

**Mississippi State Department of Health
2019 & 2020 Infant Mortality Report**

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Executive Summary

Background. Infant mortality is the death of an infant within his or her first year of life. The infant mortality rate is a measure of the number of infant deaths for every 1,000 live births. This measure is a marker of and helps us understand the overall quality of the health of a population. Infant mortality also can help us identify factors that contribute to death, gaps in health care, and barriers to care access. This report describes the infant mortality rate and characteristics of Mississippi resident infant deaths which occurred in 2019 and 2020.

Key Findings.

- In 2019-2020, there were 615 infant deaths and 72,114 live births to Mississippi residents. The infant mortality rate for this period was 8.5 infant deaths per 1,000 live births.
 - In 2019, there were 322 infant deaths and 36,634 live births to Mississippi residents. The infant mortality rate in 2019 was 8.8 infant deaths per 1,000 live births.
 - In 2020, there were 293 infant deaths and 35,480 live births to Mississippi residents. In 2020, the infant mortality rate was 8.3 infant deaths per 1,000 live births, a decrease of about 6 percent from 2019.
- The leading causes of death included
 - prematurity and/or complications of pregnancy, labor and delivery,
 - major structural birth defects, and
 - sudden unexplained infant death / accidental suffocation or strangulation in bed.These leading causes of death accounted for about seven out of every ten infant deaths.
- In 2019, 215 of 322 infants (66.8%) and, in 2020, 193 of 293 infants (65.9%) who died in their first year of life were born prior to 37 weeks gestation. More than 40 percent of infants who died in 2019 and 2020 were born at 28 weeks gestation or earlier.
- In 2019 and 2020, about half of all infant deaths were among infants who were born weighing less than 1500 grams.
- Although there have been advances in technology, maternal-fetal medicine and newborn care, extremely premature infants (particularly those less than 28 weeks gestation) and extremely low birth weight infant (< 1000 grams) are at great risk for death (mortality risk of 30-50%) and disability (20-50%).

Key Recommendations to Improve Outcomes.

- Improve maternal health
 - Improve women’s overall health before pregnancy, especially hypertension and how it may impact the health of the woman before, during and after pregnancy.
- Improve women’s healthcare, healthcare quality, and health outcomes
 - Support policies that improve women’s access to preventive wellness and reproductive care prior to pregnancy and that extend postpartum care coverage to one year after delivery
- Improve maternal access to insurance coverage
 - Support policies that allow for expanded models of pregnancy care, including midwifery care
- Eliminate racial and ethnic inequities through multilevel strategies including:
 - Conduct implicit bias and anti-racism education and training in healthcare
 - Support the education and representation of Black and Indigenous medical professionals in nursing, medicine, and public health
 - Address financial and social barriers to health
 - Increase access to doulas from within patient populations to provide culturally concordant pregnancy support
- Increase breastfeeding initiation and the continuation of breastfeeding or feeding of breastmilk to at least eight weeks postpartum
- Reinforce safe sleep practices with families and caregivers and provide safe sleep training to providers and childcare facilities

Introduction and Background

Infant mortality, the death of an infant under the age of one year, is an important indicator of the overall health of a population. Infant mortality is closely related to important social determinants of health which have a “major impact on people’s health, well-being, and quality of life”, such as “safe housing, transportation, and neighborhoods; racism, discrimination, and violence; education, job opportunities, and income; access to nutritious foods and physical activity opportunities; polluted air and water; language and literacy skills”.¹ Systemic and historical experiences of racism, inequities in health care access and the quality of health care, discrimination and population differences in social determinants of health all contribute to disparities observed in infant mortality, not biological differences among groups of people. Infant health and well-being also reflect the quality, safety, accessibility, and equity within our healthcare system and the capacity to provide risk-appropriate care to both pregnant women and newborns.

This report describes the infant mortality rate (i.e., the number of infant deaths per 1,000 live births) and characteristics of Mississippi resident infant deaths which occurred in 2019 and 2020.

- During 2019, there were 36,634 live births to Mississippi resident women and 322 infant deaths. The Mississippi infant mortality rate (IMR) in 2019 was 8.8 infant deaths per 1,000 live births, an increase of more than 4 percent from 2018.
- During 2020, there were 35,480 live births to Mississippi resident women and 293 infant deaths. The Mississippi IMR in 2020 was 8.3 infant deaths per 1,000 live births, a decrease of almost 6 percent from 2019.

States often compare and rank their IMRs to each other and to national objectives. *Healthy People* is a national plan that creates and releases health-related goals and objectives to guide the improvement of the health of the nation’s people.² The Healthy People 2030 (HP2030) plan set a goal of decreasing the national IMR within one year of age to no more than 5 infant deaths

¹ U.S. Department of Health and Human Services. Office of Disease Prevention and Health Promotion. Healthy People 2030. Social Determinants of Health. [Social Determinants of Health - Healthy People 2030 | health.gov](https://www.health.gov/social-determinants-of-health); accessed 2/11/2022

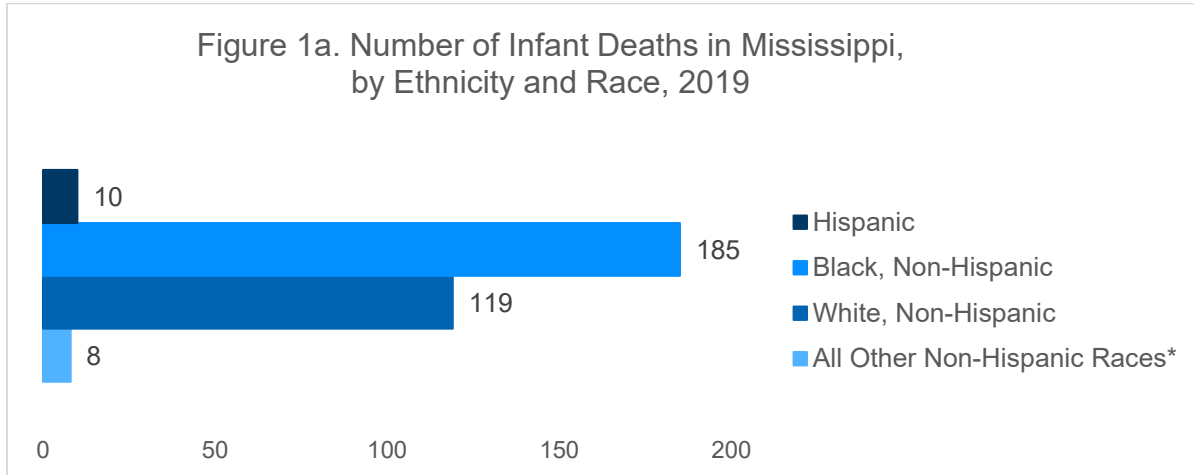
² U.S. Department of Health and Human Services. Office of Disease Prevention and Health Promotion. Healthy People 2030. [Healthy People 2030 | health.gov](https://www.health.gov/healthy-people-2030); accessed 2/11/2022

per 1,000 live births.³ Mississippi has consistently had one of the highest infant mortality rates in the nation with most recent rates hovering around 9 infant deaths for every 1,000 infants born.⁴

Geographic and racial disparities in infant mortality in Mississippi are significant. In Mississippi, the rate of infant mortality among non-Hispanic Black infants was twice that of non-Hispanic White infants. Mississippi's race-specific IMRs have changed very little over the past decade. In 2020, while the overall IMR was 8.3 per 1,000 live births, racial disparities in infant mortality were evident. The IMR among Black infants showed a slow decrease from a high of 13.3 deaths per 1,000 live births in 2012 to 11.8 deaths per 1,000 live births in 2020, an 11.3 percent decrease. The infant mortality rate among White infants decreased from a high of 7.2 deaths per 1,000 live births in 2016 to 5.7 deaths per 1,000 live births in 2020, representing a 21 percent decrease.

Deaths and Births in 2019

In 2019, there were 322 infant deaths and 36,634 live births to Mississippi resident women.⁵ (Figures 1a, 1b)

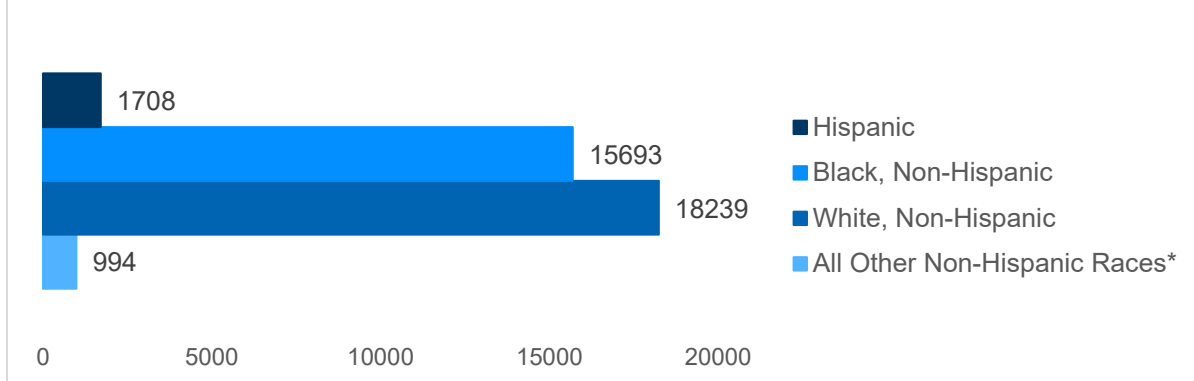


³ U.S. Department of Health and Human Services. Office of Disease Prevention and Health Promotion. Healthy People 2030. Objectives and Data. [Objectives and Data - Healthy People 2030 | health.gov](https://www.health.gov/objectives-and-data); accessed 2/11/2022

⁴ United Health Foundation. America's Health Rankings. Data from analysis of CDC WONDER Online Database, Linked Birth/Infant Death files. AmericasHealthRankings.org. https://www.americashealthrankings.org/explore/health-of-women-and-children/measure/IMR_MCH/state/ALL; accessed 5/28/2021

⁵ Data sources for all figures and tables are included at the end of this report. *Note: Infants classified as 'all other non-Hispanic' include those who are American Indian, Asian (e.g., Vietnamese, Chinese or Filipino), and infants of two or more races.

Figure 1b. Number of Births in Mississippi, by Ethnicity and Race, 2019



Deaths and births by race and ethnicity were as follows:

- Hispanic infants accounted for 10 (3.1%) deaths and 1,708 (4.7%) births;
- Non-Hispanic Black (referred to as “Black” throughout this report) infants accounted for 185 (57.5%) deaths and 15,693 (42.8%) births;
- Non-Hispanic White (referred to as “White” throughout this report) infants accounted for 119 (37.0%) deaths and 18,239 (49.8%) births; and
- Infants of other races and other / unknown ethnicities accounted for 8 (2.5%) deaths and 994 (2.7%) births.

Deaths and Births in 2020

In 2020, there were 293 infant deaths and 35,480 live births to Mississippi resident women. (Figures 2a, 2b)

Figure 2a. Number of Infant Deaths in Mississippi, by Ethnicity and Race, 2020

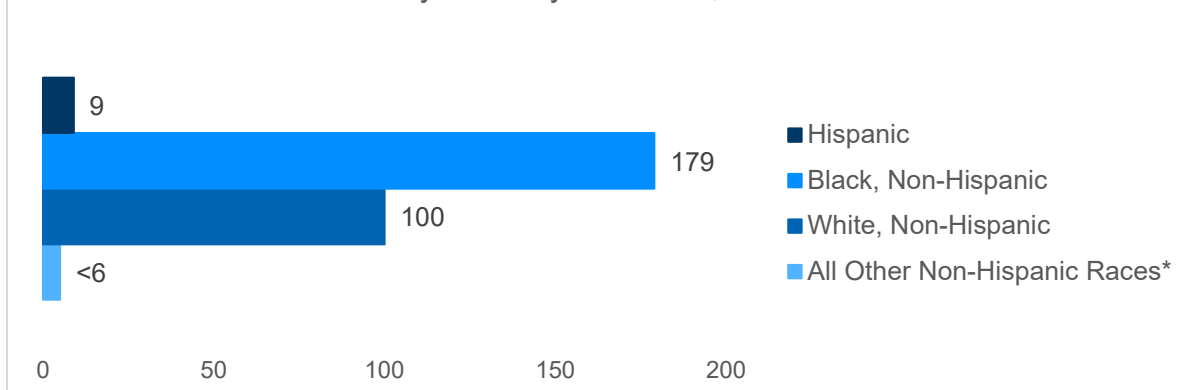
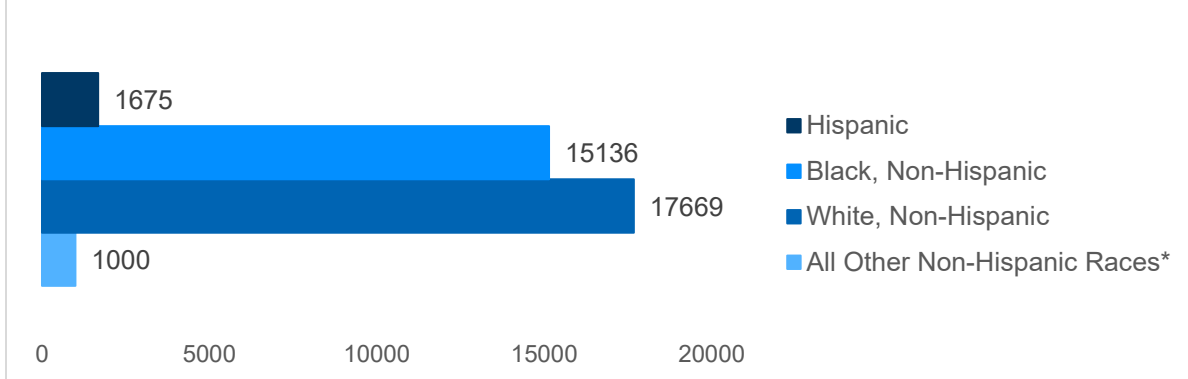


Figure 2b. Number of Births in Mississippi, by Ethnicity and Race, 2020



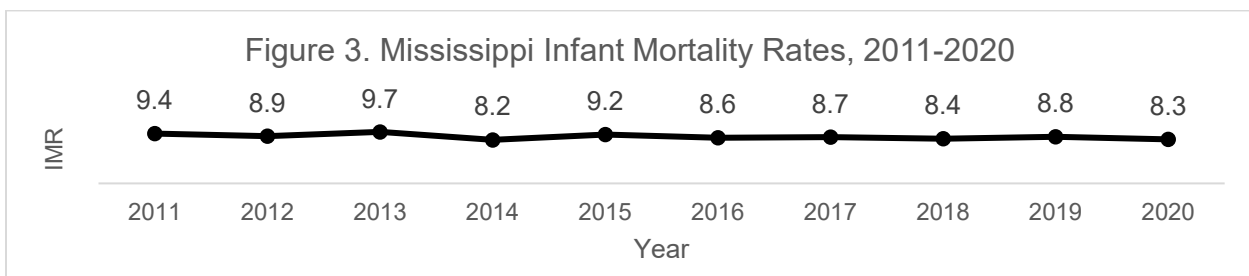
Deaths and births by race and ethnicity were as follows:

- Hispanic infants accounted for 9 (3.1%) deaths and 1,675 (4.7%) births;
- Non-Hispanic Black infants accounted for 179 (61.1%) deaths and 15,136 (42.7%) births;
- Non-Hispanic White infants accounted for 100 (34.1%) deaths and 17,669 (49.8%) births; and
- Infants of other races and other / unknown ethnicities accounted for less than 6 (1.7%) deaths and 1,000 (2.8%) births.

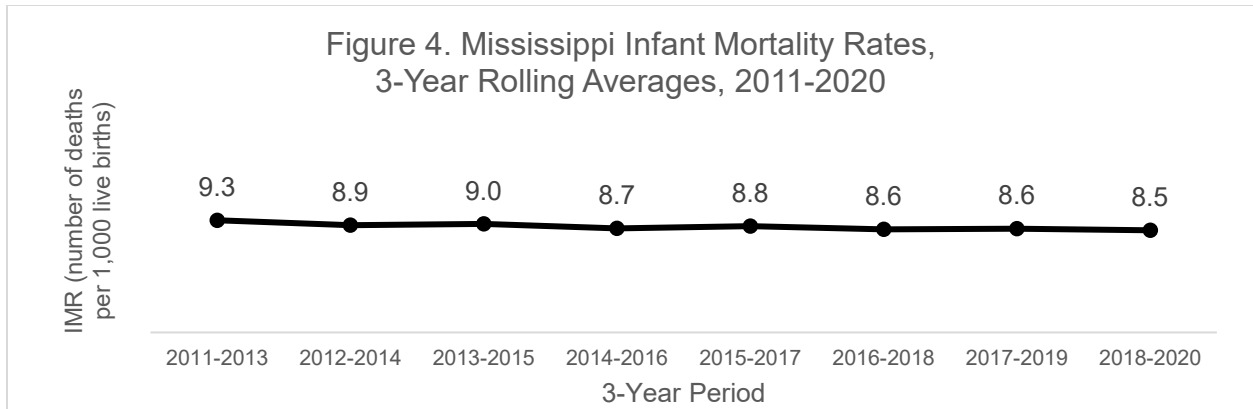
Trends in Infant Mortality

The state IMR is more than three percentage points (a difference of almost 50 percent) above the HP2030 target of no more than 5 infant deaths per 1,000 live births. The Mississippi IMR since 2016 has ranged between 8.3 infant deaths per 1,000 live births and 8.8 infant deaths per 1,000 live births. (Figure 3) In 2020, the IMR was 8.3 infant deaths per 1,000 live births, a decrease of about 6 percent from 2019.

Figure 3. Mississippi Infant Mortality Rates, 2011-2020



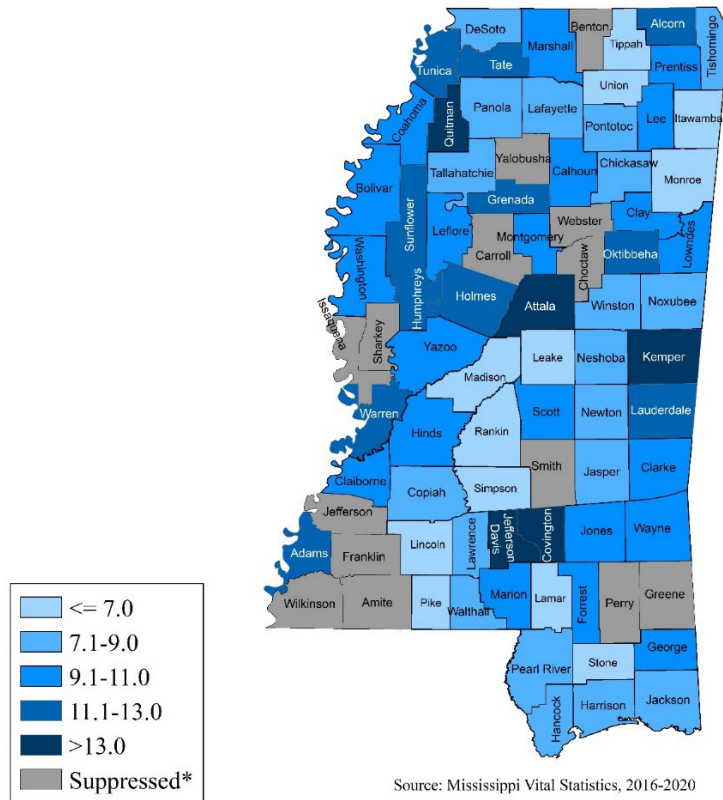
Infant mortality in Mississippi has declined slightly during the past decade. Since 2011, a rolling 3-year average⁶ of the IMR indicates that the IMR has decreased from 9.3 per 1,000 live births in 2011-2013 to 8.5 for the most recent 3-year period (2018-2020). (Figure 4)



Geographic Disparities. Mississippi has geographic disparities in infant mortality. The average IMR for the 2016-2020 period by county is depicted in Figure 5a. Figure 5b shows the state's IMRs by health district. As depicted in Figure 5b, areas of the state with some of the most challenging resource needs often have the highest rates of infant mortality.

⁶ "Rolling averages, also known as moving averages, are a type of chart analysis technique used to examine ... data collected over extended periods of time.... They are typically utilized to smooth out data series. The ultimate purpose of rolling averages is to identify long-term trends. They are calculated by averaging a group of observations of a variable of interest over a specific period of time. Such averaged number becomes representative of that period in a trend line.... [These] period-based averages "roll," or "move," because when a new observation is gathered over time, the oldest observation of the pool being averaged is dropped out and the most recent observation is included into the average." (Encyclopedia of Survey Research Methods. PJ Lavrakas, ed. 2008. Doi: <https://dx.doi.org/10.4135/9781412963947.n497>)

Mississippi County Average Infant Mortality Rate
2016-2020



* Rates not reported due to small values that may lead to unreliable estimates

Figure 5a. Mississippi Average Infant Mortality Rate, By County, 2016-2020

Mississippi Infant Mortality Rate by District, 2020

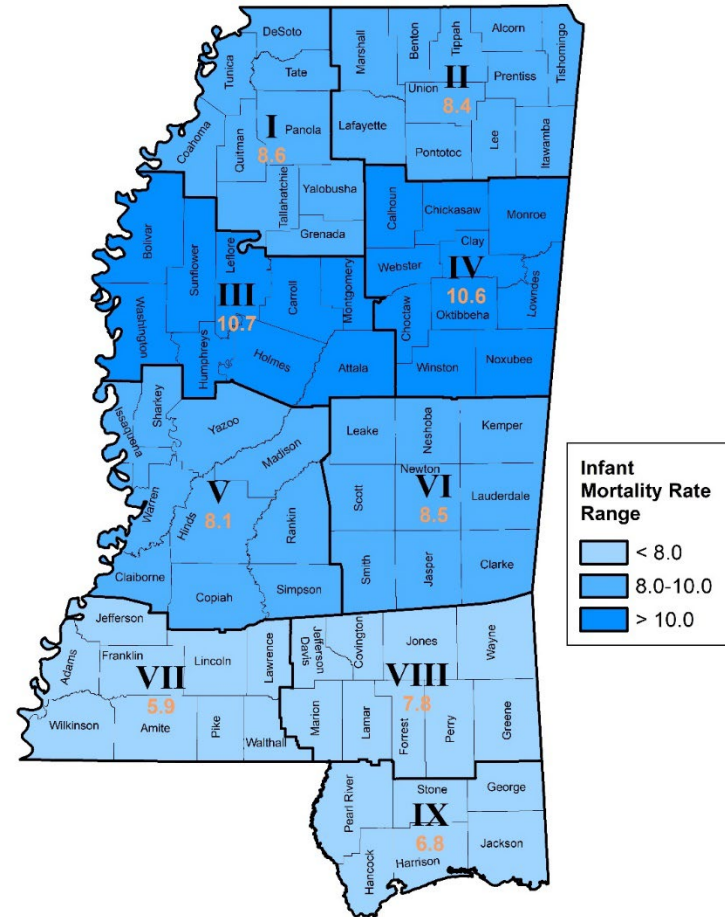
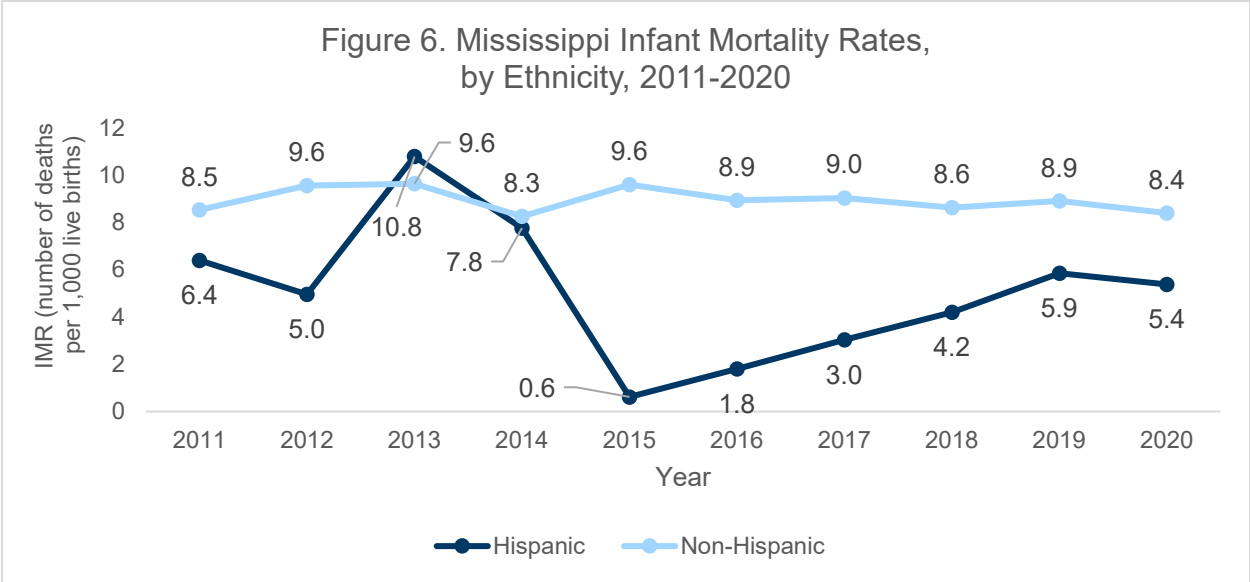


Figure 5b. Mississippi Infant Mortality Rate, By District, 2020

Ethnic Disparities. The IMR for Hispanic infants was generally lower than the IMR for non-Hispanic infants between 2011 and 2020. (Figure 6)

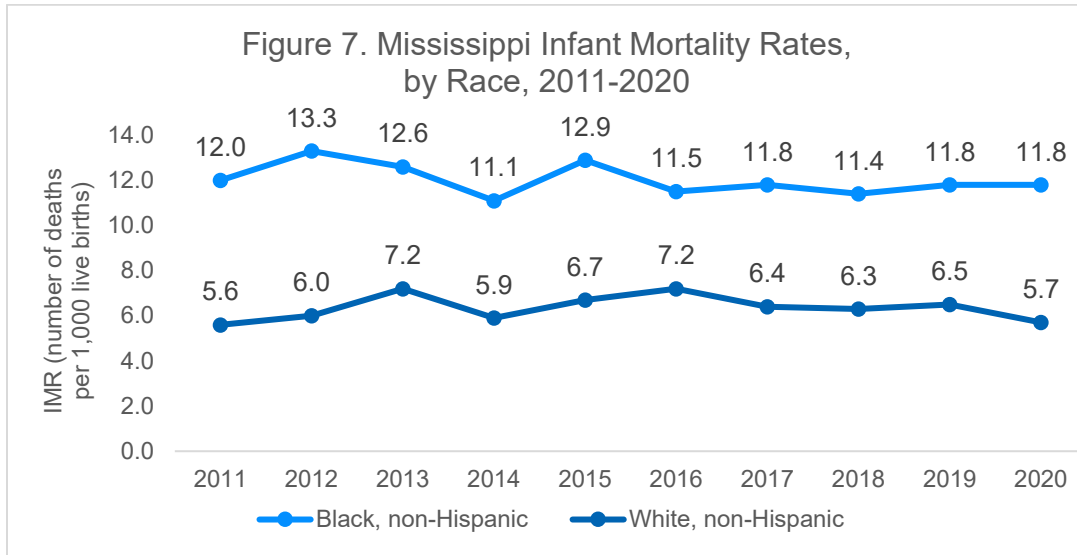


The 2020 IMR for Hispanic infants was 5.4 per 1,000 live births and the IMR for non-Hispanic infants was 8.4 per 1,000 live births—a difference of about 43 percent. For comparison, in 2018, the United States IMR for Hispanic infants was 5.2 per 1,000 live births. **Caution should be used in interpreting Mississippi IMRs for deaths among Hispanic infants. These rates are based upon a small number of deaths occurring each year.**

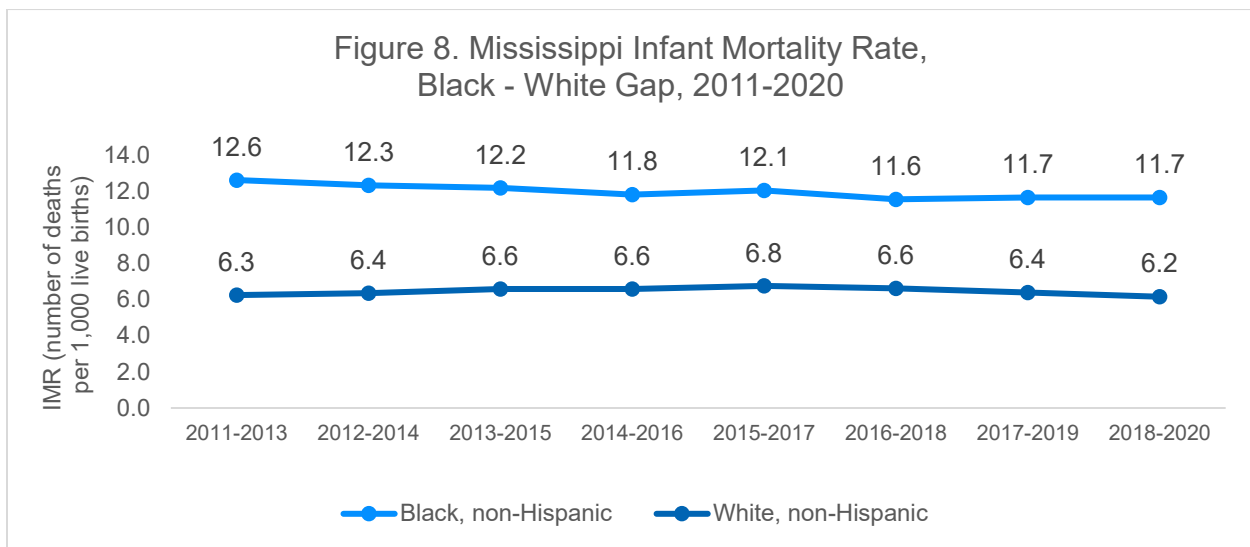
Racial Disparities. In 2020, while the overall IMR was 8.3 per 1,000 live births, racial disparities in infant mortality were evident. The IMR among Black infants showed a slow decrease from a high of 13.3 deaths per 1,000 live births in 2012 to 11.8 deaths per 1,000 live births in 2020, a decrease of 11 percent. The United States IMR for Black infants was 10.8 deaths per 1,000 live births in 2018—one percentage point below Mississippi’s most current IMR.⁷ White infant mortality has fluctuated over the past decade. The infant mortality rate among White infants decreased from a high of 7.2 deaths per 1,000 live births in 2016 to 5.7 deaths per 1,000 live births in 2020, a 21 percent decrease. (Figure 7) The United States IMR for White infants also

⁷ Centers for Disease Control and Prevention. National Center for Chronic Disease Prevention and Health Promotion. Division of Reproductive Health. Infant Mortality. [Infant Mortality | Maternal and Infant Health | Reproductive Health | CDC](#); accessed 1/12/2022

was lower than the Mississippi IMR. The United States IMR in 2018 for White infants was 4.6 deaths per 1,000 live births.⁸

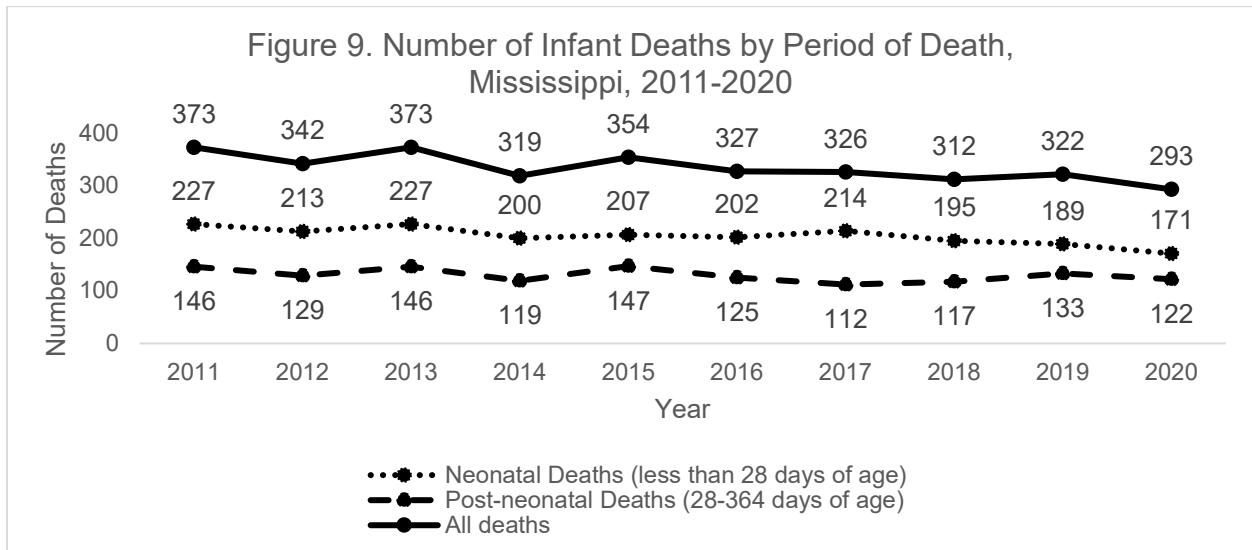


The disparity or gap between the IMR of Black and White infants narrowed between the 2011-2013 and 2014-2016 periods. However, the Black - White IMR gap has changed little in the past five years. Black, non-Hispanic IMRs since 2016-2018 have stagnated and White, non-Hispanic IMRs decreased slightly, thus widening the Black – White IMR gap 2-fold. (Figure 8)

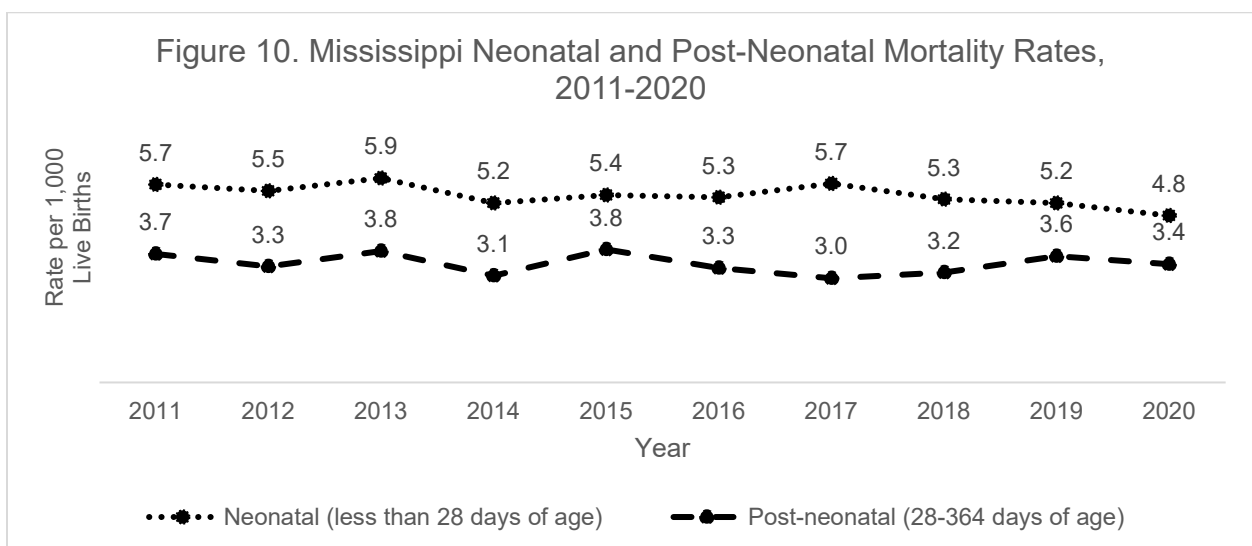


⁸ Centers for Disease Control and Prevention. National Center for Chronic Disease Prevention and Health Promotion. Division of Reproductive Health. Infant Mortality. [Infant Mortality | Maternal and Infant Health | Reproductive Health | CDC](#); accessed 1/12/2022

Timing of Death. Infant death also can be examined by the time period after birth when death occurs. Deaths can be divided into two critical periods: the neonatal period (between birth and 27 days of life); and the post-neonatal period (between 28 and 364 days of life). About 6 of every 10 infant deaths occur among infants in the neonatal period and 4 of every 10 infant deaths occur among infants in the post-neonatal period. (Figure 9) The number of deaths in the neonatal period has decreased over the past decade.



Between 2011 and 2020, the gap between neonatal mortality rates (deaths of infants who died between birth and 27 days of life) and post-neonatal mortality rates (deaths of infants who died between 28 and 364 days of life) has narrowed. (Figure 10)

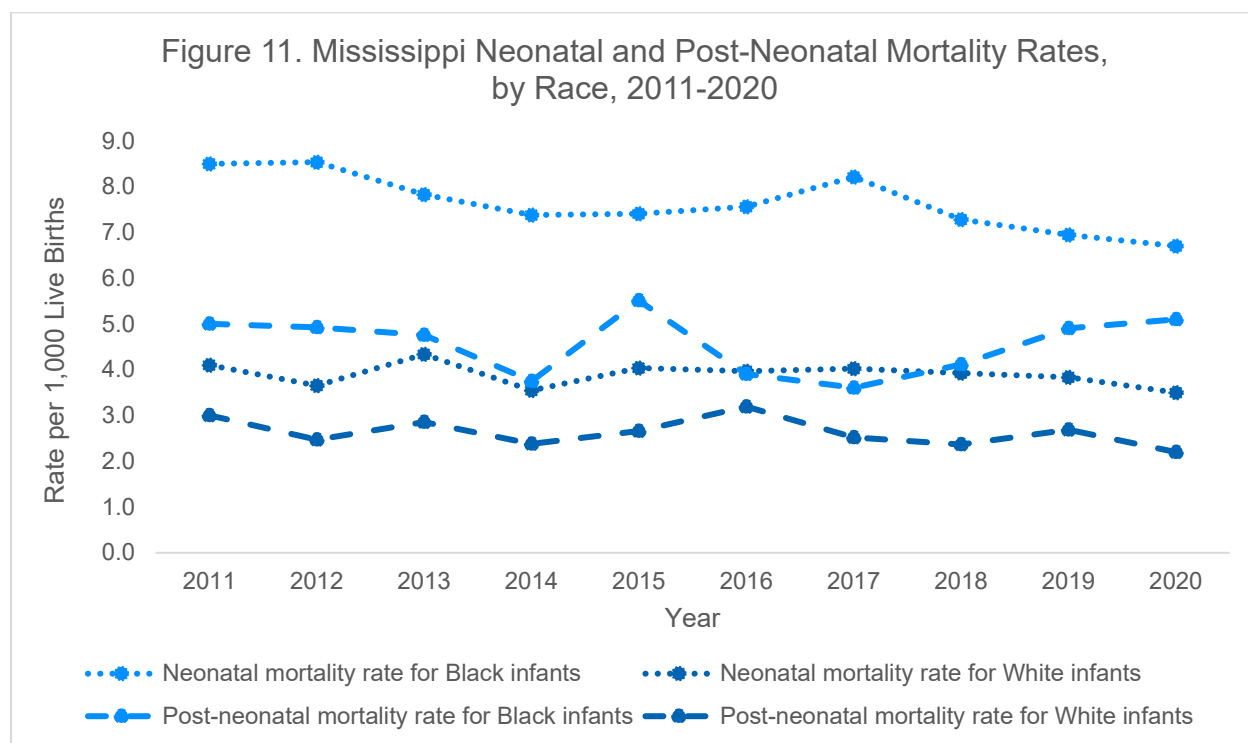


In 2019, the Mississippi neonatal and post-neonatal mortality rates were 5.2 and 3.6 per 1,000 live births, respectively. The 2020 Mississippi neonatal and post-neonatal mortality rates decreased to 4.8 and 3.4 per 1,000 live births, respectively. Both of these rates exceeded the HP2020 neonatal and post-neonatal mortality rates of 4.1 and 2.0, respectively.⁹

Racial Disparities in Timing of Death. Racial disparities in timing of death also are common in Mississippi. During 2011-2020, neonatal mortality rates among Black infants were consistently higher than all other rates. (Table 1, Figure 11) Neonatal mortality rates of Black infants decreased 18 percent between 2017 and 2020; however, post-neonatal mortality rates of Black infants during the same time period increased by 42 percent. Neonatal and post-neonatal mortality rates of White infants changed minimally between 2011 and 2020.

Table 1. Neonatal and Post-Neonatal Mortality Rates, By Race, Mississippi 2011-2020

Mortality Period	Race	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Neonatal	Black	8.5	8.5	7.8	7.4	7.4	7.6	8.2	7.3	6.9	6.7
	White	4.1	3.7	4.3	3.5	4.0	4.0	4.0	3.9	3.8	3.5
Post-neonatal	Black	5.0	4.9	4.8	3.8	5.5	3.9	3.6	4.1	4.9	5.1
	White	3.0	2.5	2.9	2.4	2.7	3.2	2.5	2.4	2.7	2.2



⁹ U.S. Department of Health and Human Services. Office of Disease Prevention and Health Promotion. Healthy People 2020. [Healthy People 2020 | Healthy People 2020](#); retrieved 12/13/2021

Leading Causes of and Disparities in Infant Death in 2019 and 2020

In 2019-2020, there were 615 infant deaths. The period IMR was 8.5 per 1,000 live births. The number and percent of deaths grouped into similar causes of death is presented in Table 2.

Table 2. Deaths by Cause of Death Grouping, Mississippi 2019-2020

Cause of Death Group	2019 Deaths	2020 Deaths	Total Deaths	Percent Deaths	2019-2020 Rate per 1,000 Live Births
Birth Defects	72	48	120	20%	1.7
Cardiovascular / Respiratory Conditions	47	39	86	14%	1.2
Infections	33	24	57	9%	0.8
Injuries / Accidents	8	9	17	3%	0.2
Prematurity / Complications of Pregnancy, Labor and Delivery	80	79	159	26%	2.2
Sudden Unexplained Infant Death / Accidental Suffocation and/or Strangulation in Bed	72	78	150	24%	2.1
Other	10	16	26	4%	0.4
Total	322	293	615	100%	8.5

The leading causes of death among infants in both 2019 and 2020 were sudden unexplained infant death / accidental suffocation and/or strangulation in bed, prematurity / complications of pregnancy, labor and delivery, and congenital malformations, deformations and chromosomal abnormalities (more commonly known as birth defects). (Figures 12a, 12b) All other causes—such as, cardiovascular and respiratory conditions, infections, injuries and accidents, etc.—accounted for the remaining causes of death.

Figure 12a. Leading Causes of Infant Mortality in Mississippi, 2019

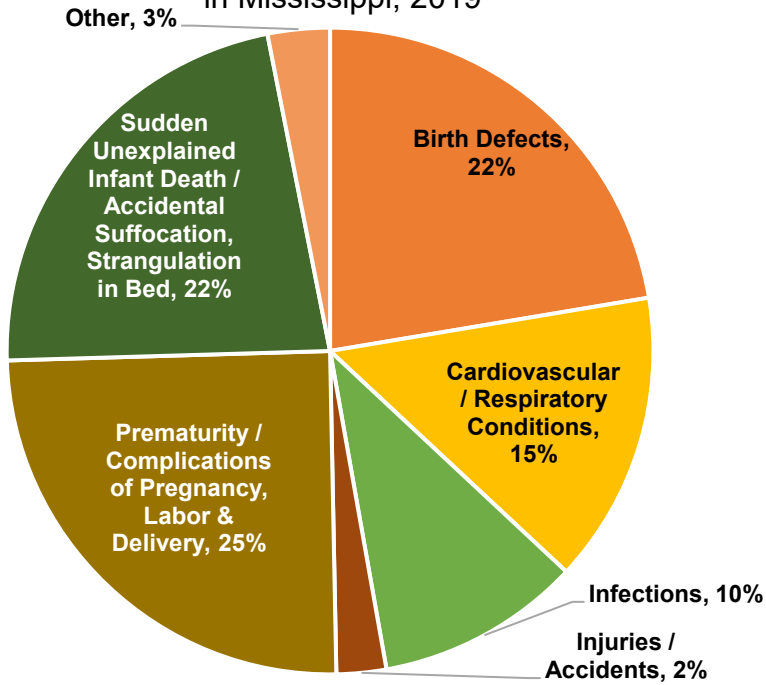
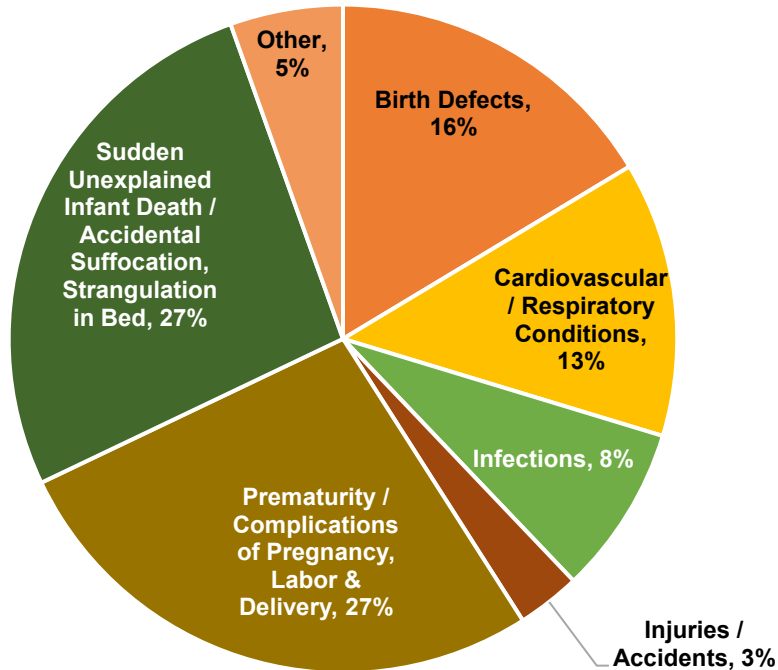


Figure 12b. Leading Causes of Infant Mortality in Mississippi, 2020



Sudden Unexpected Infant Death. Sudden Unexpected Infant Death (SUID) a term used to describe the sudden and unexpected death of an infant less than one year of age in which the cause was not obvious before investigation. These deaths often happen during sleep or in the baby's sleep area.¹⁰ Most SUID cases in Mississippi occur when the newborn is placed in an unsafe sleep environment or the sleep environment becomes unsafe and causes suffocation, strangulation or an overlay accident to occur (these types of deaths are often referred to as accidental suffocation or strangulation in bed). Sudden Infant Death Syndrome (SIDS) is a form of SUID where no cause is identified but is affected by sleeping position and environment. SUID is the leading cause of death for Mississippi infants between one and four months of age.

Sudden unexpected infant death / accidental suffocation and/or strangulation in bed accounted for about 1 in every 5 infant deaths in 2019 and about 1 in every 6 infant deaths in 2020. In 2019 and 2020, there were 150 SUID-related deaths (72 in 2019 and 78 in 2020). This represents a slight decrease in the number of deaths from 2018 during which 82 SUID-related deaths occurred. However, SUID-related deaths are disproportionately high in Mississippi compared to most states. Combining data from 2015 through 2019, the SUID rates varied across the United States, but Mississippi had the highest SUID rate (184.7 per 100,000 live births) in the nation (range 46.3-184.7 per 100,000 live births).¹¹

Prematurity. Premature or preterm birth is when an infant is born too early, before 37 weeks of pregnancy has been completed. The earlier an infant is born, the higher the risk of death or serious disability. Infants who are born before 37 weeks of gestation are at an increased risk of breathing complications, infections, brain injury and death. Although there have been advances in technology, maternal-fetal medicine, and newborn care, extremely premature infants (less than 28 weeks gestation) and extremely low birth weight infants (<1000 grams) are at great risk for death (30-50%) and disability (20-50%).¹² Table 3 presents the number of infant deaths in Mississippi by gestational age group by ethnicity, race, and overall.

¹⁰ Centers for Disease Control and Prevention. National Center for Chronic Disease Prevention and Health Promotion. Division of Reproductive Health. Sudden Unexpected Infant Death and Sudden Infant Death Syndrome. About SUID and SIDS. <https://www.cdc.gov/sids/about/index.htm>; accessed 12/13/2021

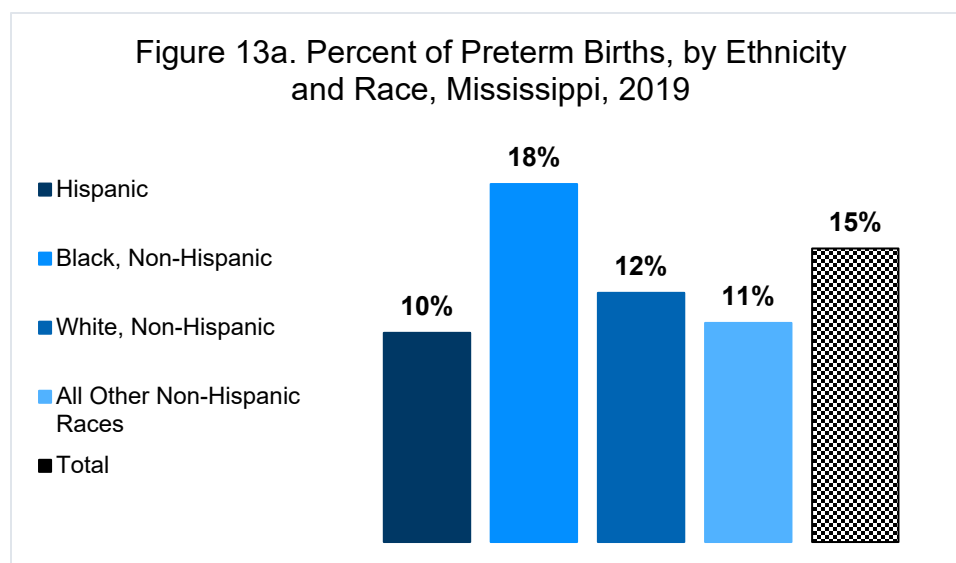
¹¹ Centers for Disease Control and Prevention. National Center for Chronic Disease Prevention and Health Promotion. Division of Reproductive Health. Sudden Unexpected Infant Death and Sudden Infant Death Syndrome. Data and Statistics. [Data and Statistics for SIDS and SUID | CDC](#); accessed 2/3/2022

¹² Glass HC, Costarino AT, Stayer SA, Brett CM, Cladis F, Davis PJ. Outcomes for extremely premature infants. *Anesth Analg*. 2015;120(6):1337-1351. doi:10.1213/ANE.0000000000000705

Table 3. Number of Deaths by Gestational Age Group, by Ethnicity and Race, Mississippi 2019-2020

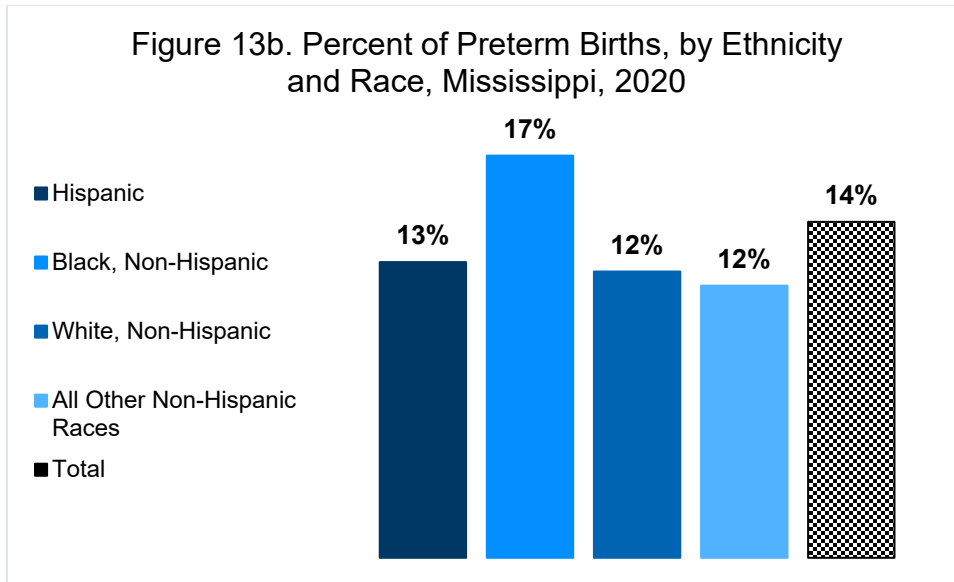
Gestational Age Group (in weeks)	Hispanic	Black, non-Hispanic	White, non-Hispanic	All Other non-Hispanic Races	Total
Extreme preterm (<28)	8	175	72	<6	260
Early to Late Preterm (28-36)	<6	87	55	<6	148
Early term (37-38)	<6	44	44	<6	93
Term & Late Term (39-40 and >40)	<6	57	45	<6	109
Unknown gestational age	<6	<6	<6	<6	<6
Total	19	365	219	12	615

In 2020, 14.2% of women in Mississippi gave birth prior to 37 weeks gestation, compared to 10.1% of women in the United States, a difference of more than 33 percent.¹³ (Figures 13a,13b) According to March of Dimes, Mississippi has the highest preterm birth rate in the nation.¹⁴



¹³ Centers for Disease Control and Prevention. National Center for Chronic Disease Prevention and Health Promotion. Division of Reproductive Health. Preterm Birth. [Preterm Birth | Maternal and Infant Health | Reproductive Health | CDC](#); accessed 1/12/2022

¹⁴ March of Dimes. 2021 March of Dimes Report Card. <https://www.marchofdimes.org/materials/March-of-Dimes-2021-Full-Report-Card.pdf>



In 2019 and 2020, all race and ethnic populations in Mississippi experienced higher rates of preterm birth when compared to their counterparts in the United States. Preterm birth is more common overall and by race in Mississippi (Mississippi Hispanic women, 10.4% and United States Hispanic women, 9.8%; Mississippi Black women, 17.8% and United States Black women, 14.0%; Mississippi White women, 12.4% and United States White women, 9.2%).¹⁵ There were few changes within each group between 2019 and 2020. There was, however, a 23% increase in the percentage of preterm births among Hispanic women between 2019 and 2020.

Prematurity and complications of pregnancy, labor and delivery accounted for about 1 in 3 infant deaths in both 2019 and 2020. In 2019, 215 of 322 infants (66.8%) and, in 2020, 193 of 293 infants (65.9%) who died in their first year of life were born prior to 37 weeks gestation. (Figures 14a, 14b) In 2019-2020, more than 90 percent of infants born at 22 weeks gestation or earlier and more than 40 percent of infants who were born at 23-24 weeks gestation died within the first year of life—often in the first hours or days following birth.

¹⁵ Centers for Disease Control and Prevention. National Center for Chronic Disease Prevention and Health Promotion. Division of Reproductive Health. Preterm Birth. [Preterm Birth | Maternal and Infant Health | Reproductive Health | CDC](#); accessed 1/12/2022

Figure 14a. Percent of Infant Deaths by Gestational Age at Birth, Mississippi, 2019

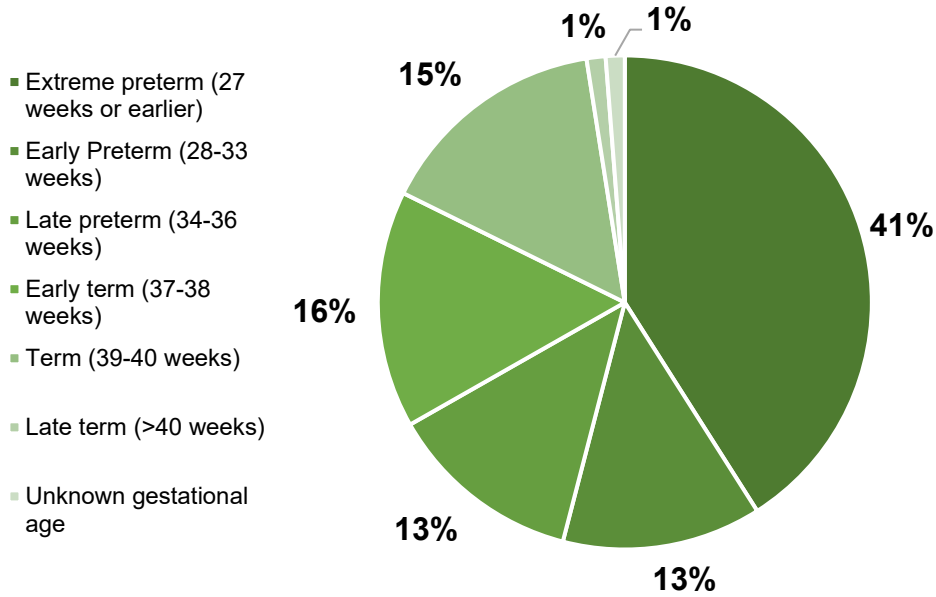
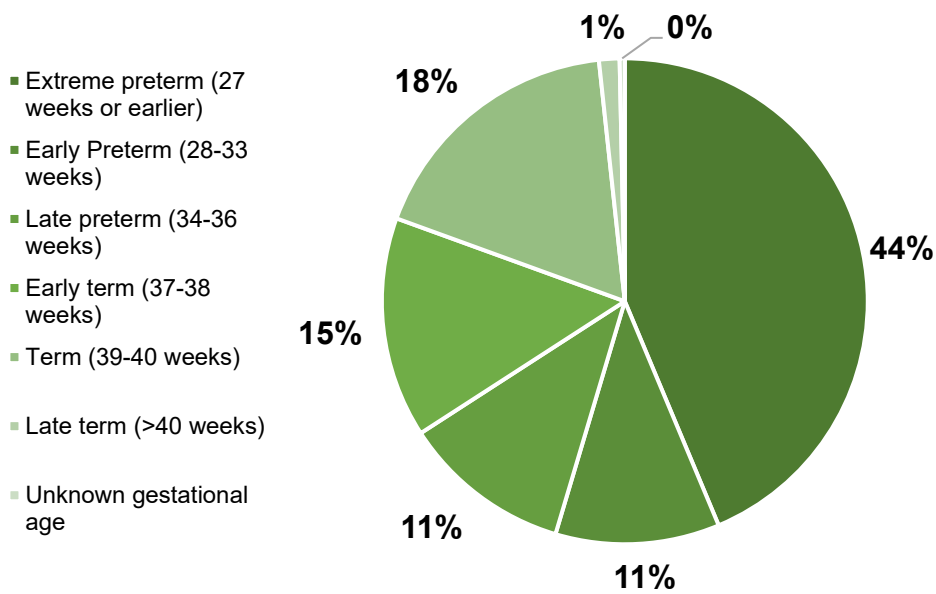


Figure 14b. Percent of Infant Deaths by Gestational Age at Birth, Mississippi, 2020



Low Birthweight. All newborns are weighed at birth and the weight is classified into several categories: normal (2,500 grams or 5.5 pounds, or more); low birthweight (below 2,500 grams or 5.5 pounds); very low birthweight (below 1,500 grams or 3.3 pounds); and extremely low birthweight (below 1,000 grams or 2.2 pounds). Weight of the newborn at birth also presents additional health risks. These risks and can be difficult to distinguish from the health risks associated with prematurity. While most newborns with a very low birthweight are also premature, infants born weighing less than 1500 grams (3.3 pounds), often have little body fat and may have trouble staying warm, trouble feeding and gaining weight, be prone to developing infection and serious digestive problems, and at greater risk for Sudden Unexpected Infant Death.

Race disparities also are present in Mississippi deaths among infants born weighing less than 1500 grams (very low birthweight). In 2019-2020, almost half (48%) of the 615 infant deaths were among infants who weighed less than 1,500 grams at birth. (Table 4)

Table 4. Number of Deaths by Weight of Infant at Birth, by Ethnicity and Race, Mississippi, 2019-2020

	Hispanic	Black, non-Hispanic	White, non-Hispanic	All Other non-Hispanic Races*	Total by Birthweight Category
Very low birthweight	9	190	92	<6	297
Low birthweight	<6	66	32	<6	103
Normal birthweight	8	109	92	<6	215
Total by Ethnicity/Race	19	365	216	15	615

*Includes all non-Hispanic individuals, including those without a specified race

In 2019, 47.2% of infants who died were born weighing less than 1,500 grams. Black infants accounted for 65.8% of the deaths and White infants accounted for 28.9% of deaths. (Figure 15a) In 2020, 49.5% of infants who died were born weighing less than 1500 grams. Black infants accounted for 62.1% of the deaths and White infants accounted for 33.1% of deaths. (Figure 15b)

Figure 15a. Percent of Infant Deaths by Weight at Birth, Mississippi, 2019

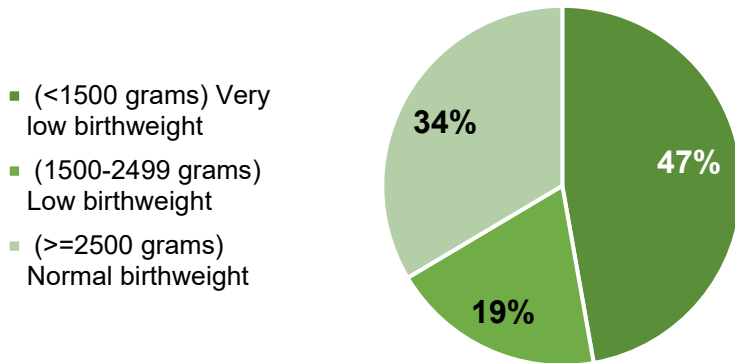
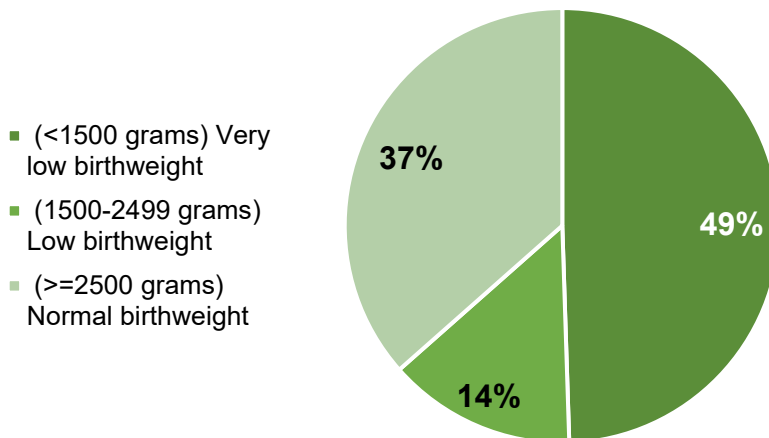


Figure 15b. Percent of Infant Deaths by Weight at Birth, Mississippi, 2020

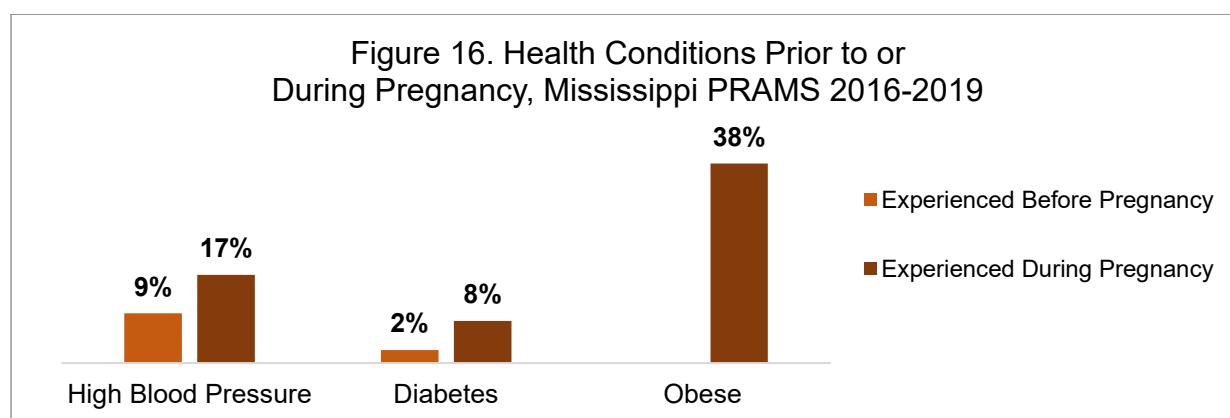


Birth Defects. Major structural birth defects are defined as conditions that (1) are present at birth, (2) result from a malformation or disruption in one or more parts of the body, and (3) have a serious adverse effect on health, development, or functional ability. Some birth defects are related to genetic abnormalities. In 2019 and 2020, about 100 infant deaths were associated with one or more major structural birth defects. Birth defects accounted for 1 in 5 infant deaths in 2019 and about 1 in 7 infant deaths in 2020. A comprehensive description of birth defects may be found here: [Reports - Mississippi State Department of Health \(ms.gov\)](#).

Using Maternal Preconception Care to Help Decrease Infant Morbidity and Mortality

Preconception care is defined as individualized care for ... “women that is focused on reducing maternal and fetal morbidity and mortality, increasing the chances of conception when pregnancy is desired, and providing contraceptive counseling to help prevent pregnancies now or in the near future”.^{16,17} The term “interconception care” is used when referring specifically to care provided between pregnancies. Some maternal conditions are known to be associated with birth defects and are common chronic conditions that contribute to poor overall health in women—before, during and after pregnancy.

Figure 16 shows the percentages of women who had a live birth between 2016 and 2019 (inclusive) and reported that they had hypertension (high blood pressure) or diabetes before and/or during pregnancy and women who were obese at the time of pregnancy.



Hypertension (High Blood Pressure). Preeclampsia and complications from chronic hypertension are leading drivers of maternal morbidity, mortality and preterm birth. A recent report analyzed 2016 and 2017 hospital discharge data to provide the most current prevalence estimates of chronic hypertension and pregnancy-associated hypertension at delivery

¹⁶ Centers for Disease Control and Prevention. National Center for Chronic Disease Prevention and Health Promotion. Division of Reproductive Health. Preconception Care.

<https://www.cdc.gov/preconception/overview.html>; accessed 12/17/2021

¹⁷ Johnson K, Posner SF, Biermann J, Cordero JF, Atrash HK, Parker CS, Boulet S, Curtis MG; CDC/ATSDR Preconception Care Work Group; Select Panel on Preconception Care. Recommendations to improve preconception health and health care--United States. A report of the CDC/ATSDR Preconception Care Work Group and the Select Panel on Preconception Care. *MMWR Recomm Rep*. 2006 Apr 21;55(RR-6):1-23. PMID: 16617292.

hospitalization.¹⁸ Hypertensive disorders in pregnancy, including chronic hypertension and pregnancy-associated hypertension (i.e., gestational hypertension, preeclampsia-eclampsia, and chronic hypertension with superimposed preeclampsia), are associated with poor maternal, fetal, and neonatal outcomes. Findings reveal the burden of hypertensive disorders in pregnancy remains high and varies considerably by jurisdiction. More than 1 in 10 delivery hospitalizations had a pregnancy-associated hypertension diagnosis, including:

- The national prevalence of chronic hypertension was 216 per 10,000 delivery hospitalizations; ranging by state from 125 to 400.
- The national prevalence of pregnancy-associated hypertension was 1,021 per 10,000 delivery hospitalizations; ranging by state from 693 to 1,382.

Diabetes. Poorly controlled diabetes before pregnancy (Type 1 and Type 2) increases the risk of many birth defects including heart, neurologic, musculoskeletal and pulmonary defects.

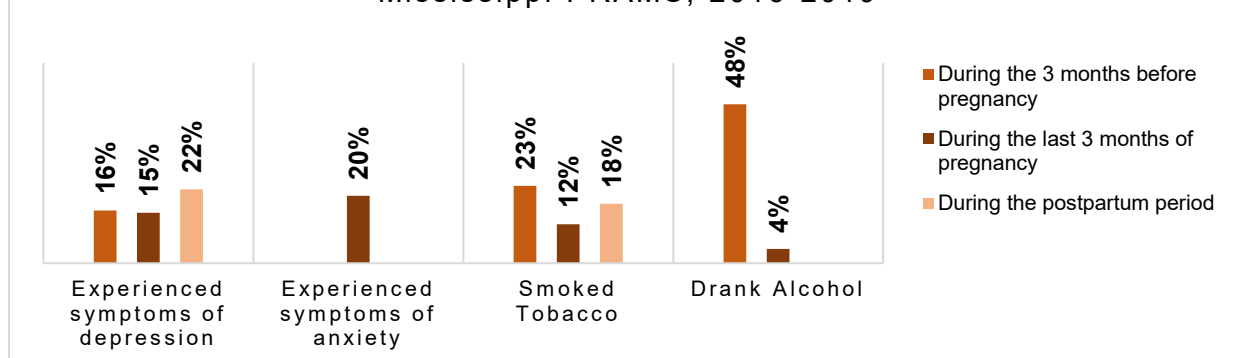
Obesity. Babies born to obese mothers have a higher rate of cardiac defects and are twice as likely to have neural tube defects compared to babies born to mothers who are not obese. Diagnosis of cardiac and neural tube defects can be more difficult in obese women.

In addition to chronic conditions, some mental health conditions and substance use in pregnancy have been shown to contribute to poor maternal health, aggravate existing maternal health conditions, or be associated with poor infant development and outcomes.

Perinatal Mood and Anxiety Disorders. Depression and/or anxiety before, during and after pregnancy are some of the most common perinatal health conditions. Mississippi PRAMS data indicate that depression and/or anxiety affect about 1 in 5 women in the perinatal period. (Figure 17)

¹⁸ DeSisto CL, Robbins CL, Ritchey MD, Ewing AC, Ko JY, Kuklina EV. Hypertension at delivery hospitalization - United States, 2016-2017. *Pregnancy Hypertens.* 2021 Dec;26:65-68. doi: 10.1016/j.preghy.2021.09.002. Epub 2021 Sep 14. PMID: 34537460.

Figure 17. Depression, Tobacco Use and Alcohol Consumption Before, During and After Pregnancy, Mississippi PRAMS, 2016-2019



Perinatal mood and anxiety disorders (PMADs) is an umbrella term that encompasses maternal mental illness during pregnancy and up to one year postpartum.¹⁹ These disorders differ from the “Baby Blues” (mild depressive symptoms and anxiety) which are commonly experienced and resolve after 2-3 weeks postpartum. PMADs are not fleeting—common signs include delusions or strange beliefs that feel real, hallucinations (seeing or hearing things that are not there), feeling confused, feeling disconnected from reality, decreased need for or inability to sleep, paranoia and suspiciousness, and difficulty communicating at times. PMADs can be caused or exacerbated by a multitude of physiological, psychological, or circumstantial factors. These disorders can have a negative effect on maternal health and well-being as well as the woman’s ability to form a bond with her newborn and maintain relationships.

Smoking Tobacco and/or Using Nicotine Delivery Systems (Vaping). Cigarette smoking before or during pregnancy increases the woman’s risk for adverse pregnancy outcomes and the health of the baby before and after delivery. Adverse outcomes include: pregnancy complications (including the premature rupture of membranes, placenta previa, placental abruption, ectopic pregnancy, preterm birth); fetal growth restriction and low birthweight; congenital malformations, like orofacial clefts; adverse effects on fetal lung and brain development; stillbirth; perinatal mortality; and Sudden Infant Death Syndrome (SIDS).²⁰ Studies also show that there are adverse effects to secondhand smoke as well to pregnant women, including preterm birth and reductions in birthweight, and infants (SIDS, middle ear

¹⁹ <https://www.cfmmh.com/perinatal-mood-disorders>; retrieved 12/13/2021

²⁰ Centers for Disease Control and Prevention. National Center for Chronic Disease Prevention and Health Promotion. Office on Smoking and Health. Maternal and Infant Care Settings and Smoking Cessation. [Maternal and Infant Care Settings and Smoking Cessation | Smoking and Tobacco Use | CDC](#); accessed 2/11/2022

disease, lower respiratory illness, and decreased lung function. Almost 1 in 4 women smoke in the three months before pregnancy, about 1 in 10 continued to smoke during pregnancy, and about 1 in 5 smoke or resume smoking in the postpartum period. (Figure 17)

Using of Alcohol and Binge Drinking in Pregnancy. The use of alcohol during pregnancy is associated with a number of birth abnormalities or defects—abnormal facial features, central nervous system problems, neurodevelopmental disorders, and abnormalities in the heart, kidneys, bones, and auditory system. Children with a fetal alcohol spectrum disorder also may be small for gestational age at birth and small in stature.²¹ There is no known safe amount of alcohol use during pregnancy or while trying to get pregnant. There is also no safe time during pregnancy to drink. All types of alcohol are equally harmful, including all wines and beer. Mississippi PRAMS data indicate that almost half of women reported the consumption of alcohol in the 3 months before pregnancy. (Figure 17)

Using/Misusing Prescription Medications and/or non-Prescription Drugs During Pregnancy. Between 2010 and 2017, the incidence of Neonatal Abstinence Syndrome (NAS) per 1,000 birth hospitalizations in Mississippi increased by 130% (absolute difference 1.5 (95% CI: 0.9, 2.2)) and maternal opioid-related diagnosis per 1,000 birth hospitalizations increased by 145% (absolute difference 2.8 (95% CI: 1.9, 3.6)).²² During 2017, 59.1% (1,836,956) of all opioid prescriptions in Mississippi were dispensed to women. During the same year, women of childbearing age filled 16.0% (496,643) of all opioid prescriptions in the state.²³

In Mississippi, neonatal hospital stays related to maternal substance use spiked from 113 in 2010 to 854 in 2019. During 2019, nearly half (47%) of the drugs involved in newborn hospitalizations affected by maternal substance use were unspecified. Cannabis was recorded in 30%, cocaine in 7%, opiates in 6%, and stimulants in 5% of all neonatal hospitalizations related to maternal substance use. Neonatal abstinence syndrome, caused by severe intrauterine drug exposure, was documented in 16% or 139 hospitalizations. Among infant stays related to substance exposure, comorbidities were highly prevalent: 26.4% were born

²¹ Alcohol and Pregnancy. <https://www.stanfordchildrens.org/en/topic/default?id=alcohol-and-pregnancy-85-P01188>; accessed 12/13/2021

²² Hirai, Ko et al. NAS and Maternal Opioid-related Diagnoses in the US, 2010-2017. *JAMA*. 2021;325(2):146-155. doi:10.1001/jama.2020.24991

²³ Opioid Prescriptions among Reproductive-Aged Women in Mississippi, 2012-2017. [8240.pdf \(ms.gov\)](#)

prematurely, 25.6% had a coexisting low birth weight, 25.7% had coexisting respiratory conditions, and 13.9% had a coexisting congenital disease. The overwhelming majority of these infants were poor. Among the 854 hospitalizations, 85.5% (730) were covered by Medicaid and 8.1% (69) were uninsured. Total charges for these hospital stays grew 64.0% over a four-year period, increasing from \$19,936,930 in 2016 to \$32,694,118 in 2019 and totaling over \$101 million for the study period. Rates were nearly identical for Black and White newborns. Infants residing in rural areas, however, had slightly higher hospitalization rates than infants residing in urban areas. Rates were highest in the northeastern corner of the state and in south Mississippi. Many birth defects can be identified prenatally with genetic testing and detailed ultrasound. Early diagnosis and access to specialty services may reduce infant deaths from birth defects, particularly those related to heart defects. In addition, preconception care and interconception care can be the periods of time where women have an opportunity to become familiar with their existing health status, their health conditions and behaviors that may place themselves or their baby at risk as well as protective behaviors that may play a role in their health and their newborn's health. All women, whether they are planning to have a baby, deciding whether being a mother is right for them, or beyond their reproductive years, can take steps to improve their health.

Key Strategies for Decreasing Infant Mortality

Improving Maternal Health, Healthcare and Insurance Coverage and Access. The optimal timing to improve maternal health is prior to pregnancy²⁴ Women need access to preventive wellness care and reproductive care prior to pregnancy to effectively reduce risks that can lead to preterm birth or pregnancy complications. Lack of medical insurance before and after pregnancy for uninsured or underinsured women or those eligible for Medicaid, limit the ability to receive care for chronic medical conditions like hypertension and diabetes that can lead to poor infant outcomes and increase the risk of death.

Eliminating Racial Inequities. In Mississippi, Black infants are nearly twice as likely to die as White infants and make up most infant deaths in our state. There are no biological reasons for this stark disparity and reflects long standing effects of social inequities and the impacts of historical and structural racism. Efforts to reduce Mississippi's overall infant mortality rate must address critical social determinants of health including poverty, education and the effects of

²⁴ Interconception Care. https://msdh.ms.gov/msdhsite/_static/44,0,381.html#Care; accessed 1/12/2022

historical, structural, and interpersonal racism and bias on maternal and infant health. Implicit bias training, engaging families and communities for tailored solutions and supporting efforts for diversity, equity and inclusion within healthcare and public health settings are initial steps that can be taken.

Increasing Breastfeeding. Breastmilk can reduce severe complications in preterm babies, reduce the risk of sudden and unexpected infant deaths and improve long-term health across multiple areas from obesity to asthma²⁵ According to the 2019 Mississippi Pregnancy Risk Assessment Monitoring System survey, approximately 70 percent of infants were ever breastfed compared to more than 80 percent in the United States. MSDH has partnerships across the state through the Office of Women, Infants and Children (WIC), with Baby Cafés, and hospitals through the Baby Friendly Hospital Initiative to enhance and support breastfeeding in Mississippi. There are now 21 hospitals designated as ‘Baby Friendly’ in Mississippi demonstrating excellence in breastfeeding support and infant nutrition.

Promoting Smoking Cessation and Reducing Secondhand Smoke Exposure. Smoking cessation is one of the best actions a woman can take to prepare for a healthy pregnancy and to help her baby thrive.²⁶ Resources for health care providers, including tobacco treatment protocols, action steps for clinicians, and tobacco cessation change packages are available on CDC’s Office of Smoking and Health website ([Maternal and Infant Care Settings and Smoking Cessation | Smoking and Tobacco Use | CDC](#)). Additional guidance on tobacco cessation in pregnant woman is available from the U.S. Preventive Services Task Force²⁷ and the American College of Obstetricians and Gynecologists²⁸. Local resources are available through MSDH’s Office of Tobacco Control and the Mississippi Tobacco Quitline.²⁹

²⁵ Breastfeeding. https://msdh.ms.gov/msdhsite/_static/41,0,144.html; accessed 1/12/2022

²⁶ Centers for Disease Control and Prevention. National Center for Chronic Disease Prevention and Health Promotion. Office on Smoking and Health. Maternal and Infant Care Settings and Smoking Cessation. [Maternal and Infant Care Settings and Smoking Cessation | Smoking and Tobacco Use | CDC](#); accessed 2/11/2022

²⁷ U.S. Preventive Services Task Force. Tobacco Smoking Cessation in Adults, Including Pregnant Persons: Interventions. January 19, 2021. [Recommendation: Tobacco Smoking Cessation in Adults, Including Pregnant Persons: Interventions | United States Preventive Services Taskforce \(uspreventiveservicestaskforce.org\)](#); accessed 1/11/2022

²⁸ The American College of Obstetricians and Gynecologists. Tobacco and Nicotine Cessation During Pregnancy. Committee Opinion, No. 807, May 2020. [Tobacco and Nicotine Cessation During Pregnancy | ACOG](#); accessed 1/12/2022

²⁹ Smoking Cessation. https://msdh.ms.gov/msdhsite/_static/44,0,381.html#Care; accessed 1/12/2022

Focusing on Safe Sleep at Every Opportunity. All healthcare providers for pregnant women, parents and children should be discussing safe sleep practices and ensuring that families and caregivers have access to safe sleep environments.³⁰ Hospitals can work with ‘Cribs for Kids’ to implement programs to educate families and provide cribs for those in need. Community leaders, churches, social workers, and childcare providers in Mississippi can increase awareness about, promote and practice safe sleep within their communities.

³⁰ Safe Sleep Environments. https://msdh.ms.gov/msdhsite/_static/41,0,202.html; accessed 1/12/2022

Data Sources for Tables and Figures

All data for figures 1-15 and tables 1-4 were obtained from the Mississippi Statistically Automated Health Resource System (MSTAHRs) and the Mississippi State Department of Health, Public Health Statistics. Data for figures 16-17 were obtained from the Mississippi Pregnancy Risk Assessment Monitoring System, 2016-2019.