

Table 3: Ohio Neonatal, Postneonatal and Infant Mortality, by County (2016)

County	Neonate Deaths***	Neonatal Mortality Rate	Postneonate Deaths****	Post Neonatal Mortality Rate	Total Infant Deaths	Infant Mortality Rate	Total Births
Ohio*****	713	5.2	311	2.3	1,024	7.4	138,198
Adams	4	*	0	*	4	*	345
Allen	8	*	2	*	10	8.0**	1,255
Ashland	7	*	1	*	8	*	623
Ashtabula	4	*	0	*	4	*	1,087
Athens	4	*	1	*	5	*	560
Auglaize	3	*	2	*	5	*	573
Belmont	1	*	1	*	2	*	605
Brown	1	*	2	*	3	*	492
Butler	23	5.1	8	*	31	6.9	4,478
Carroll	1	*	1	*	2	*	270
Champaign	1	*	1	*	2	*	387
Clark	15	9.7**	5	*	20	13.0	1,539
Clermont	10	4.3**	5	*	15	6.5**	2,324
Clinton	2	*	3	*	5	*	484
Columbiana	5	*	2	*	7	*	1,073
Coshocton	1	*	2	*	3	*	463
Crawford	2	*	0	*	2	*	471
Cuyahoga	90	6.1	38	2.6	128	8.7	14,748
Darke	2	*	2	*	4	*	631
Defiance	4	*	1	*	5	*	432
Delaware	7	*	1	*	8	*	2,123
Erie	6	*	0	*	6	*	799
Fairfield	7	*	3	*	10	*	1,679
Fayette	0	*	0	*	0	*	335
Franklin	120	6.3	45	2.4	165	8.7	18,955
Fulton	5	*	1	*	6	*	454

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

* Rates based on fewer than 10 infant deaths are unstable and not reported

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

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

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

***** The total for Ohio includes 5 births with county of residence unknown

2016 COUNTY-LEVEL DATA

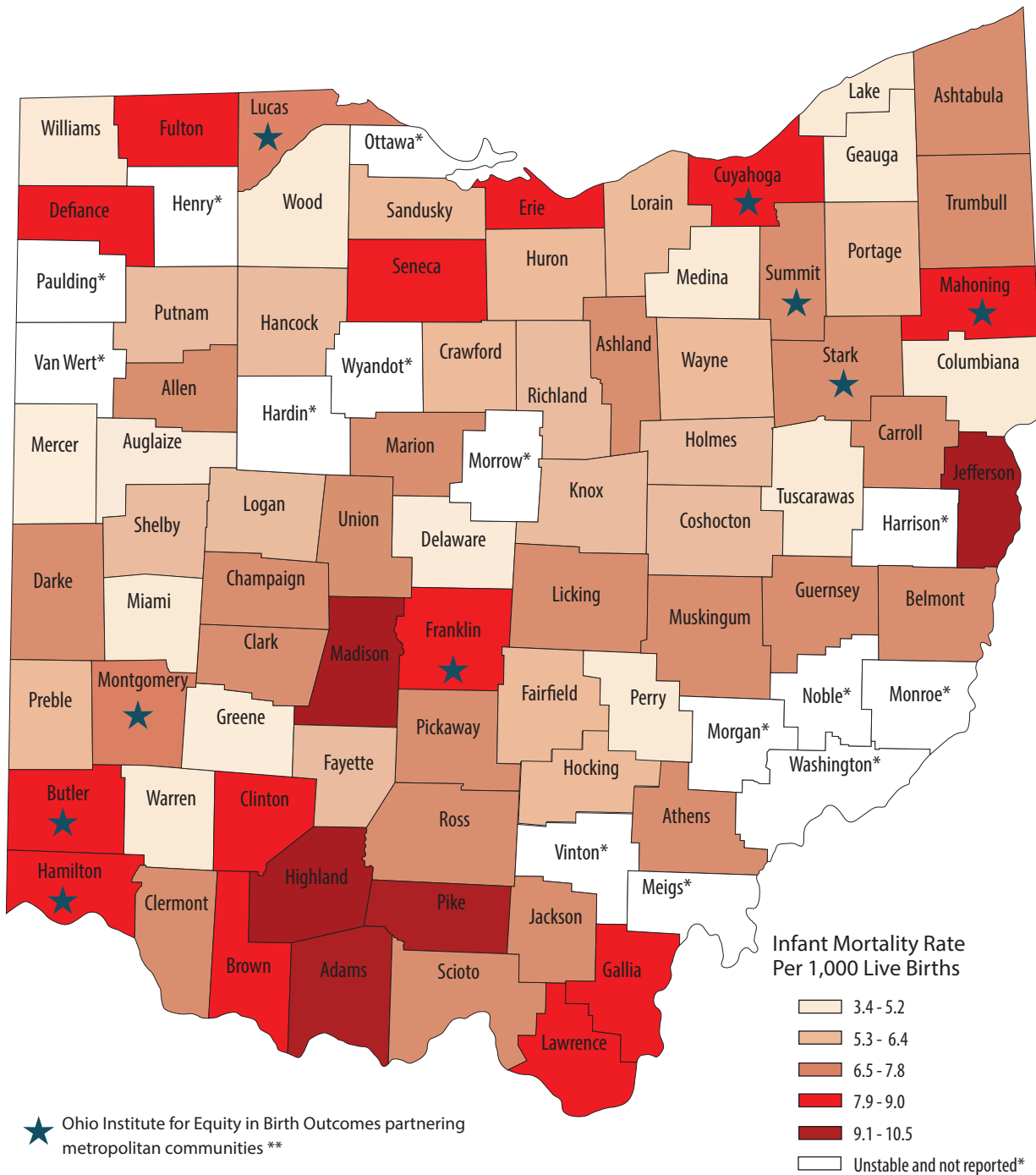
Table 3: Ohio Neonatal, Postneonatal and Infant Mortality, by County (2016) continued

Area	Neonate Deaths***	Neonatal Mortality Rate	Postneonate Deaths****	Post Neonatal Mortality Rate	Total Infant Deaths	Infant Mortality Rate	Total Births
Gallia	0	*	0	*	0	*	379
Geauga	3	*	2	*	5	*	928
Greene	2	*	4	*	6	*	1,806
Guernsey	5	*	0	*	5	*	475
Hamilton	66	6.1	32	3.0	98	9.1	10,747
Hancock	3	*	0	*	3	*	900
Hardin	0	*	1	*	1	*	394
Harrison	2	*	1	*	3	*	150
Henry	3	*	1	*	4	*	290
Highland	1	*	4	*	5	*	567
Hocking	0	*	1	*	1	*	299
Holmes	3	*	1	*	4	*	687
Huron	3	*	1	*	4	*	784
Jackson	2	*	0	*	2	*	400
Jefferson	5	*	4	*	9	*	662
Knox	3	*	0	*	3	*	769
Lake	13	6.0**	4	*	17	7.9**	2,165
Lawrence	4	*	1	*	5	*	655
Licking	15	7.1**	5	*	20	9.5	2,101
Logan	1	*	0	*	1	*	501
Lorain	8	*	7	*	15	4.5**	3,298
Lucas	30	5.3	11	2.0**	41	7.3	5,634
Madison	2	*	4	*	6	*	414
Mahoning	9	*	6	*	15	6.0**	2,498
Marion	5	*	3	*	8	*	763
Medina	5	*	1	*	6	*	1,815
Meigs	0	*	0	*	0	*	234
Mercer	2	*	0	*	2	*	588
Miami	2	*	2	*	4	*	1,231
Monroe	0	*	0	*	0	*	129
Montgomery	33	5.0	12	1.8**	45	6.8	6,653

Table 3: Ohio Neonatal, Postneonatal and Infant Mortality, by County (2016) continued

Area	Neonate Deaths***	Neonatal Mortality Rate	Postneonate Deaths****	Post Neonatal Mortality Rate	Total Infant Deaths	Infant Mortality Rate	Total Births
Morgan	0	*	0	*	0	*	143
Morrow	4	*	1	*	5	*	357
Muskingum	5	*	1	*	6	*	1,029
Noble	1	*	0	*	1	*	125
Ottawa	1	*	1	*	2	*	318
Paulding	1	*	0	*	1	*	204
Perry	1	*	2	*	3	*	410
Pickaway	0	*	1	*	1	*	604
Pike	0	*	0	*	0	*	325
Portage	5	*	6	*	11	7.6**	1,440
Preble	1	*	0	*	1	*	424
Putnam	2	*	1	*	3	*	430
Richland	7	*	5	*	12	8.9**	1,341
Ross	3	*	1	*	4	*	834
Sandusky	1	*	2	*	3	*	689
Scioto	10	11.3**	1	*	11	12.4**	887
Seneca	2	*	2	*	4	*	598
Shelby	0	*	2	*	2	*	592
Stark	26	6.1	12	2.8**	38	9.0	4,232
Summit	26	4.3	19	3.2**	45	7.5	6,018
Trumbull	15	7.1**	1	*	16	7.6**	2,104
Tuscarawas	4	*	2	*	6	*	1,209
Union	5	*	2	*	7	*	667
Van Wert	2	*	1	*	3	*	375
Vinton	0	*	1	*	1	*	145
Warren	9	*	4	*	13	5.3**	2,436
Washington	3	*	1	*	4	*	574
Wayne	7	*	0	*	7	*	1,525
Williams	2	*	3	*	5	*	438
Wood	5	*	2	*	7	*	1,367
Wyandot	2	*	2	*	4	*	252

Figure 2: Ohio Infant Mortality Average 5-Year Rate, by County (2012-2016)



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

Infant mortality rate county groupings were determined by Jenks Natural Breaks. This method finds the best way to split up the ranges by minimizing the variation within each group, so the areas within each color are as close as possible in value to each other.

* Rates based on fewer than 10 infant deaths are unstable and not reported.

** Ohio Institute for Equity in Birth Outcomes partnering communities seek to improve overall birth outcomes and reduce racial and ethnic disparities in infant mortality. These metropolitan areas accounted for 59 percent of all infant deaths, and 86 percent of black infant deaths, in Ohio in 2016.

OHIO INFANT MORTALITY 5-YEAR COUNTY-LEVEL DATA

Table 4: Ohio 5-Year Average Infant Mortality Rate, by County (2012-2016)

Area	Total Deaths	Total Births	Infant Mortality Rate	Area	Total Deaths	Total Births	Infant Mortality Rate
Ohio***	5,055	694,343	7.3				
Adams	17	1,663	10.2**	Licking	75	9,927	7.6
Allen	47	6,360	7.4	Logan	16	2,721	5.9**
Ashland	21	3,112	6.7	Lorain	94	16,833	5.6
Ashtabula	37	5,498	6.7	Lucas	221	28,366	7.8
Athens	20	2,728	7.3	Madison	22	2,098	10.5
Auglaize	14	2,729	5.1**	Mahoning	104	12,090	8.6
Belmont	23	3,418	6.7	Marion	27	3,770	7.2
Brown	21	2,482	8.5	Medina	41	8,861	4.6
Butler	184	22,642	8.1	Meigs	6	1,200	*
Carroll	10	1,374	7.3**	Mercer	14	2,839	4.9**
Champaign	14	1,999	7.0**	Miami	20	5,935	3.4
Clark	54	7,911	6.8	Monroe	5	737	*
Clermont	79	11,618	6.8	Montgomery	250	33,406	7.5
Clinton	20	2,539	7.9	Morgan	1	726	*
Columbiana	27	5,443	5.0	Morrow	9	1,898	*
Coshocton	14	2,291	6.1**	Muskingum	34	5,126	6.6
Crawford	13	2,383	5.5**	Noble	4	674	*
Cuyahoga	669	74,378	9.0	Ottawa	7	1,706	*
Darke	22	3,109	7.1	Paulding	7	1,073	*
Defiance	19	2,148	8.8**	Perry	11	2,134	5.2**
Delaware	50	10,845	4.6	Pickaway	23	3,069	7.5
Erie	35	3,978	8.8	Pike	18	1,735	10.4**
Fairfield	48	8,390	5.7	Portage	41	7,207	5.7
Fayette	10	1,760	5.7**	Preble	12	2,194	5.5**
Franklin	770	94,000	8.2	Putnam	13	2,235	5.8**
Fulton	22	2,461	8.9	Richland	40	7,010	5.7
Gallia	17	1,880	9.0**	Ross	29	4,235	6.8
Geauga	20	4,577	4.4	Sandusky	21	3,353	6.3
Greene	42	9,084	4.6	Scioto	30	4,441	6.8
Guernsey	16	2,329	6.9**	Seneca	24	2,910	8.2
Hamilton	487	54,503	8.9	Shelby	17	3,053	5.6**
Hancock	28	4,618	6.1	Stark	162	21,003	7.7
Hardin	9	1,906	*	Summit	211	30,497	6.9
Harrison	9	803	*	Trumbull	78	10,510	7.4
Henry	9	1,560	*	Tuscarawas	29	5,761	5.0
Highland	26	2,724	9.5	Union	21	3,150	6.7
Hocking	10	1,570	6.4**	Van Wert	9	1,693	*
Holmes	24	3,778	6.4	Vinton	8	744	*
Huron	22	3,750	5.9	Warren	60	11,975	5.0
Jackson	16	2,132	7.5**	Washington	8	3,043	*
Jefferson	32	3,335	9.6	Wayne	48	7,788	6.2
Knox	22	3,710	5.9	Williams	11	2,147	5.1**
Lake	54	11,243	4.8	Wood	33	6,895	4.8
Lawrence	29	3,451	8.4	Wyandot	7	1,300	*

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

* Rates based on fewer than 10 infant deaths are unstable and not reported.

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

*** Ohio includes 2 deaths and 63 births with unknown county.

OHIO INFANT MORTALITY 5-YEAR DATA

**Table 5: Ohio Neonatal, Postneonatal, and Infant Mortality,
by Race (2012-2016)**

Race	Year	Neonatal Deaths**	Neonatal IM Rate	Postneonatal Deaths***	Postneonatal IM Rate	Total Infant Deaths	Overall IM Rate	Births
White	2012	469	4.4	206	1.9	675	6.4	106,004
	2013	454	4.3	187	1.8	641	6.1	104,938
	2014	406	3.8	162	1.5	568	5.3	106,371
	2015	379	3.6	201	1.9	580	5.5	106,028
	2016	429	4.1	181	1.7	610	5.8	104,957
Black	2012	220	9.3	110	4.6	330	13.9	23,696
	2013	245	10.1	93	3.8	338	14.0	24,158
	2014	252	10.4	92	3.8	344	14.3	24,133
	2015	252	10.4	115	4.7	367	15.1	24,288
	2016	255	10.5	114	4.7	369	15.2	24,316
All Races	2012	720	5.2	327	2.4	1,047	7.6	138,284
	2013	729	5.2	295	2.1	1,024	7.4	139,035
	2014	692	5.0	263	1.9	955	6.8	139,514
	2015	667	4.8	338	2.4	1,005	7.2	139,312
	2016	713	5.2	311	2.3	1,024	7.4	138,198

Source: Ohio Department of Health, Bureau of Vital Statistics

* Rates with a numerator <20 should be interpreted with caution.

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

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

The majority of infant deaths were neonatal deaths while fewer than one-third were postneonatal deaths.

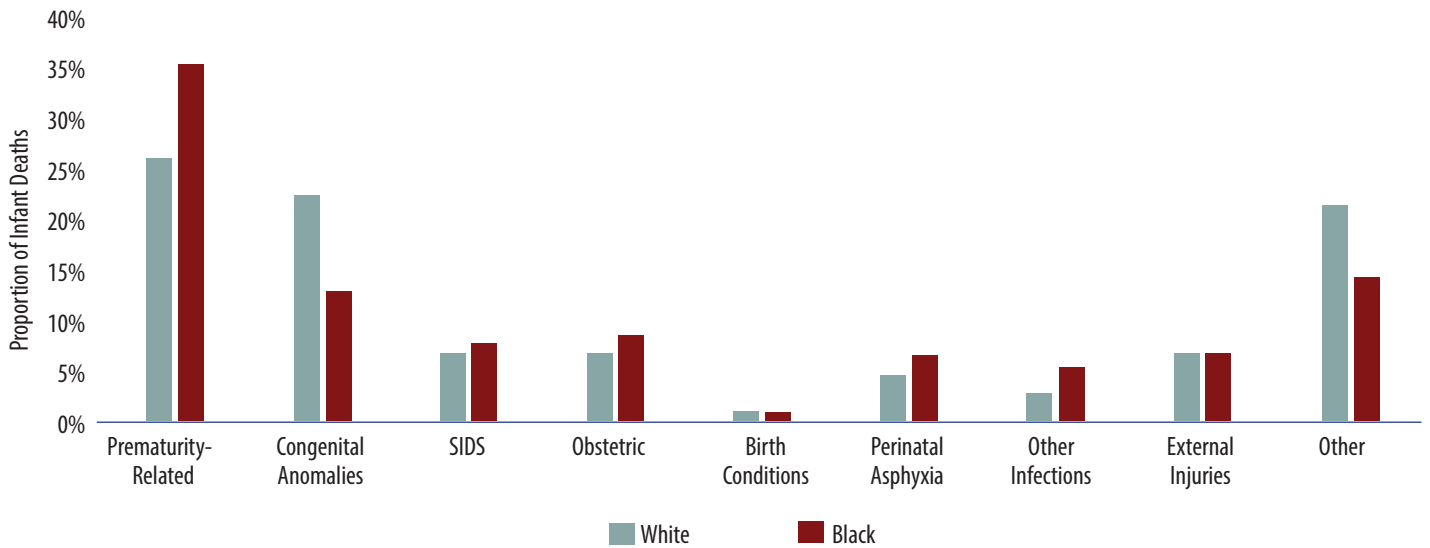
APPENDIX A LEADING CAUSES OF INFANT DEATH IN OHIO

Table 6: Number of Infant Deaths in Ohio, by Top 5 Causes (2013-2016)

Cause	Year			
	2013	2014	2015	2016
Prematurity-Related	298	291	273	311
Congenital Anomalies	204	192	184	193
Sudden Infant Death Syndrome	90	71	87	75
Obstetric Conditions	90	90	93	77
External Injuries	72	56	100	69

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

Figure 4: Infant Cause of Death by Race, Ohio (2007-2016)



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

APPENDIX B ADDRESSING PREMATURE TO REDUCE INFANT MORTALITY IN OHIO

Prematurity-related conditions such as preterm birth (before 37 weeks of pregnancy have been completed), low birth weight and respiratory distress syndrome are the leading cause of infant death in Ohio. Ohio's prematurity infant mortality rate has not changed significantly in the past decade. An estimated 30-40 percent of prematurity-related conditions are due to genetic issues that are difficult to address. Addressing the contributing factors to other prematurity-related infant deaths has the potential to save the lives of many Ohio babies.



INCREASING USE OF PROGESTERONE TREATMENT FOR WOMEN AT RISK FOR PRETERM BIRTH

Progesterone is a hormone medication that has the potential to reduce the incidence of preterm birth, especially infants born before 32 weeks of pregnancy have been completed when rates of infant mortality are highest.

- The Ohio Department of Health and the Ohio Department of Medicaid work with the Ohio Perinatal Quality Collaborative on its Progesterone Quality Improvement Project. The statewide collaborative includes perinatal clinicians, hospitals, and government entities working together to improve birth outcomes through early identification of women at risk for preterm birth, and wider use of progesterone treatment. In Fiscal Year 2017, the Ohio Perinatal Quality Collaborative worked with 23 outpatient clinic teams and four Federally Qualified Health Centers to increase the early identification of women at risk for preterm birth. In addition, the Collaborative worked with Ohio Department of Medicaid and Medicaid managed care plans to establish consistent, streamlined pathways to enable women to obtain progesterone.
- By the end of Calendar Year 2017, the Ohio Equity Institute teams in Cincinnati, Cleveland and Columbus will begin implementing, within specific high-risk communities, the Ohio Perinatal Quality Collaborative's evidence-based strategies for ensuring that pregnant women at risk for preterm birth receive progesterone treatment. In 2018, the other six Ohio Equity Institute teams will begin efforts toward implementing these evidence-based strategies. Supported in part by state and federal funding, Ohio Equity Institute teams operate in nine metropolitan areas that accounted for 59 percent of all infant deaths, and 86 percent of African-American infant deaths, in Ohio in 2016.

PROMOTING RECOMMENDED BIRTH SPACING

A birth interval of at least 18 months allows a woman to recover from pregnancy, increases the likelihood of a healthy next pregnancy and reduces the risk of a having a preterm and/or low birth weight baby.

- Access to effective family planning methods, including long acting reversible contraceptives, is important to helping women of reproductive age avoid or delay pregnancy. In compliance with federal Title X guidelines, the Ohio Department of Health's reproductive health and wellness program is working on increasing access to long acting reversible contraceptives for women who want them.

PROMOTING LIFE PLANS

Supporting women and men of reproductive age to think about their life goals including whether/when to have children can help reduce pregnancies at greater risk for preterm birth.

- The Ohio Department of Health provides reproductive health services to approximately 30,000 women and 5,000 men each year. The agency helps clients develop a life plan — a structured format for women and men to think about life goals and circumstances, and their preferences about whether/when to have children.

APPENDIX B

ADDRESSING PREMATURITY TO REDUCE INFANT MORTALITY IN OHIO

SMOKING CESSATION

Smoking is one of the most common preventable risk factors for infant mortality as it increases the risk of preterm birth and low birth weight.

- The 5A's model from the U.S. Public Health Service clinical practice guidelines recommends the following approach to encouraging people to quit smoking: Ask the client about her smoking status; Advise her to quit smoking; Assess her willingness to quit; Assist her in quitting; and Arrange for follow-up during subsequent visits. The Ohio Department of Health is working on expanding the 5A's into publicly funded maternal and child health programs, including continued expansion within the WIC program. The agency is creating a toolkit to assist such programs with 5A's implementation. The agency also is contracting with the Ohio University Voinovich School of Leadership and Public Affairs to engage and assist providers in implementing the 5A's model and culturally appropriate smoking cessation promotion.
- The Ohio Department of Health promotes a nationally recognized, evidence-based smoking cessation model to reduce smoking among women during pregnancy. Moms Quit for Two utilizes the "Baby and Me – Tobacco Free" model and is offered across Ohio by many local health departments, Ohio Equity Institute teams and other community organizations.
- Pregnant women in Ohio are eligible to receive free help to quit smoking through the Ohio Tobacco Quit Line Pregnancy Program (1-800-QUIT-NOW). Community health coordinators connect women who smoke to cessation resources such as a local Baby & Me – Tobacco Free program.

PREGNANCY-INDUCED DIABETES AND HIGH BLOOD PRESSURE

Some women develop diabetes or high blood pressure during pregnancy which is harmful to their health and increases the risk of having a preterm birth and/or low birth weight baby.

- The Ohio Department of Health's Gestational Diabetes Collaborative is improving the use of recommended diabetes screenings and prenatal care through quality improvement science and a toolkit. The Collaborative also aims to improve postpartum care that can reduce diabetes risks in a future pregnancy. This work is supported by the Ohio Department of Health and the Ohio Department of Medicaid.
- Based on findings from reviews of pregnancy-associated deaths in women, the Ohio Department of Health in 2014 launched a series of simulation-based trainings for improving responses to obstetric emergencies. One of the training scenarios covers hypertensive emergency including correct measurement of and treatment for hypertension. In 2017, four day-long trainings were conducted as well as four train-the-trainer sessions.

HOME VISITING SERVICES FOR EXPECTANT WOMEN

The Ohio Department of Health provides funding for local partners to conduct home visits to women during pregnancy.

- The Ohio Department of Health provides evidence-based home visiting services through local partners to women during pregnancy, and to parents with young children up to Kindergarten entry. Services include providing expectant parents at risk for poor birth outcomes with information and support in the comfort of their homes. Social workers, nurses, or other early childhood professionals meet regularly with expectant or new parents who want and need extra support to have a healthy baby and ensure their children are physically, socially and emotionally healthy and ready to learn.

DECREASING INDUCED BIRTHS < 39 WEEKS GESTATION WITHOUT MEDICAL INDICATION

Delivery should not be induced without medical or obstetric cause before pregnancy reaches at least 39 weeks to improve birth outcomes.

- The Ohio Department of Health and Ohio Department of Medicaid have supported the Ohio Perinatal Quality Collaborative in a project whose goal is to assure that initiation of labor or caesarean sections on women who are not in labor occur only when obstetrically or medically indicated. Concurrently with this project from 2008 through 2013, Ohio experienced statewide reductions in premature births, especially births at 34 through 36 weeks gestation. Recognizing that sustaining improvement requires ongoing attention, these efforts have continued, and the number of deliveries through induction or caesarean section at less than 39 weeks gestation have remained below pre-2008 levels.

Suffocation is the leading cause of injury-related death for babies before their first birthdays. Babies who sleep on couches or chairs, in bed with another person, or on their stomachs are more likely to die from suffocation. In 2016, Ohio Child Fatality Review boards identified 117 sleep-related infant deaths — 33 fewer than in 2015. Sleep-related infant deaths have been trending downward over time, corresponding with intensive state and local initiatives to promote safe sleep practices. Still, sleep-related infant deaths are among the most preventable infant deaths by practicing the ABCs of safe sleep — place babies Alone, on their Back, in a Crib.

Infant Safe Sleep



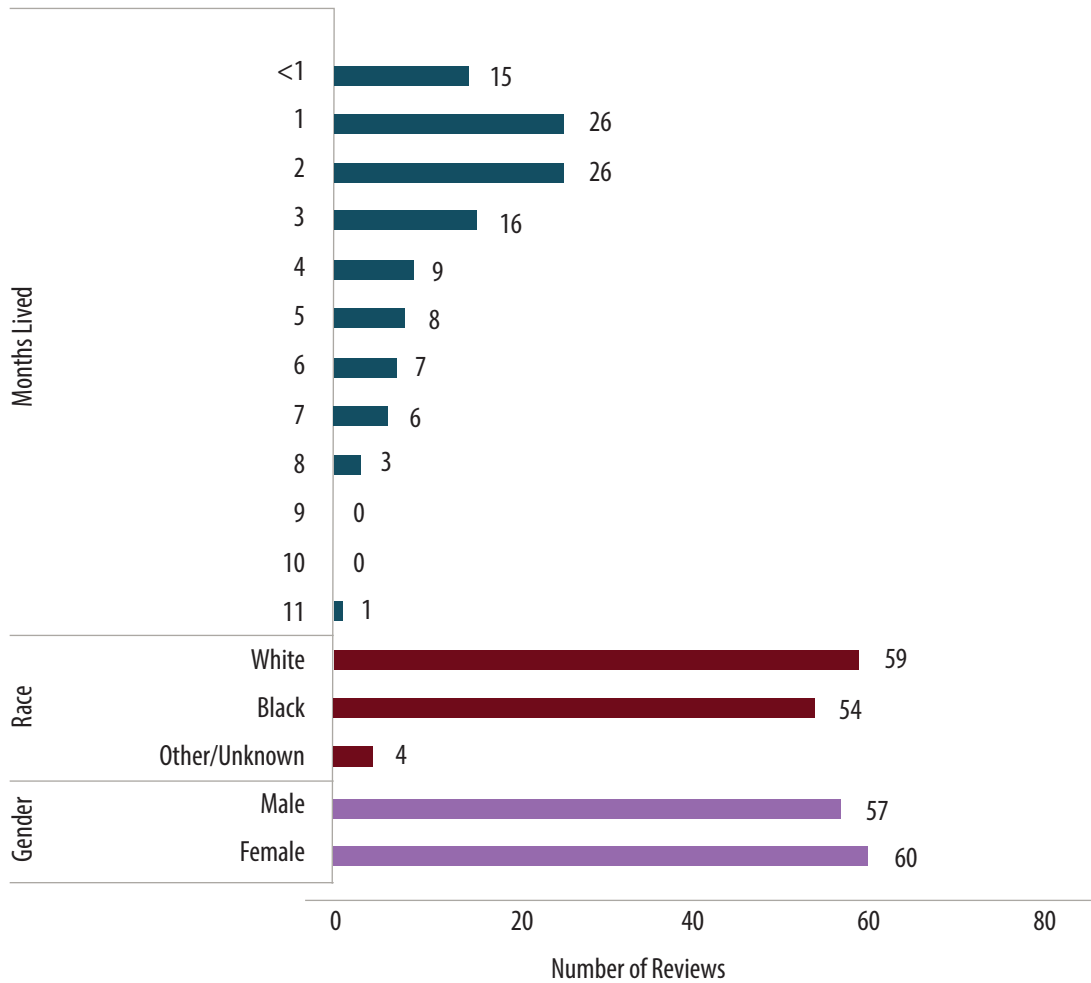
2016 Child Fatality Review data⁴ provides insight into sleep-related infant deaths (see below and Figures 7 and 8):

- Fifty-seven percent (67) of the 117 sleep-related deaths involved infants between one month and three months old. Sleep-related deaths become less common as infants age, but still occur up to 11 months old.
- Black infants comprised 46 percent of sleep-related infant deaths, despite only representing 18 percent of live births in 2016. Hispanic infants comprised 7 percent of sleep-related infant deaths, but only 5 percent of 2016 live births.
- A number of unsafe sleep circumstances were commonly reported for sleep-related infant deaths:
 - ◆ Bed-sharing was reported at the time of the death in 49 percent (57) of infant deaths, most often with an adult only (70 percent), an adult and another child (11 percent), or another child only (2 percent).
 - ◆ Of 46 infant death reviews that indicated bed-sharing with an adult or adult and child, 43 percent indicated that the supervising adult was impaired at the time of the incident with 75 percent impaired by sleep and 30 percent impaired by alcohol.
- Eight infant death reviews indicated an adult fell asleep while feeding the infant, with 50 percent bottle-feeding and 50 percent breastfeeding.
- Infants were put to sleep on their back in only 51 percent of infant death reviews; 33 percent were put to sleep on their side or stomach. Infant sleep position was not documented in 17 percent of the infant deaths reviewed.
- Second-hand smoke exposure was reported for 41 (35 percent) of infant sleep-related deaths.
- Of the 34 infant death reviews in which a crib or bassinet was indicated as the incident location, 76 percent (26) reported object(s) found in the sleep space. Among the 26 reviews indicating objects in the crib or bassinet, the most commonly found objects were thin blankets (73 percent) and pillows (27 percent). With 35 percent (9) reported multiple objects in the crib.
- Of the 71 infant deaths that occurred in an unsafe sleep environment, such as a chair or co-sleeping with another person, a safe sleep option such as a crib/bassinet/port-a-crib was present in the home in 62 percent of reviews, not present in 15 percent of reviews, and unknown for 23 percent of reviews.

⁴Ohio law requires county or regional Child Fatality Review Boards to review the deaths of all children younger than 18 years of age. These boards are composed of multidisciplinary groups of community leaders whose careful review process results in a thorough description of the factors related to infant and child deaths.

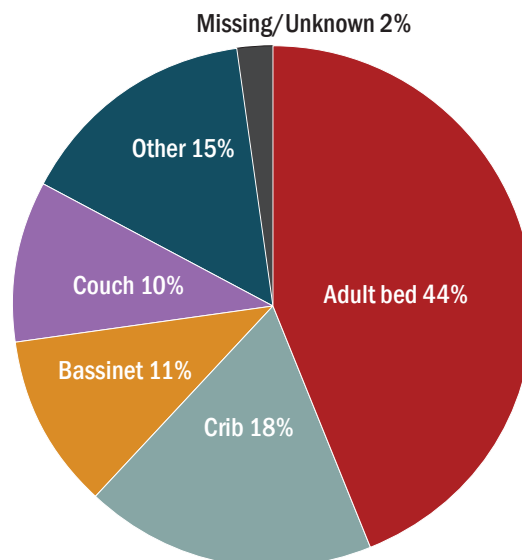
APPENDIX C
2016 SLEEP-RELATED INFANT DEATHS

Figure 7: Reviews of Infant Sleep-Related Deaths by Age, Race and Gender, 2016 (N=117)



Source: Ohio Department of Health, Bureau of Vital Statistics

Figure 8: Reviews of Infant-Sleep-Related Deaths by Incident Location, 2016 (N=117)

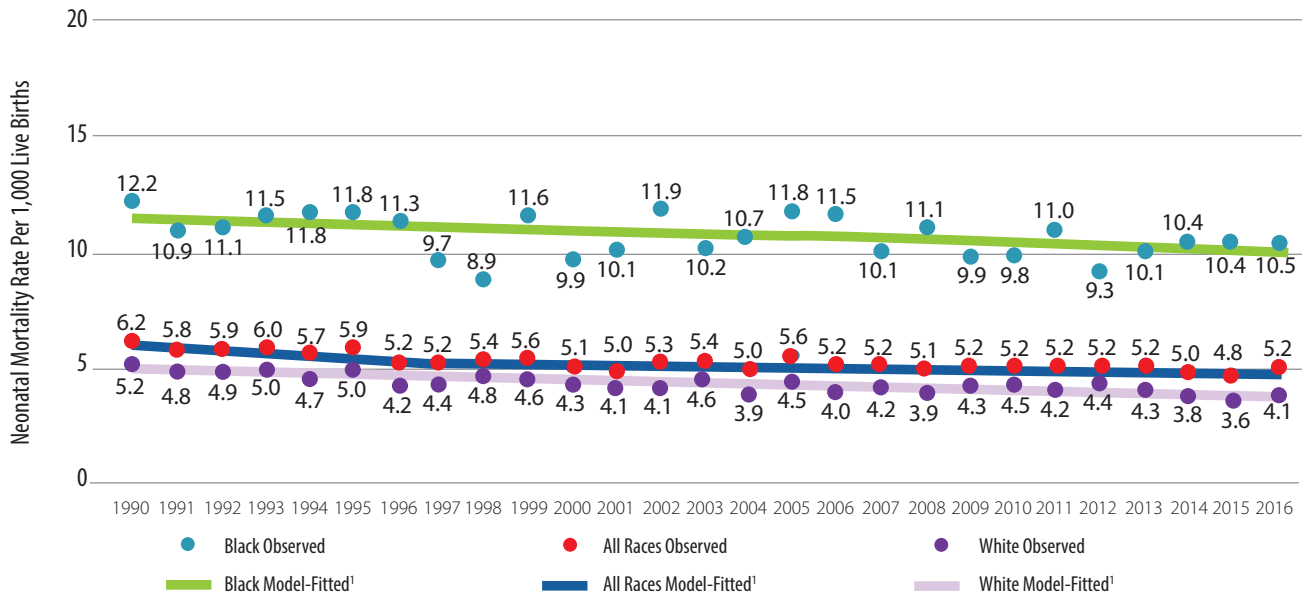


Source: Ohio Department of Health, Bureau of Vital Statistics

APPENDIX D NEONATAL INFANT MORTALITY RATE TRENDS (1990-2016)

Neonatal infant mortality is defined as the death of a live-born infant during the first 27 days of life. Ohio's neonatal infant mortality rate was 6.2 deaths per 1,000 live births in 1990; 5.1 in 2000; 5.2 in 2010; and 5.2 in 2016. There was a downward trend in neonatal infant mortality in Ohio throughout the course of this 26-year period. This downward trend has been similar for both white neonatal infant mortality and black neonatal infant mortality.

Figure 9: Trends in Ohio Neonatal Mortality, by Race (1990-2016)



Source: Ohio Department Of Health, Bureau Of Vital Statistics.

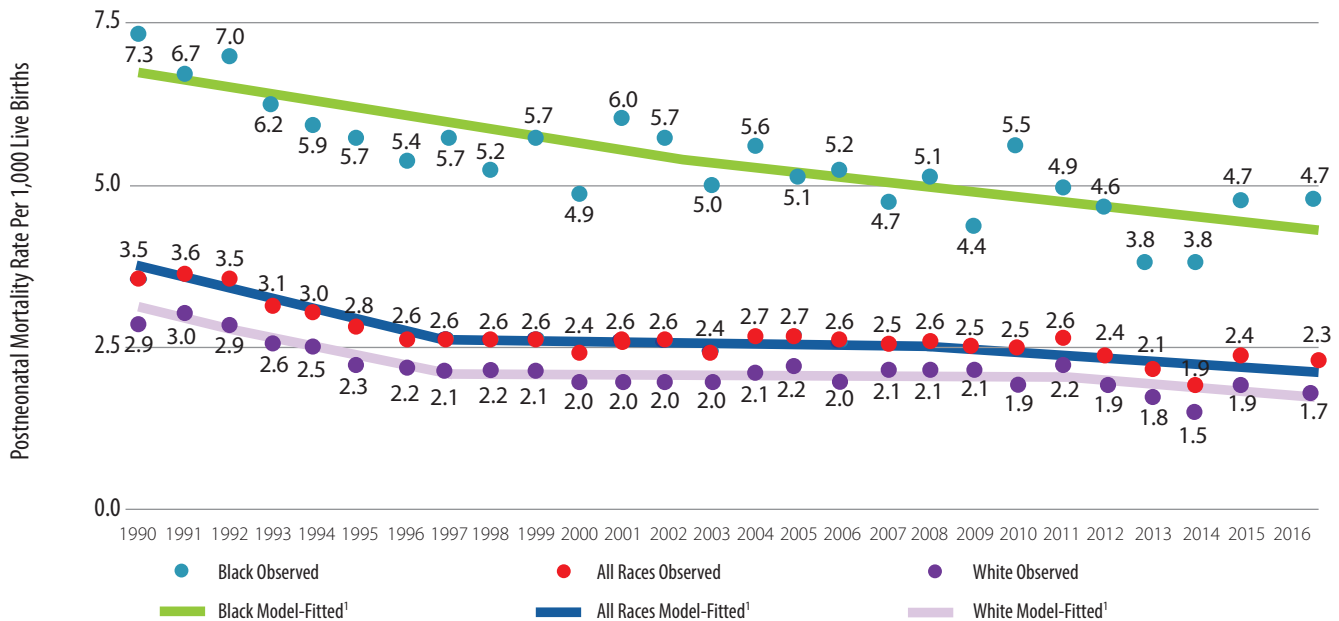
¹ "Model-Fitted" Definition – Joinpoint software models were used to test the statistical significance of changes in trends. For each group the best fitting trend lines are presented. A change in trend was observed for all races neonatal infant mortality in 1997. No change in trend was detected for black neonatal infant mortality or white neonatal infant mortality.

APPENDIX D POSTNEONATAL INFANT MORTALITY RATE TRENDS (1990-2016)

Postneonatal infant mortality is defined as the death of an infant between 28 days and 364 days of life. Ohio's postneonatal mortality rate was 3.5 deaths per 1,000 live births in 1990; 2.4 in 2000; 2.5 in 2010; and 2.3 in 2016.

There was a downward trend in postneonatal infant mortality in Ohio throughout the course of this 26-year period. Postneonatal infant mortality for white infants and black infants differed significantly during this time frame. Among white infants, postneonatal infant mortality decreased throughout the 26-year period, but more slowly after 1997 than from 1990 to 1996. Among black infants, however, an ongoing significant decrease in postneonatal infant mortality occurred throughout the entire period from 1990 through 2016.

Figure 10: Trends in Ohio Postneonatal Mortality, by Race (1990-2016)



Source: Ohio Department Of Health, Bureau Of Vital Statistics.

¹ "Model-Fitted" Definition – Joinpoint software models were used to test the statistical significance of changes in trends using a Monte Carlo permutation method. For each group the best fitting trend lines are presented. A change in trend was observed for all races postneonatal infant mortality in 1997 and for white postneonatal mortality in 1997. No change in trend was detected for black postneonatal infant mortality.