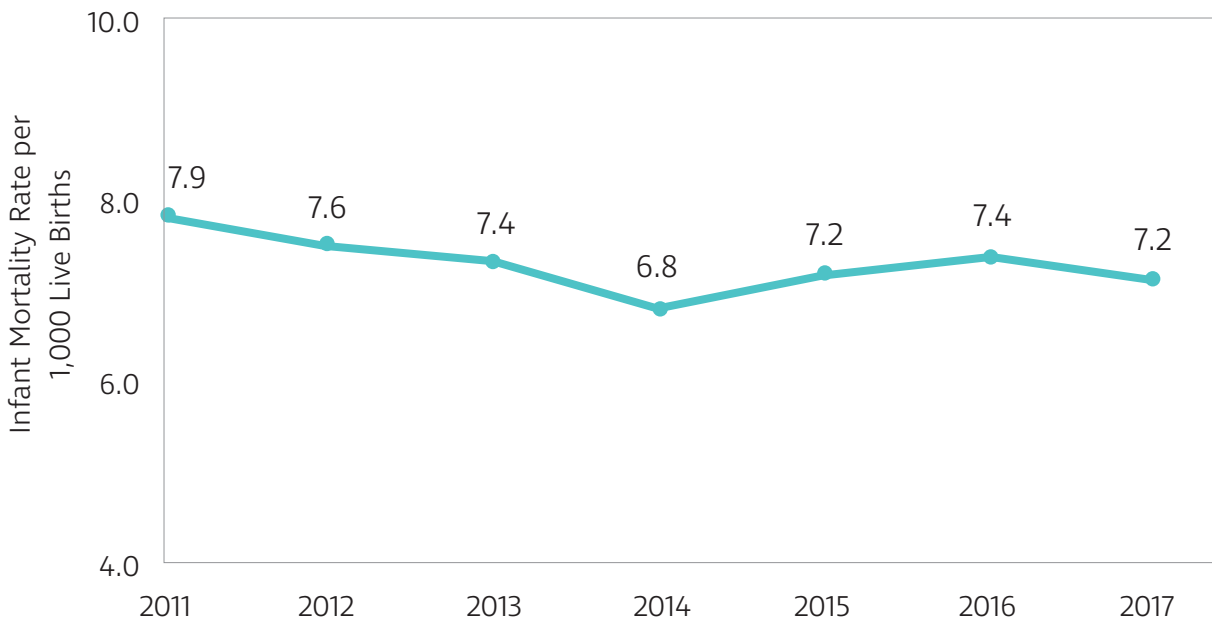
## Deaths to Ohio Infants, 2017

In August of 2018, the Ohio Department of Health (ODH) reported that 982 Ohio babies died before their first birthday in 2017.

While Ohio's infant mortality rate has been trending downward during the past decade, progress has been slower than desired and racial disparities are persistent.

ODH continues to investigate those deaths to further describe infant mortality in Ohio and identify new prevention opportunities. This brief provides findings from ODH's continued investigation, which includes analyses by duration of gestation, underlying cause of death, and risk factors. Several key demographic and maternal and child health indicators are presented for all deaths, among deaths due to leading causes, and among deaths to infants born before 24 weeks of gestation.

**Figure 1. Ohio Infant Mortality Rate, 2011-2017<sup>1</sup>**



<sup>1</sup>Annual percent change from 2011-2014= -4.17; Annual percent change from 2014-2017= 1.71

# Summary

## **This report has three main conclusions.**

- 1) Prematurity remains the leading cause of infant death in Ohio, comprising almost one-third of deaths. Half of all infants who died were born prior to 28 weeks gestation (a full-term pregnancy is at least 37 weeks).
- 2) Mortality rates from prematurity, congenital anomaly, and Sudden Infant Death Syndrome (SIDS) have all been trending downward.
- 3) Preventable risk factors and opportunities for intervening were both common among infants who died.

**Opportunities to intervene-prematurity and obstetric conditions:** A woman with a previous preterm birth is at risk for another preterm birth, but we found that fewer than 20 percent of infants who died due to prematurity or obstetric conditions had a mother with a previous preterm birth. However, over two-thirds had a prior pregnancy and that prior pregnancy could be a touchpoint with the medical system for optimizing the mother's health between pregnancies and thus improving the outcome of a subsequent pregnancy. First trimester prenatal care is an opportunity to identify and alleviate risks for a preterm birth. But over 30 percent of these mothers lack first trimester prenatal care, indicating a need to remove barriers both to early pregnancy identification and access to prenatal care. About one in four of these mothers was likely eligible for WIC but not receiving benefits. Two-thirds lived in an OEI county and a disproportionate number were black, supporting the focus of efforts to prevent prematurity within those nine counties and black families.

**Opportunities to intervene-prematurity and SIDS:** SIDS deaths are often considered highly preventable, however, in 2017, 67 Ohio infants died from SIDS and it was the fourth most common cause of infant death. More than half of the mothers of infants who died of SIDS participated in WIC while pregnant, indicating that WIC is an appropriate venue for advocating SIDS prevention including smoking cessation during pregnancy, keeping baby free of second hand smoke, breastfeeding, and safe sleep.

**Preventable preconception risk factors–prematurity and obstetric conditions:** Over one-third (36 percent) of deaths were among infants born before 24 weeks of gestation, and therefore highly unlikely to survive. Preventable risk factors for preterm birth were relatively common among the mothers of these infants and all infants who died of prematurity or obstetric conditions: over 40 percent were obese and one-third conceived after a shorter-than-recommended interpregnancy interval. Additionally, one in five deaths due to prematurity were born to women who smoked before pregnancy.

**Preventable preconception risk factors - SIDS:** Almost half of infants who died of SIDS had mothers who smoked before pregnancy and 39 percent continued smoking into the third trimester of pregnancy.

ODH continues to examine vital statistics and other data sources to better understand infant deaths so they may be prevented.

# Prematurity and congenital anomaly together accounted for half of the infant deaths in 2017.

**Prematurity-related causes were the underlying cause of death for 314 (32 percent) infants.**

**Among these infants**

- Almost two-thirds (63 percent) lived in a county served by the Ohio Institute for Equity in Birth Outcomes (OEI).
- Most (54 percent) of their mothers were low income (presumed to receive Medicaid at delivery) but only half of those received WIC benefits during pregnancy.
- 39 percent of their mothers received no prenatal care in the first trimester.
- The mothers of 41 percent were black.

**Congenital Anomaly was the underlying cause of death for 179 (18 percent) infants.**

- Among these infants, 75 percent of mothers had a previous pregnancy and 65 percent had a previous live birth, indicating potential opportunities for potential prevention between pregnancies.
- The mothers of 66 percent of these infants were white.

**Obstetric Conditions were the underlying cause of death for 90 (9 percent) infants.**

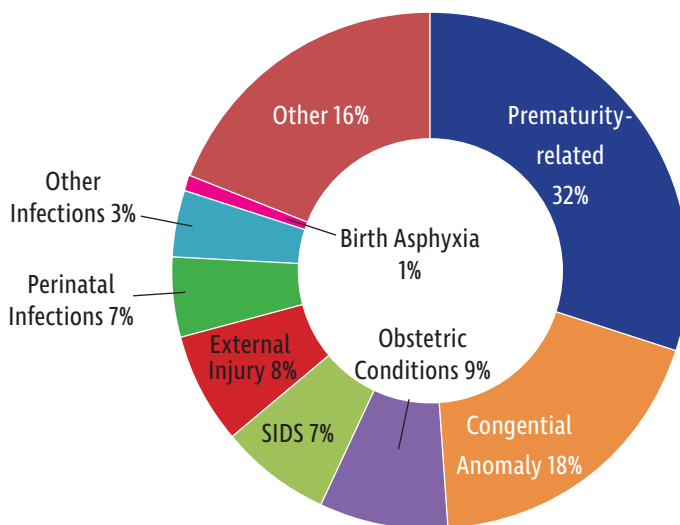
**Among infants who died of obstetric conditions**

- More than half (64 percent) died before the end of the first day of life.
- Almost all (80 percent) were born before 24 weeks gestation.
- 74 percent of mothers had a previous pregnancy while 50 percent had a previous live birth.
- The mothers of 48 percent were obese before pregnancy.

**External Injury was the underlying cause of death for 79 (8 percent) infants.**

- 38 percent of mothers received no prenatal care during the first trimester.
- Over half (68 percent) of the mothers received WIC benefits during pregnancy.
- The mothers of 77 percent of these infants had a previous pregnancy and 77 percent had a previous live birth, presenting potential opportunities for intervention between pregnancies.

**Figure 2. Cause of Infant Death, Ohio 2017**



# Prematurity and congenital anomaly together accounted for half of the infant deaths in 2017.

**SIDS** was the underlying cause of death for 67 (7 percent) infants.

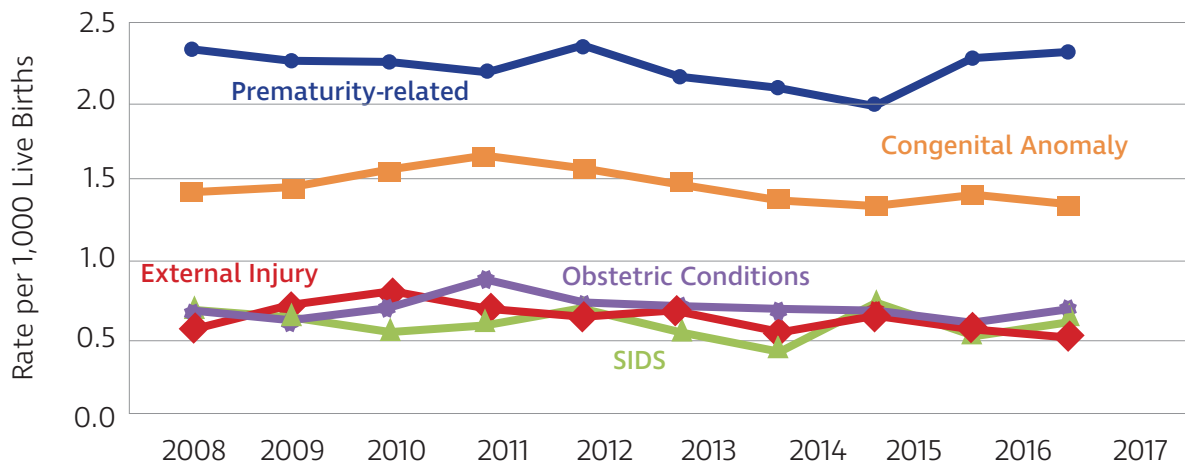
## Among infants who died of SIDS

- Most (84 percent) died after the first month of life but before their first birthday.
- More than two-thirds (69 percent) lived in an OEI county.
- The majority (84 percent) of mothers were low income (presumed to receive Medicaid at delivery) and 59 percent received WIC benefits during pregnancy.
- The mothers of almost half (45 percent) smoked in the three months before becoming pregnant.
- Over one-third (39 percent) of the mothers smoked into the third trimester of pregnancy.

## Mortality rates for 2 of the 5 top causes have been decreasing.

- Congenital anomaly deaths decreased by a -3.5 annual percent change from 2011-2017.
- SIDS deaths decreased by a -6.4 annual percent change from 2011-2017.

Figure 3. Cause-Specific Infant Mortality Rates for Top Causes, 2008-2017



# Infant Mortality by Duration of Gestation

Infant survival is highly associated with gestational age

Figure 4. Proportion of Infant Births by Gestational Age, Ohio 2017

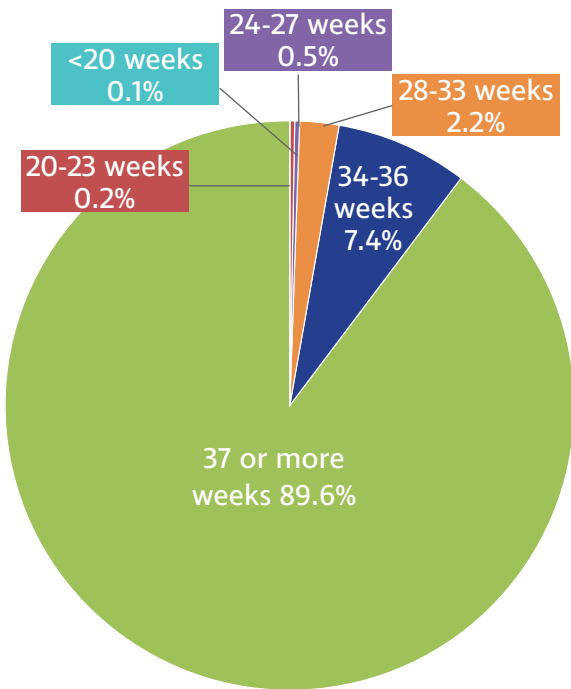
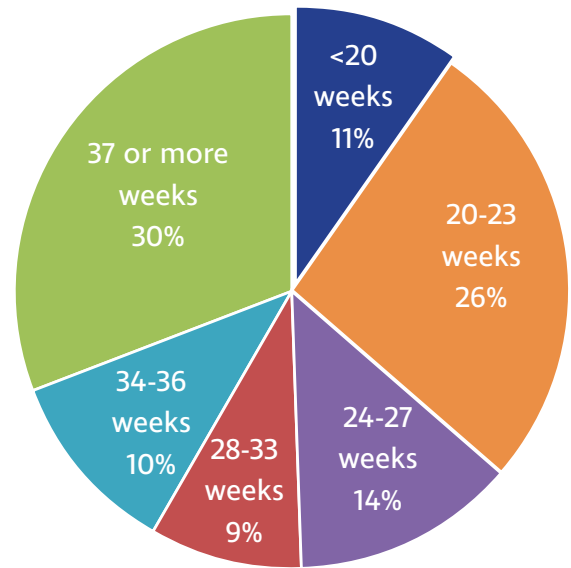


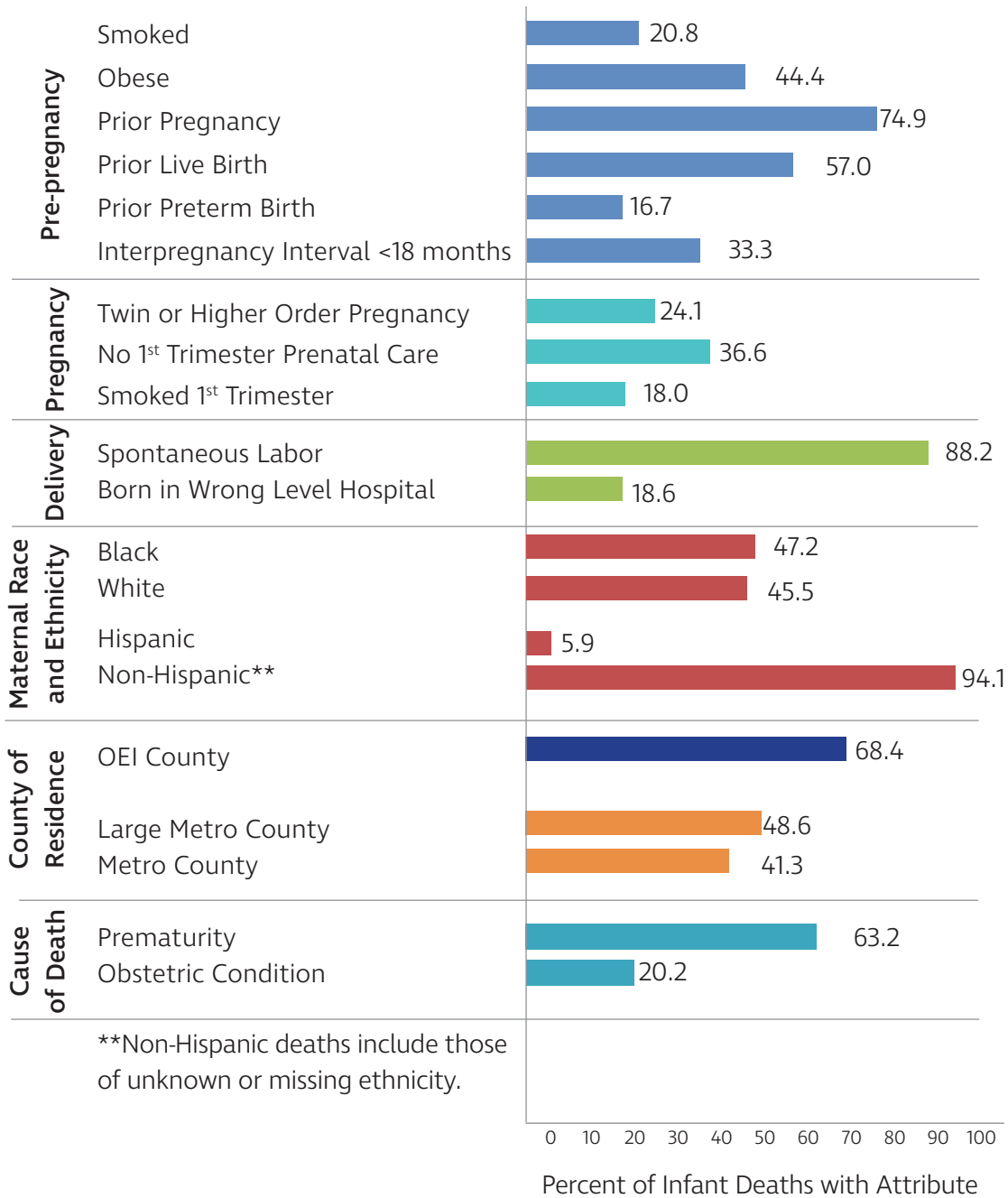
Figure 5. Proportion of Infant Deaths by Gestational Age, Ohio 2017



Although infants born less than 24 weeks accounted for 0.3 percent of total infants born, 356, over one-third, accounted for infant deaths. Among infants who died and were born at less than 24 weeks gestation, only 14 percent of the mothers had a prior preterm birth, but 68 percent had previously been pregnant.

# Infant Mortality by Duration of Gestation

Figure 6. Maternal and Infant Attributes of Infants who Died and were Born Before 24 Weeks Gestation, Ohio 2017



**Almost half of the infants who died did not survive their first day of life.**

- Within the first hour of life, 13 percent of infant deaths occurred.
- By the end of the first day of life, 32 percent more had died.
- After the first month, but before the first birthday (called post-neonatal death), 30 percent died.

**Most of the infants who died were born early or small.**

**Of the infants who died**

- Half (52 percent) were very low birth weight (<1500g or 3 lbs 5 oz).
- Half (50 percent) were born before 28 weeks gestation (called very preterm).
- A quarter (24 percent) were small for their gestational age [among singletons born at greater than 21 weeks of gestation].

**Preventable Risk Factors for infant death were common.**

**Among infants who died**

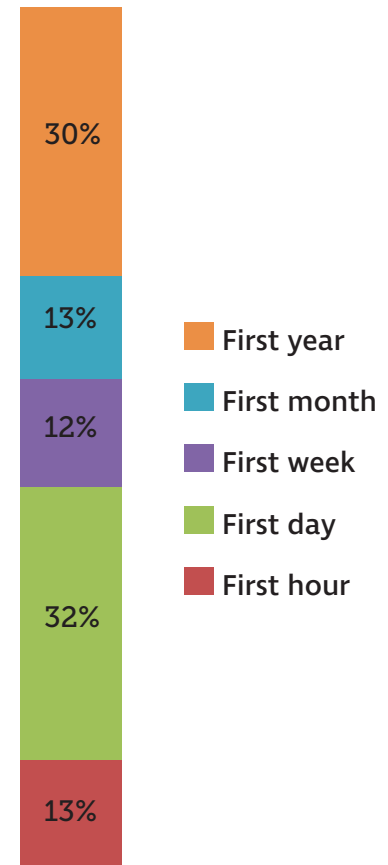
- More than one-third were born to mothers who received no first trimester prenatal care.
- Two in five whose mothers had a prior birth were conceived earlier than recommended (less than 18 months after the prior birth).
- 24 percent had a mother who smoked at the beginning of pregnancy.
- One in ten was born to a teenaged mother.

**Many women whose infant died had health concerns prior to pregnancy.**

**Of the infants' mothers prior to pregnancy**

- One in three (38 percent) was obese.
- One in four (24 percent) smoked within three months of becoming pregnant.
- Prepregnancy hypertension (6 percent) and diabetes (2 percent) were relatively uncommon but pose high risk to pregnancy.

**Figure 7. Age at death among infants who died Ohio, 2017**



# Preventable Risk Factors for Infant Death were Common

**There are opportunities to intervene and improve the chances of a healthy pregnancy.**

- About a quarter (27 percent) of mothers were not participating in WIC, but were likely eligible.
- The mothers of one-third (38 percent) of infants who died were WIC participants during pregnancy, a program which presents other opportunities for prevention.
- Most (75 percent) mothers had a previous pregnancy and may have benefited from care between pregnancies.
- 38 percent of women did not receive first trimester prenatal care.

**Infant deaths were not evenly distributed among the Ohio population.**

**Among infants who died**

- Almost two-thirds (61 percent) lived in an urban county targeted through the Ohio Institute for Equity in Birth Outcomes(OEI): Cuyahoga, Franklin, Hamilton, Summit, Butler, Lucas, Montgomery, Stark, Mahoning.
- 36 percent had a mother who was non-Hispanic black.

**Table 1. Common risk factors among infant deaths, Ohio 2017<sup>1</sup>**

|            | Risk Factor   | %  | #   |
|------------|---|----|-----|
| Behavioral | Conceived <18 months after prior birth <sup>2</sup> | 41 | 125 |
|            | Mother smoked during first trimester of pregnancy   | 20 | 196 |
|            | Low income (presumed Medicaid)                      | 59 | 554 |
| Social     | Father not named on birth certificate               | 34 | 331 |
|            | Mother's education < high school                    | 20 | 190 |
|            | Teen mother (<20 years of age)                      | 9  | 86  |
| Healthcare | No first trimester prenatal care <sup>3</sup>       | 38 | 323 |
|            | Born at inadequate level hospital <sup>4</sup>      | 9  | 85  |

<sup>1</sup>Restricted to 982 deaths with a linked birth certificate.

<sup>2</sup>Among the 303 infants whose mothers had a previous live birth.

<sup>3</sup>16 percent unknown.

<sup>4</sup>Among infants born in a facility.



# Data Sources and Methods

This report contains data from the period linked birth /infant death data set, which is part of Ohio's Vital Statistics System. The period linked birth/infant death data set includes all infant deaths under one year of age reported on death certificates and all live births reported from birth certificates. Only residents of Ohio are included. The period linked birth/infant death data set is the primary data set for analyzing infant mortality trends and patterns in Ohio and mirrors the system used nationally. It is also the primary source for examining race and Hispanic-origin infant mortality and for examining factors related to birth. Race and Hispanic origin are self-reported by the mother on the birth certificate. Causes of infant death were categorized using modified Dollfus criteria, which organizes infant deaths by etiology and their amenability to prevention efforts.

For these data analyses, rates for subcategories with fewer than ten infant deaths are suppressed due to insufficient reliability or confidentiality requirements. Refer to the Appendix for detailed tables of the data referenced in this report.

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. For some measures, there appear to be observed differences between categories or over time, however, these differences were not statistically significant and so are not mentioned in the text.

## Definitions:

**Congenital Anomaly:** This Dollfus category of infant cause of death includes deaths caused by congenital malformations, deformations, and chromosomal anomalies, and congenital disorders.

**County Type:** Based on the Centers for Medicaid and Medicare Services designations, this report divides counties into large metro, metro, micro or rural county types.

**Eligible for WIC:** For purposes of these analyses, women were income eligible for WIC if they were presumed to be insured by Medicaid at delivery.

**Father not Named on Birth Certificate:** The birth certificate contained no information about the father of the infant. Lack of information about the father is sometimes used as a lack of paternal support for the pregnancy and infant.

**Inadequate Hospital Level:** An infant born in a hospital without the appropriate level of care given the infants gestational age and/or birth weight. Levels of neonatal care are prescribed through Ohio Revised Code.

**Infant Death:** The death of a live-born baby before his or her first birthday.

## Data Sources and Methods

**Infant Mortality Rate:** The number of infant deaths in a specific year divided by the number of live births within that same year, multiplied by 1,000.

**Mother:** An Ohio resident woman physically giving birth to the infant.

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

**Obese:** Refers to a mother's body mass index (BMI) that was greater than 30 kg/m<sup>2</sup> before becoming pregnant.

**Obstetric Conditions:** A Dollfus category of infant cause of death comprised primarily of the following: premature rupture of membranes, placenta previa, placental separation and hemorrhage, incompetent cervix, and multiple pregnancy.

**OEI:** The Ohio Institute for Equity in Birth Outcomes is a partnership between ODH and nine urban communities to improve birth outcomes and reduce racial disparities in infant deaths.

**Prematurity:** Dollfus category of infant cause of death comprised of short gestation and low birth weight as well as several other causes that are specific to prematurity, such as neonatal hemorrhage, respiratory distress syndrome, and necrotizing enterocolitis.

**SIDS:** This acronym stands for Sudden Infant Death Syndrome and is also a modified Dollfus category for infant cause of death.

**Small for Gestational Age:** An infant who is smaller at birth than the usual amount for infants born at the same gestational age pregnancy.

**Spontaneous Preterm Birth:** Initiation of labor was spontaneous rather than provider initiated such as through labor induction, caesarean without labor, or membrane rupture.

**WIC:** The Special Supplemental Nutrition Program for Women, Infants, and Children is a Federal program administered by the state to income eligible women and their children up to age five. The program improves pregnancy outcomes by providing or referring to support services.

## References

Ohio Department of Health. 2017 Ohio Infant Mortality Data: General Findings. Available at [www.odh.ohio.gov/wps/portal/gov/odh/know-our-programs/infant-and-fetal-mortality/reports](http://www.odh.ohio.gov/wps/portal/gov/odh/know-our-programs/infant-and-fetal-mortality/reports)

Klebanoff, M. A., Yossef-Salameh, L., Latimer, C., Oza-Frank, R., Kachoria, R., Reagan, P. B., Oliver, E. A., Buhimschi, C. S. and Buhimschi, I. A. (2016), Development and Validation of an Algorithm to Determine Spontaneous versus Provider-Initiated Preterm Birth in US Vital Records. *Paediatr Perinat Epidemiol*, 30: 134–140. doi:10.1111/ppe.12267.

Nakamura AM, Dove MS, Minnal A, Damesyn M, Curtis MP. Infant Mortality: Development of a Proposed Update to the Dollfus Classification of Infant Deaths. *Public Health Rep*. 2015;130(6):632-642. doi:10.1177/003335491513000613.

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## Suggested Citation

Ohio Department of Health. Deaths to Ohio Infants, 2017. Columbus, OH:

Ohio Department of Health. 2018.

# Appendix

## Supplementary Data Tables

Table 1: Data for pages 2-5, 7-8

| Attribute                              | All Deaths |           |             |
|--|------------|-----------|-------------|
|  | Percent    | Numerator | Denominator |
| <b>Behavioral</b>                      |            |           |             |
| Smoked Pre-pregnancy                   | 24.3       | 239       | 982         |
| Smoked 1st Trimester                   | 20.0       | 196       | 982         |
| Smoked 3rd Trimester                   | 15.0       | 147       | 982         |
| Interpregnancy interval <18 months     | 41.3       | 125       | 303         |
| <b>Social</b>                          |            |           |             |
| Low Income (presumed Medicaid)         | 58.6       | 554       | 946         |
| Education less than High School        | 20.1       | 190       | 945         |
| Father not on birth certificate        | 33.7       | 331       | 982         |
| <b>Medical: Prepregnancy</b>           |            |           |             |
| Obese                                  | 38.2       | 357       | 935         |
| Hypertension                           | 5.6        | 54        | 973         |
| Diabetes                               | 2.1        | 20        | 973         |
| <b>Medical: Pregnancy</b>              |            |           |             |
| Gestational Hypertension               | 7.0        | 68        | 973         |
| Gestational Diabetes                   | 5.0        | 49        | 973         |
| Twin or higher order pregnancy         | 15.3       | 149       | 973         |
| <b>Healthcare and Services</b>         |            |           |             |
| No 1st Trimester Prenatal Care         | 38.1       | 323       | 847         |
| Born in Wrong Level Hospital           | 9.2        | 85        | 926         |
| WIC during Pregnancy                   | 38.4       | 363       | 946         |
| No WIC but probably eligible           | 27.4       | 255       | 932         |
| <b>Maternal Pregnancy History</b>      |            |           |             |
| Prior Pregnancy                        | 75.1       | 723       | 963         |
| Prior Live Birth                       | 62.9       | 603       | 959         |
| Prior Preterm Birth                    | 12.0       | 117       | 973         |
| <b>Demographic: Mother's Race</b>      |            |           |             |
| Black                                  | 36.1       | 354       | 982         |
| White                                  | 56.9       | 559       | 982         |
| <b>Demographic: Mother's Ethnicity</b> |            |           |             |
| Hispanic                               | 5.7        | 56        | 982         |
| Non-Hispanic**                         | 94.3       | 926       | 982         |

# Appendix

Table 1: Data for pages 2-5, 7-8 *continued*

| Attribute  | All Deaths |           |             |
|--|------------|-----------|-------------|
|  | Percent    | Numerator | Denominator |
| <b>Demographic: Mother's Age (years)</b>         |            |           |             |
| <18  | 2.9        | 28        | 969         |
| 18-19  | 6.0        | 58        | 969         |
| 20-24  | 27.9       | 270       | 969         |
| 25-29  | 29.2       | 283       | 969         |
| 30-34  | 21.3       | 206       | 969         |
| 35-39  | 10.0       | 97        | 969         |
| 40 or more                                       | 2.8        | 27        | 969         |
| <b>Demographic: County of Residence at Death</b> |            |           |             |
| OEI County                                       | 60.8       | 592       | 974         |
| Large Metro County                               | 37.6       | 369       | 982         |
| Metro County                                     | 51.2       | 503       | 982         |
| Micro County                                     | 9.8        | 96        | 982         |
| Rural County                                     | *          | *         | *           |
| <b>Delivery: Gestational Age</b>                 |            |           |             |
| Before 20 weeks                                  | 10.8       | 105       | 969         |
| 20-23 weeks                                      | 25.9       | 251       | 969         |
| 24-27 weeks                                      | 13.5       | 131       | 969         |
| 28-33 weeks                                      | 9.5        | 92        | 969         |
| 34-36 weeks                                      | 10.0       | 97        | 969         |
| 37 weeks or more                                 | 30.2       | 293       | 969         |
| <b>Delivery: Birth Weight</b>                    |            |           |             |
| Less than 500 grams                              | 25.7       | 228       | 887         |
| 500-599 grams                                    | 20.9       | 185       | 887         |
| 1000-1499 grams                                  | 5.1        | 45        | 887         |
| 1500-1999 grams                                  | 7.4        | 66        | 887         |
| 2000-2499 grams                                  | 8.5        | 75        | 887         |
| 2500 or more grams                               | 32.5       | 288       | 887         |
| Small for gestational age (SGA)                  | 24.2       | 155       | 641         |
| <b>Death: Timing</b>                             |            |           |             |
| Within first hour of life                        | 12.9       | 127       | 982         |
| By end of first day                              | 31.7       | 311       | 982         |
| By end of first week                             | 12.1       | 119       | 982         |
| By end of first month                            | 12.9       | 127       | 982         |
| Before first birthday                            | 30.4       | 298       | 982         |

# Appendix

Table 1: Data for pages 2-5, 7-8 *continued*

| Attribute                                    | All Deaths |           |             |
|--|------------|-----------|-------------|
|  | Percent    | Numerator | Denominator |
| <b>Death Location</b>                        |            |           |             |
| Within hospital as inpatient                 | 76.7       | 753       | 982         |
| ER or outpatient setting                     | 13.7       | 134       | 982         |
| Dead on arrival                              | *          | *         | *           |
| Home   | 7.2        | 71        | 982         |
| Hospice/Nursing Home/Long Term Care Facility | *          | *         | *           |
| <b>Dollfus Cause of Death Category</b>       |            |           |             |
| Prematurity                                  | 32.0       | 314       | 982         |
| Congenital Anomaly                           | 18.2       | 179       | 982         |
| Obstetric Condition                          | 9.2        | 90        | 982         |
| SIDS   | 6.8        | 67        | 982         |
| External Injuries                            | 8.0        | 79        | 982         |
| Perinatal Infections                         | 6.0        | 59        | 982         |
| Birth Asphyxia                               | *          | *         | *           |
| Other Infections                             | 2.9        | 28        | 982         |
| Other  | 16.0       | 157       | 982         |

Source: Ohio Department of Health, Ohio Vital Statistics Linked Birth/Infant Death files

\* 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.

# Appendix

Table 2. Data for pages 3-4

| Attribute                          | Due to Prematurity |            |              | Due to Congenital Anomaly |            |              | Due to Obstetric Conditions |            |              | Due to External Injury |            |              | Due to Sudden Infant Death Syndrome |            |              |
|------------------------------------|--------------------|------------|--------------|---------------------------|------------|--------------|-----------------------------|------------|--------------|------------------------|------------|--------------|-------------------------------------|------------|--------------|
|                                    | %                  | Numer-ator | Denomi-nator | %                         | Numer-ator | Denom-inator | %                           | Numer-ator | Denomi-nator | %                      | Numer-ator | Denomi-nator | %                                   | Numer-ator | Denom-inator |
| <b>Behavioral</b>                  |                    |            |              |                           |            |              |                             |            |              |                        |            |              |                                     |            |              |
| Smoked Pre-pregnancy               | 22.3               | 70         | 314          | 17.3                      | 31         | 179          | 15.6                        | 14         | 90           | 40.5                   | 32         | 79           | 44.8                                | 30         | 67           |
| Smoked 1st Trimester               | 19.8               | 62         | 314          | 13.4                      | 24         | 179          | 13.3                        | 12         | 90           | 31.7                   | 25         | 79           | 38.8                                | 26         | 67           |
| Smoked 3rd Trimester               | 11.5               | 36         | 314          | 10.1                      | 18         | 179          | *                           | *          | *            | 29.1                   | 23         | 79           | 38.8                                | 26         | 67           |
| Interpregnancy interval <18 months | 41.5               | 27         | 65           | 38.9                      | 28         | 72           | *                           | *          | *            | 50.0                   | 14         | 28           | 50.0                                | 17         | 34           |
| <b>Social</b>                      |                    |            |              |                           |            |              |                             |            |              |                        |            |              |                                     |            |              |
| Low Income (presumed Medicaid)     | 54.4               | 162        | 298          | 50.3                      | 88         | 175          | 55.8                        | 48         | 86           | 78.4                   | 58         | 74           | 83.6                                | 56         | 67           |
| Education less than high school    | 14.8               | 43         | 290          | 24.6                      | 44         | 179          | *                           | *          | *            | 35.1                   | 26         | 74           | 22.4                                | 15         | 67           |
| Father not on birth certificate    | 37.6               | 118        | 314          | 28.5                      | 51         | 179          | 27.8                        | 25         | 90           | 36.7                   | 29         | 79           | 44.8                                | 30         | 67           |
| <b>Medical: Prepregnancy</b>       |                    |            |              |                           |            |              |                             |            |              |                        |            |              |                                     |            |              |
| Obese                              | 45.5               | 132        | 290          | 28.0                      | 49         | 175          | 47.7                        | 41         | 86           | 33.8                   | 25         | 74           | 40.9                                | 27         | 66           |
| Hypertension                       | 8.0                | 25         | 313          | *                         | *          | *            | *                           | *          | *            | *                      | *          | *            | *                                   | *          | *            |
| Diabetes                           | *                  | *          | *            | *                         | *          | *            | *                           | *          | *            | *                      | *          | *            | *                                   | *          | *            |
| <b>Medical: Pregnancy</b>          |                    |            |              |                           |            |              |                             |            |              |                        |            |              |                                     |            |              |
| Gestational Hypertension           | 3.5                | 11         | 313          | 10.1                      | 18         | 179          | *                           | *          | *            | *                      | *          | *            | *                                   | *          | *            |
| Gestational Diabetes               | *                  | *          | *            | 8.4                       | 15         | 179          | *                           | *          | *            | *                      | *          | *            | *                                   | *          | *            |
| Twin or higher order pregnancy     | 26.8               | 84         | 313          | 7.3                       | 13         | 179          | 25.8                        | 23         | 89           | *                      | *          | *            | *                                   | *          | *            |
| <b>Healthcare and Services</b>     |                    |            |              |                           |            |              |                             |            |              |                        |            |              |                                     |            |              |
| No 1st Trimester Prenatal Care     | 38.5               | 100        | 260          | 39.1                      | 63         | 161          | 32.9                        | 25         | 76           | 37.7                   | 26         | 69           | 46.7                                | 28         | 60           |
| Born in Wrong Level Hospital       | 17.6               | 51         | 290          | 6.3                       | 11         | 176          | 14.1                        | 12         | 85           | *                      | *          | *            | *                                   | *          | *            |
| WIC during Pregnancy               | 28.5               | 84         | 295          | 38.2                      | 68         | 178          | 28.2                        | 24         | 85           | 68.0                   | 51         | 75           | 59.1                                | 39         | 66           |
| No WIC but probably eligible       | 32.8               | 95         | 290          | 19.4                      | 34         | 175          | 32.9                        | 27         | 82           | 23.0                   | 17         | 74           | 30.3                                | 20         | 66           |
| <b>Maternal Pregnancy History</b>  |                    |            |              |                           |            |              |                             |            |              |                        |            |              |                                     |            |              |
| Prior Pregnancy                    | 72.2               | 221        | 306          | 75.3                      | 134        | 178          | 73.9                        | 65         | 88           | 77.3                   | 58         | 75           | 89.6                                | 60         | 67           |
| Prior Live Birth                   | 57.4               | 174        | 303          | 65.2                      | 116        | 178          | 50.0                        | 44         | 88           | 77.3                   | 58         | 75           | 82.1                                | 55         | 67           |
| Prior Preterm Birth                | 17.6               | 55         | 313          | 8.4                       | 15         | 179          | 12.4                        | 11         | 89           | *                      | *          | *            | *                                   | *          | *            |

# Appendix

Table 2. Data for pages 3-4 *continued*

| Attribute                                      | Due to Prematurity |            |              | Due to Congenital Anomaly |            |              | Due to Obstetric Conditions |            |              | Due to External Injury |            |              | Due to Sudden Infant Death Syndrome |            |              |
|--|--------------------|------------|--------------|---------------------------|------------|--------------|-----------------------------|------------|--------------|------------------------|------------|--------------|-------------------------------------|------------|--------------|
|  | %                  | Numer-ator | Denomi-nator | %                         | Numer-ator | Denom-inator | %                           | Numer-ator | Denomi-nator | %                      | Numer-ator | Denomi-nator | %                                   | Numer-ator | Denom-inator |
| Demographic: Mother's Race                     |                    |            |              |                           |            |              |                             |            |              |                        |            |              |                                     |            |              |
| Black  | 41.1               | 129        | 314          | 25.1                      | 45         | 179          | 50.0                        | 45         | 90           | 32.9                   | 26         | 79           | 41.8                                | 28         | 67           |
| White  | 52.9               | 166        | 314          | 66.5                      | 119        | 179          | 40.0                        | 36         | 90           | 58.2                   | 46         | 79           | 55.2                                | 37         | 67           |
| Demographic: Mother's Ethnicity                |                    |            |              |                           |            |              |                             |            |              |                        |            |              |                                     |            |              |
| Hispanic                                       | 4.5                | 14         | 314          | 7.8                       | 14         | 179          | 7.8                         | 7          | 90           | *                      | *          | *            | 6.0                                 | 4          | 67           |
| Non-Hispanic***                                | 95.5               | 300        | 314          | 92.2                      | 165        | 179          | 92.2                        | 83         | 90           | 98.7                   | 78         | 79           | 94.0                                | 63         | 67           |
| Demographic: Mother's Age (years)              |                    |            |              |                           |            |              |                             |            |              |                        |            |              |                                     |            |              |
| <18  | *                  | *          | *            | *                         | *          | *            | *                           | *          | *            | *                      | *          | *            | *                                   | *          | *            |
| 18-19  | 5.8                | 18         | 309          | 5.6                       | 10         | 179          | *                           | *          | *            | *                      | *          | *            | *                                   | *          |              |
| 20-24  | 26.5               | 82         | 309          | 24.0                      | 43         | 179          | 18.0                        | 16         | 89           | 41.3                   | 31         | 75           | 40.3                                | 27         | 67           |
| 25-29  | 28.8               | 89         | 309          | 30.2                      | 54         | 179          | 23.6                        | 21         | 89           | 26.7                   | 20         | 75           | 32.8                                | 22         | 67           |
| 30-34  | 22.3               | 69         | 309          | 22.9                      | 41         | 179          | 31.5                        | 28         | 89           | *                      | *          | *            | 14.9                                | 10         | 67           |
| 35-39  | 11.7               | 36         | 309          | 10.1                      | 18         | 179          | 12.4                        | 11         | 89           | *                      | *          | *            | *                                   | *          | *            |
| 40 or more                                     | *                  | *          | *            | *                         | *          | *            | *                           | *          | *            | *                      | *          | *            | *                                   | *          | *            |
| Demographic: County of Residence at Death      |                    |            |              |                           |            |              |                             |            |              |                        |            |              |                                     |            |              |
| OEI County                                     | 62.6               | 196        | 313          | 51.4                      | 92         | 179          | 74.2                        | 66         | 89           | 52.0                   | 39         | 75           | 68.7                                | 46         | 67           |
| Large Metro County                             | 44.9               | 141        | 314          | 33.5                      | 60         | 179          | 46.7                        | 42         | 90           | 24.1                   | 19         | 79           | 41.8                                | 28         | 67           |
| Metro County                                   | 45.2               | 142        | 314          | 54.8                      | 98         | 179          | 46.7                        | 42         | 90           | 54.4                   | 43         | 79           | 50.8                                | 34         | 67           |
| Micro County                                   | 9.2                | 29         | 314          | 10.6                      | 19         | 179          | *                           | *          | *            | 15.2                   | 12         | 79           | *                                   | *          | *            |
| Rural County                                   | *                  | *          | *            | *                         | *          | *            | *                           | *          | *            | *                      | *          | *            | *                                   | *          | *            |
| Delivery: Spontaneous vs. Provider Initiated** |                    |            |              |                           |            |              |                             |            |              |                        |            |              |                                     |            |              |
| Spontaneous Labor                              | 79.2               | 248        | 313          | *                         | *          | *            | *                           | *          | *            | *                      | *          | *            | *                                   | *          | *            |
| Provider-initiated labor/delivery              | 20.8               | 65         | 313          | *                         | *          | *            | *                           | *          | *            | *                      | *          | *            | *                                   | *          | *            |
| Delivery: Gestational Age                      |                    |            |              |                           |            |              |                             |            |              |                        |            |              |                                     |            |              |
| Before 20 weeks                                | 21.2               | 65         | 306          | *                         | *          | *            | 25.6                        | 23         | 90           | *                      | *          | *            | *                                   | *          | *            |
| 20-23 weeks                                    | 52.3               | 160        | 306          | *                         | *          | *            | 54.4                        | 49         | 90           | *                      | *          | *            | *                                   | *          | *            |
| 24-27 weeks                                    | 19.3               | 59         | 306          | 7.3                       | 13         | 178          | *                           | *          | *            | *                      | *          | *            | *                                   | *          | *            |
| 28-33 weeks                                    | 3.9                | 12         | 306          | 14.6                      | 26         | 178          | *                           | *          | *            | *                      | *          | *            | *                                   | *          | *            |
| 34-36 weeks                                    | *                  | *          | *            | 27.0                      | 48         | 178          | *                           | *          | *            | *                      | *          | *            | 14.9                                | 10         | 67           |
| 37 weeks or more                               | *                  | *          | *            | 46.6                      | 83         | 178          | *                           | *          | *            | 79.8                   | 63         | 79           | 77.6                                | 52         | 67           |



# Appendix

Table 2. Data for pages 3-4 *continued*

| Attribute                                     | Due to Prematurity |            |              | Due to Congenital Anomaly |            |              | Due to Obstetric Conditions |            |              | Due to External Injury |            |              | Due to Sudden Infant Death Syndrome |            |              |
|---|--------------------|------------|--------------|---------------------------|------------|--------------|-----------------------------|------------|--------------|------------------------|------------|--------------|-------------------------------------|------------|--------------|
|   | %                  | Numer-ator | Denomi-nator | %                         | Numer-ator | Denomi-nator | %                           | Numer-ator | Denomi-nator | %                      | Numer-ator | Denomi-nator | %                                   | Numer-ator | Denomi-nator |
| <b>Delivery: Birth Weight</b>                 |                    |            |              |                           |            |              |                             |            |              |                        |            |              |                                     |            |              |
| Less than 500 grams                           | 53.3               | 136        | 255          | *                         | *          | *            | 71.8                        | 56         | 78           | *                      | *          | *            | *                                   | *          | *            |
| 500-599 grams                                 | 38.8               | 99         | 255          | 8.0                       | 14         | 176          | 16.7                        | 13         | 78           | *                      | *          | *            | *                                   | *          | *            |
| 1000-1499 grams                               | *                  | *          | *            | 9.1                       | 16         | 176          | *                           | *          | *            | *                      | *          | *            | *                                   | *          | *            |
| 1500-1999 grams                               | *                  | *          | *            | 21.0                      | 37         | 176          | *                           | *          | *            | *                      | *          | *            | *                                   | *          | *            |
| 2000-2499 grams                               | *                  | *          | *            | 18.8                      | 33         | 176          | *                           | *          | *            | *                      | *          | *            | *                                   | *          | *            |
| 2500 or more grams                            | *                  | *          | *            | 40.3                      | 71         | 176          | *                           | *          | *            | 81.3                   | 61         | 75           | 80.6                                | 54         | 67           |
| Small for gestational age                     | 13.6               | 16         | 118          | 40.6                      | 65         | 160          | *                           | *          | *            | 21.9                   | 16         | 73           | 17.5                                | 11         | 63           |
| <b>Death: Timing</b>                          |                    |            |              |                           |            |              |                             |            |              |                        |            |              |                                     |            |              |
| Within first hour of life                     | 22.3               | 70         | 314          | 8.4                       | 15         | 179          | 27.8                        | 25         | 90           | *                      | *          | *            | *                                   | *          | *            |
| By end of first day                           | 48.7               | 153        | 314          | 31.3                      | 56         | 179          | 64.4                        | 58         | 90           | *                      | *          | *            | *                                   | *          | *            |
| By end of first week                          | 13.4               | 42         | 314          | 14.0                      | 25         | 179          | *                           | *          | *            | *                      | *          | *            | *                                   | *          | *            |
| By end of first month                         | 12.4               | 39         | 314          | 11.2                      | 20         | 179          | *                           | *          | *            | *                      | *          | *            | 16.4                                | 11         | 67           |
| Before first birthday                         | 3.2                | 10         | 314          | 35.2                      | 63         | 179          | *                           | *          | *            | 93.7                   | 74         | 79           | 83.6                                | 56         | 67           |
| <b>Death Location</b>                         |                    |            |              |                           |            |              |                             |            |              |                        |            |              |                                     |            |              |
| Within hospital as inpatient                  | 94.9               | 298        | 314          | 83.2                      | 149        | 179          | 96.7                        | 87         | 90           | 24.1                   | 19         | 79           | *                                   | *          | *            |
| ER or outpatient setting                      | 3.5                | 11         | 314          | 6.2                       | 11         | 179          | *                           | *          | *            | 43.0                   | 34         | 79           | 56.7                                | 38         | 67           |
| Dead on arrival                               | *                  | *          | *            | *                         | *          | *            | *                           | *          | *            | *                      | *          | *            | *                                   | *          | *            |
| Home  | *                  | *          | *            | 9.5                       | 17         | 179          | *                           | *          | *            | 26.6                   | 21         | 79           | 25.4                                | 17         | 67           |
| Hospice/Nursing Home/ Long Term Care Facility | *                  | *          | *            | *                         | *          | *            | *                           | *          | *            | *                      | *          | *            | *                                   | *          | *            |

Source: Ohio Department of Health, Ohio Vital Statistics Linked Birth/Infant Death files

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

\*\*Measure valid only for premature births

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

# Appendix

Table 3: Data for Page 6

| Attribute                                | Among Infants Born at < 24 weeks Gestation |           |             |
|--|--|-----------|-------------|
|  | Percent                                    | Numerator | Denominator |
| <b>Behavioral</b>                        |  |           |             |
| Smoked pre-pregnancy                     | 20.8                                       | 74        | 356         |
| Smoked 1st trimester                     | 18.0                                       | 64        | 356         |
| Interpregnancy interval <18 months       | 33.3                                       | 24        | 72          |
| <b>Social</b>                            |  |           |             |
| Low Income (presumed Medicaid)           | 56.9                                       | 193       | 339         |
| Education less than High School          | 14.8                                       | 49        | 331         |
| Father not on birth certificate          | 36.5                                       | 130       | 356         |
| <b>Medical: Prepregnancy</b>             |  |           |             |
| Obese Prepregnancy                       | 44.4                                       | 146       | 329         |
| Hypertension                             | 6.9  | 24        | 348         |
| Diabetes                                 | *  | *         | *           |
| <b>Medical: Pregnancy</b>                |  |           |             |
| Gestational Hypertension                 | *  | *         | *           |
| Gestational Diabetes                     | *  | *         | *           |
| Twin or higher order pregnancy           | 24.1                                       | 84        | 348         |
| <b>Healthcare and Services</b>           |  |           |             |
| No 1st Trimester Prenatal Care           | 36.6                                       | 109       | 298         |
| Born in Wrong Level Hospital             | 18.6                                       | 62        | 333         |
| WIC during Pregnancy                     | 28.1                                       | 94        | 334         |
| No WIC but probably eligible             | 34.8                                       | 114       | 183         |
| <b>Maternal Pregnancy History</b>        |  |           |             |
| Prior Pregnancy                          | 74.9                                       | 259       | 346         |
| Prior Live Birth                         | 57.0                                       | 196       | 344         |
| Prior Preterm Birth                      | 16.7                                       | 58        | 348         |
| <b>Demographic: Mother's Race</b>        |  |           |             |
| Black                                    | 47.2                                       | 168       | 356         |
| White                                    | 45.5                                       | 162       | 356         |
| <b>Demographic: Mother's Ethnicity</b>   |  |           |             |
| Hispanic                                 | 5.9  | 21        | 356         |
| Non-Hispanic**                           | 94.1                                       | 335       | 356         |
| <b>Demographic: Mother's Age (years)</b> |  |           |             |
| <18                                      | 2.9  | 10        | 348         |
| 18-19                                    | 6.9  | 24        | 348         |
| 20-24                                    | 25.3                                       | 88        | 348         |
| 25-29                                    | 27.3                                       | 95        | 348         |
| 30-34                                    | 22.1                                       | 77        | 348         |
| 35-39                                    | 12.6                                       | 44        | 348         |
| 40 or more                               | 2.9  | 10        | 348         |

# Appendix

Table 3: Data for Page 6 *continued*

| Attribute   | Among Infants Born at < 24 weeks Gestation |           |             |
|---|--|-----------|-------------|
|   | Percent                                    | Numerator | Denominator |
| <b>Demographic: County of Residence at Death</b>    |  |           |             |
| OEI County  | 68.4                                       | 238       | 348         |
| Large Metro County                                  | 48.6                                       | 173       | 356         |
| Metro County  | 41.3                                       | 147       | 356         |
| Micro County  | 7.9  | 28        | 356         |
| Rural County  | *  | *         | *           |
| <b>Delivery: Spontaneous vs. Provider Initiated</b> |  |           |             |
| Spontaneous Labor                                   | 88.2                                       | 307       | 348         |
| Provider-initiated labor/delivery                   | 11.8                                       | 41        | 348         |
| <b>Delivery: Gestational Age</b>                    |  |           |             |
| Before 20 weeks                                     | 29.5                                       | 105       | 356         |
| 20-23 weeks   | 70.5                                       | 251       | 356         |
| <b>Delivery: Birth Weight</b>                       |  |           |             |
| Less than 500 grams                                 | 72.6                                       | 201       | 277         |
| 500-599 grams                                       | 26.7                                       | 74        | 277         |
| 1000-1499 grams                                     | *  | *         | *           |
| 1500-1999 grams                                     | *  | *         | *           |
| 2000-2499 grams                                     | *  | *         | *           |
| 2500 or more grams                                  | *  | *         | *           |
| Small for gestational age (SGA)                     | *  | *         | *           |
| <b>Death Location</b>                               |  |           |             |
| Within hospital as inpatient                        | 95.5                                       | 340       | 356         |
| ER or outpatient setting                            | 3.9  | 14        | 356         |
| Dead on arrival                                     | *  | *         | *           |
| Home  | *  | *         | *           |
| Hospice/Nursing Home/Long Term Care Facility        | *  | *         | *           |
| <b>Dollfus Cause of Death Category</b>              |  |           |             |
| Prematurity   | 63.2                                       | 225       | 356         |
| Congenital Anomaly                                  | *  | *         | *           |
| Obstetric Condition                                 | 20.2                                       | 72        | 356         |
| SIDS  | *  | *         | *           |
| External Injuries                                   | *  | *         | *           |
| Perinatal Infections                                | 5.9  | 21        | 356         |
| Birth Asphyxia                                      | *  | *         | *           |
| Other Infections                                    | *  | *         | *           |
| Other   | 5.6  | 20        | 356         |

Source: Ohio Department of Health, Ohio Vital Statistics Linked Birth/Infant Death files

\* 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.

