MSDH

MISSISSIPPI MATERNAL MORTALITY REPORT

Review of 2017-2021 Deaths

Publication Date: April 2025

2024 Child Death Review Panel Members

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Submitted to:
Chairmen of the Mississippi House Public Health and Human Services Committee and Senate Public Health and Welfare Committee

Report prepared by:
Mississippi State Department of Health, Office of Vital Records and Public Health Statistics and Office of Women's Health, Maternal and Infant Health Bureau with support provided by

Michelle Owens, MD, MS, FACOG Chair and Maternal Fetal Medicine Specialist

Acknowledgements
This report reflects the hard work of the Mississippi Maternal Mortality Review Committee and those who respond directly to maternal loss. Without the work of coroners, medical examiners, law enforcement, emergency medical services, physicians, social service agencies, and countless others, the Maternal Mortality Review Committee would not be able to review these deaths.

The Mississippi State Department of Health acknowledges the families touched by maternal death each year. This report is generated with the goal of preventing these tragic losses. To explore or request data, please check the Mississippi Statistically Automated Health Resource System (MSTAHRS) or submit an online request for MSDH data or public records at:
https://apps.msdh.ms.gov/DataRequestEntry/requestform

A LETTER FROM MSDH EXECUTIVE DIRECTOR AND STATE HEALTH OFFICER

MSDH

Dear Chairman and Colleagues,

The Mississippi State Department of Health (MSDH) is honored to share the 2024 Maternal Mortality Report. This report builds on the important work of the Maternal Mortality Review Committee (MMRC) and includes findings for maternal deaths which occurred from 20I7-2021. The goal of this report is to identify statewide patterns in maternal health and to provide actionable recommendations directed at key stakeholders to prevent maternal mortality and morbidity. Further, this report highlights factors and social determinants of health that play a role in maternal health and contribute 10 the health disparities and inequities observed in Mississippi's maternal health outcomes. This report for deaths occurring from 2017-2021 is especially important, as it informs us of the devastating impact that COVID-19 had on maternal deaths in 2020 and 2021.

MSDH has been humbled at the response to this report and appreciates that it serves as an important vehicle to inform elected officials, policy advocates, community leaders, medical providers, foundations, and the public on approaches that can collectively impact change in the maternal health space.

The MMRC, consisting of professionals from various organizations, disciplines, and backgrounds, met six times in calendar year 2024 to review 54 maternal deaths from 2021. This work, as difficult as it may be, remains critical for improving health outcomes for all women, children, and families. However, the work of the MMRC and the data produced does not impact change in isolation; deliberate and collaborative work to act on recommendations must occur 10 improve health outcomes in Mississippi, especially those for pregnant and post-partum women.

I want to acknowledge the work of the Maternal and Infant Health Bureau (MIHB) staff, who provide the administrative and operational support for the MMRC, and I want to extend my warmest gratitude to the leadership and volunteer members of the MMRC who tirelessly leave no question unasked and no stone unturned in exploring what happened and how these deaths might have been prevented. Most importantly, I want to acknowledge the Mississippi women who lost their lives in 2017-2021 while pregnant or within a year of pregnancy. I extend my heartfelt condolences to their surviving loved ones and am optimistic that once we know better, we will do better.

Sincerely,

Daniel Edney, MD, FACP, FASAM
Executive Director State Health Officer
Mississippi State Department of Health

Fellow Mississippians,

The Maternal Mortality Review Committee (MMRC) is a multidisciplinary group of volunteers who meet several times a year to thoroughly review maternal deaths that occur during pregnancy or within the first year postpartum. Our goal is to assess the medical, social, and behavioral experiences of birthing individuals, identifying not only the circumstances surrounding each death but also the broader influences on their health, their community impact, and the challenges faced when seeking care.

Our committee includes clinicians, members of community and faith-based organizations, social workers, law enforcement, healthcare payors, and other concerned citizens. It has been an honor to serve as Chair of this group, and I am continuously inspired by the dedication, respect, and passion of the committee members and support staff. Without them, this work would not be possible.

This year's report, which includes data from reviews conducted between 2017 and 2021, captures the early years of the COVID-19 pandemic. The combination of a strained healthcare system and the heightened vulnerability of pregnancy during this period had a devastating effect on maternal mortality. Additionally, our findings emphasize the significant contributions of cardiovascular disease, obesity, and mental health disorders to maternal deaths. We continue to observe disparities in outcomes based on race and payor status. It is imperative that concerted efforts are made at the institutional, community, and state levels to reduce these disparate outcomes. We eagerly anticipate the elimination of these disparities.

Most importantly, the committee has determined that the majority of maternal deaths reviewed were preventable. We hope that the recommendations arising from these tragic situations, if implemented, will reduce preventable deaths, improve maternal mortality rates, and help eliminate healthcare disparities. Through this work, we aim to honor the lives lost by closing gaps in care and creating a framework for improving patient and provider education, enhancing community support, improving hospital preparedness, and ensuring appropriate care is available when needed—for every mother, every time.

Sincerely,

Michelle Y. Owens, MD, MS, FACOG
Chair, MS Maternal Mortality Review Committee

EXECUTIVE SUMMARY

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Executive Summary:

Across the state and the globe, maternal mortality is considered an important indicator of the quality of health during pregnancy and the postpartum period. Maternal mortality impact families, communities, and the entire state. From 2021 to 2022, the nation experienced a decrease in maternal mortality (Hoyert, 2023); however, improvements are still needed to further decrease the rates across the United States.

The Mississippi Maternal Mortality Review Committee (MMRC) is tasked with reviewing pregnancy-associated deaths to identify opportunities for improvement and make recommendations to prevent future deaths. Probable maternal deaths (also known as pregnancy-associated deaths) are identified through a surveillance process and referred to the MMRC for extensive case review, follow-up, and analysis. During the review, the MMRC determines whether the death was directly related to the pregnancy (pregnancy-related), not pregnancy related (pregnancy-associated, but not related), or unable to determine (pregnancy-associated, but unable to determine relatedness).

Key Points:

- During the five-year period (2017-2021), 83% of pregnancy-related deaths were deemed preventable.
- From 2017-2021, a total of 202 pregnancy-associated deaths were reviewed in which 38% were identified as pregnancy-related deaths.
- The major cause of pregnancy-related deaths from 2017-2021 was cardiovascular-related conditions representing 14% of these deaths.

Summary of Key High Impact MMRC Recommendations (2021 Reviews):

- The state should expand Medicaid. Designations for women and children should be considered with some of the money allocated to resources for maternal and child health populations
- All health providers should be educated about preeclampsia, blood pressure monitoring, hypertension, and related maternal warning signs/symptoms.
- There should be universal mental health screenings with resources available to providers for follow-up with knowledge on how, when and where to refer patients.
- All providers should be trained in cultural competency and how culture impacts the way they communicate with families.
- Providers should elevate patients with hypertensive/cardiac conditions in pregnancy to be seen within a week postpartum. They should have appointments set prior to discharge.
- Emergency Room Departments across should increase awareness for pregnancy and pregnancy-related complications.
- Community organizations may provide resources to educate men and women on the identification of unhealthy relationships, interpersonal violence (IPV), emotional/mental abuse, etc.

- Communities, medical, and public health professionals should communicate a sense of urgency around urgent maternal warning signs.
- Patients/Families should have access to [and education for] remote blood pressure monitoring systems/services and equipment, especially in rural areas within the state. This enhances the care for pregnancy and post-partum women who are hypertensive.

DEFINITIONS & TERMS

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Definitions & Terms

Cause of Death: On a death certificate, "cause of death" includes the sequence of medical conditions that had the greatest impact in causing death and the approximate time intervals between the onset of each condition and death. The underlying cause of death is used for tabulating death counts. The immediate cause is the final disease, injury, or complication directly causing the death. The cause of death and underlying causes listed on the death certificate are coded by the National Center for Health Statistics (NCHS) according to the appropriate revision of the *International Classification of Diseases* (ICD. Effective with deaths occurring in 1999, the United States began using the 10th revision of ICD (ICD–10).

Death Certificate: The death certificate is a permanent record of the fact of death. State law specifies the required time frame for completing and filing the death certificate. The death certificate provides important personal information about the decedent and about the circumstances and cause of death. This information has many uses related to the settlement of the estate and provides family members with closure, peace of mind, and documentation of the cause of death. The death certificate collects demographic information on the decedent such as sex, age race, ethnicity and medical certification information which includes date and time of death, cause and manner of death. The death certificate is a legal record and has legal safeguards protecting the confidentiality of the record.

The registration and storage of deaths is supported by state laws and regulations. Mississippi uses an electronic death registration system (EDRS), which is a secure web-based system for registering deaths electronically. This system is designed to simplify the data collection process and enhance communication between medical certifiers, medical examiners and coroners, funeral directors, as they work together to register deaths. The EDRS follows the 2003 U.S. Standard Death Certificate in content and structure and has built-in edits, prompts, and alerts to improve data quality. The U.S. standard certificate is revised periodically to ensure that the data collected relates to current and anticipated needs and is comparable with data from other states.

The death certificate is the source for local, state, and national mortality statistics. Mississippi has a contract with NCHS that allows the federal government to use information from that state's records to produce national vital statistics.

Manner of Death: On a death certificate, "manner of death" is important: 1) in determining accurate causes of death, 2) in processing insurance claims, and 3) in statistical studies of injuries and death. Choices are natural, homicide, accident, pending investigation, suicide and could not be determined. "Could not be determined" should only be used when it is impossible to determine the manner of death.

Maternal Death: Defined by the World Health Organization as "the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and the site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes." These deaths do not include all

deaths occurring to pregnant or recently pregnant women, but only deaths with the underlying cause of death assigned to International Statistical Classification of Diseases, 10th Revision code numbers A34, O00–O95, and O98–O99.

Maternal Mortality Rate: the number of maternal deaths per 100,000 live births.

Natural and External Causes of Death: Natural death is due to internal factors of the body such as heart disease or cancer. An external cause of injury may be classified to Accidents (V01-X59), Intentional self-harm (X60-X84), Assault (X85-Y09), Event of undetermined intent (Y10-Y34), Legal intervention and operations of war (Y35-Y36), Complications of medical and surgical care (Y40-Y84), and Sequela of external causes (Y85-Y89). When unspecified, assume all external cause one-term entities to be accidental unless the External Causes of Injury Index provides otherwise.

Potential Maternal and Pregnancy Deaths: Any death certificate with an indication of pregnancy at or within one year of death or matching a birth or fetal death certificate within one year of death, or with an underlying obstetric or pregnancy-related ICD-10 underlying cause of death code of A34, O00-O95, O98-O99.

Pregnancy-Associated Deaths: All deaths that occur during pregnancy or within one year of the end of pregnancy regardless of the cause.

Pregnancy-Related Deaths: Deaths occurring during pregnancy or within one year of the end of pregnancy from a chain of events initiated by pregnancy, or the aggravation of an unrelated condition by the physiological effects of pregnancy.

Pregnancy-Related Mortality Ratio: The estimate of the number of pregnancy-related deaths per 100,000 live births.

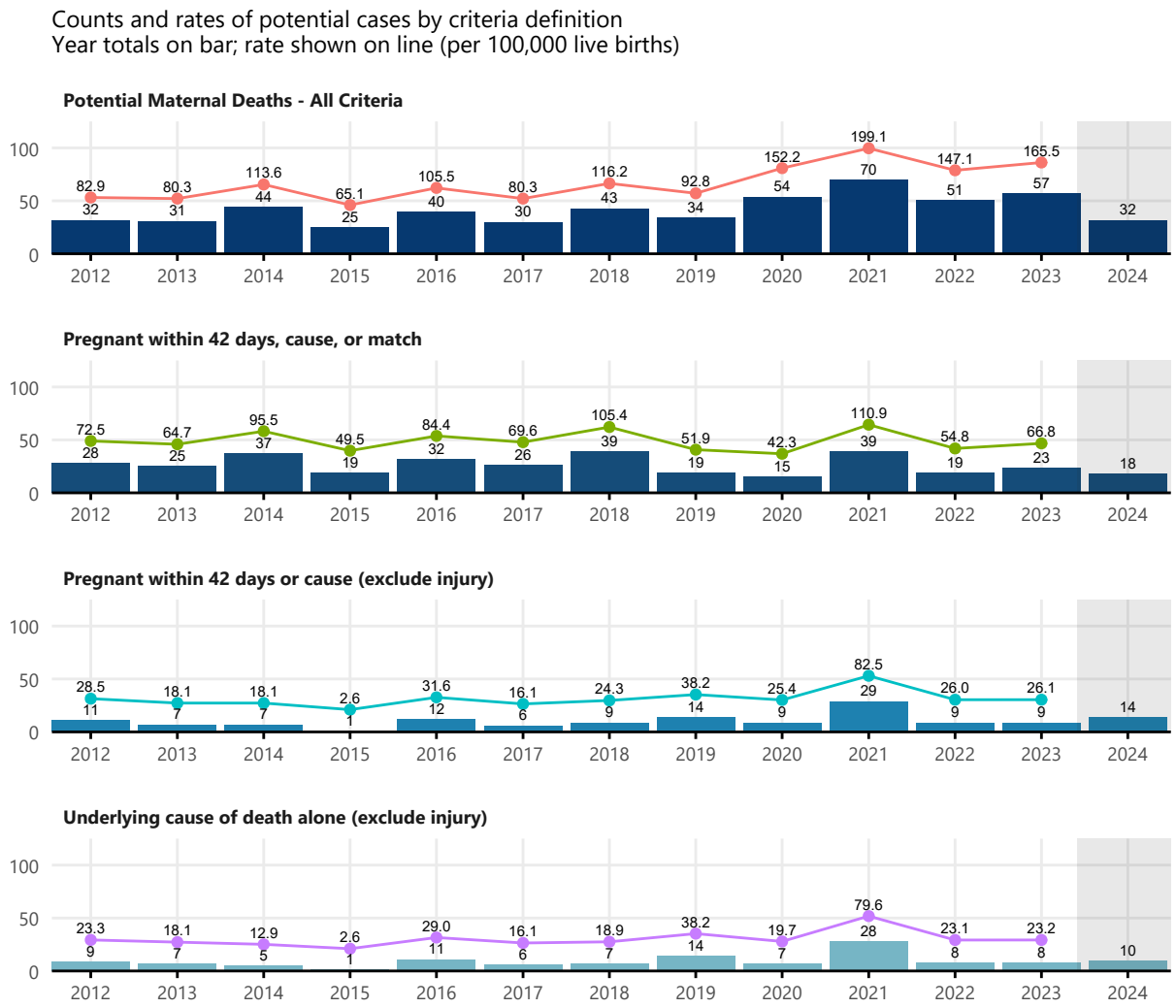
DATA

Potential Maternal and Pregnancy Mortality, Provisional 2012-2024

MSDH Office of Vital Records and Public Health Statistics, 1/22/2025

- This report defines "potential maternal and pregnancy deaths" as any death certificate with an indication of pregnancy at or within one year of death, OR matching a birth or fetal death certificate within one year of death, OR with an underlying obstetric or pregnancy-related ICD-10 underlying cause of death code of A34, O00-O95, O98-O99.
- Other definitions of maternal deaths shown below include:
  - An indication of pregnancy at death or within 42 days of death, an underlying obstetric or pregnancy-related cause of death, OR matching a birth or fetal death certificate (within 42 days of death)
  - An indication of pregnancy at or within 42 days of death OR an underlying obstetric or pregnancy-related cause of death (excluding injury causes)
  - An underlying obstetric or pregnancy-related cause of death (excluding injury causes)
- Counts and definitions shown below may not be comparable to maternal deaths reviewed by maternal mortality review committees or other sources.
- Counts and corresponding rates for less than 20 events should be interpreted with caution.

Figure 1: Potential Maternal Deaths, MS Residents, 2012-2024



NOTE: Case counts may be incomplete and subject to change; shaded region more likely to be incomplete.

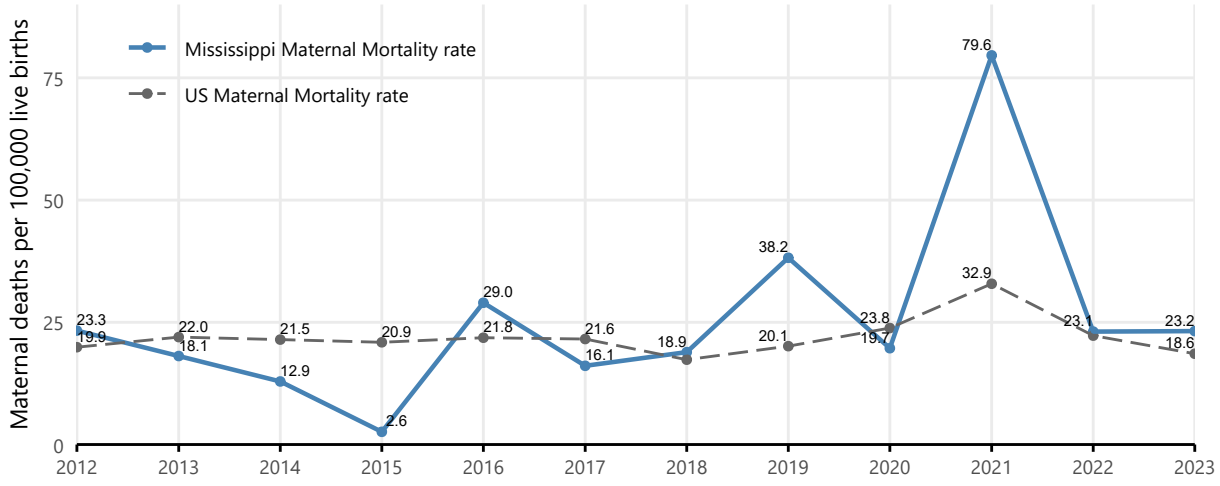
Comparing Mississippi to US Maternal Mortality

Maternal mortality may be reviewed at the national level with either the National Vital Statistics System (NVSS) or the Pregnancy Mortality Surveillance System (PMSS). In-depth reviews of maternal mortality at the state and local level are provided by Maternal Mortality Review Committees (MMRC). Each system provides details of maternal and pregnancy related mortality, although these systems may not be comparable.

- National Vital Statistics System (NVSS) reviews only death records with underlying causes of death related to maternal death for determining national trends and characteristics.
- Pregnancy Mortality Surveillance System (PMSS) reviews death records linked to birth/fetal records to determine national trends and connection between pregnancy and death.
- Maternal Mortality Review Committees (MMRCs) review death records, linked birth and fetal records, medical records, autopsies, informant interviews, and further abstracted details to determine the connection between pregnancy and death.

To compare Mississippi to the US, the maternal mortality rate is shown below using NVSS data and comparable death certificate data from the Office of Vital Records and Public Health Statistics. Mississippi maternal mortality matches the previous definition of "underlying cause of death alone (exclude injury)" (Figure 1).

Figure 2: Comparing Mississippi and United States Maternal Mortality, 2012-2023



SOURCES: CDC WONDER; MSDH Office of Vital Records and Public Health Statistics

Table 1: Mississippi and United States Maternal Mortality, 2012-2023

Year	Mississippi Maternal Mortality Rate	US Maternal Mortality Rate
2012	23.3	19.9
2013	18.1	22.0
2014	12.9	21.5
2015	2.6	20.9
2016	29.0	21.8
2017	16.1	21.6
2018	18.9	17.4
2019	38.2	20.1
2020	19.7	23.8
2021	79.6	32.9
2022	23.1	22.3
2023	23.2	18.6

[1] Includes deaths with pregnancy within 42 days of death or with an underlying cause of death of A34, O00-O95, O98-O99
[2] Rate calculated as maternal deaths per 100,000 live births

Table 2: Potential Maternal Deaths in Mississippi, 2012-2023

	All Potential Deaths[1]			Pregnant within 42 days, birth match, or cause[2]			Pregnant within 42 days, or cause[3]			Underlying cause of death alone		
Year	Count	Rate[4]	Rate, 3-yr avg.[5]	Count	Rate[4]	Rate, 3-yr avg.[5]	Count	Rate[4]	Rate, 3-yr avg.[5]	Count	Rate[4]	Rate, 3-yr avg.[5]
2023	57	165.5	170.7	23	66.8	77.7	9	26.1	45.1	8	23.2	42.2
2022	51	147.1	166.2	19	54.8	69.3	9	26.0	44.6	8	23.1	40.8
2021	70	199.1	147.3	39	110.9	68.0	29	82.5	48.5	28	79.6	45.7
2020	54	152.2	120.0	15	42.3	66.9	9	25.4	29.3	7	19.7	25.7
2019	34	92.8	96.4	19	51.9	75.7	14	38.2	26.1	14	38.2	24.3
2018	43	116.2	100.6	39	105.4	86.4	9	24.3	24.0	7	18.9	21.4
2017	30	80.3	83.6	26	69.6	67.7	6	16.1	16.7	6	16.1	15.8
2016	40	105.5	94.7	32	84.4	76.5	12	31.6	17.4	11	29.0	14.8
2015	25	65.1	86.4	19	49.5	70.0	1	2.6	13.0	1	2.6	11.2
2014	44	113.6	92.3	37	95.5	77.6	7	18.1	21.6	5	12.9	18.1
2013	31	80.3	–	25	64.7	–	7	18.1	–	7	18.1	–
2012	32	82.9	–	28	72.5	–	11	28.5	–	9	23.3	–

[1] Includes all deaths with pregnancy indicated within one year of death or other defined criteria

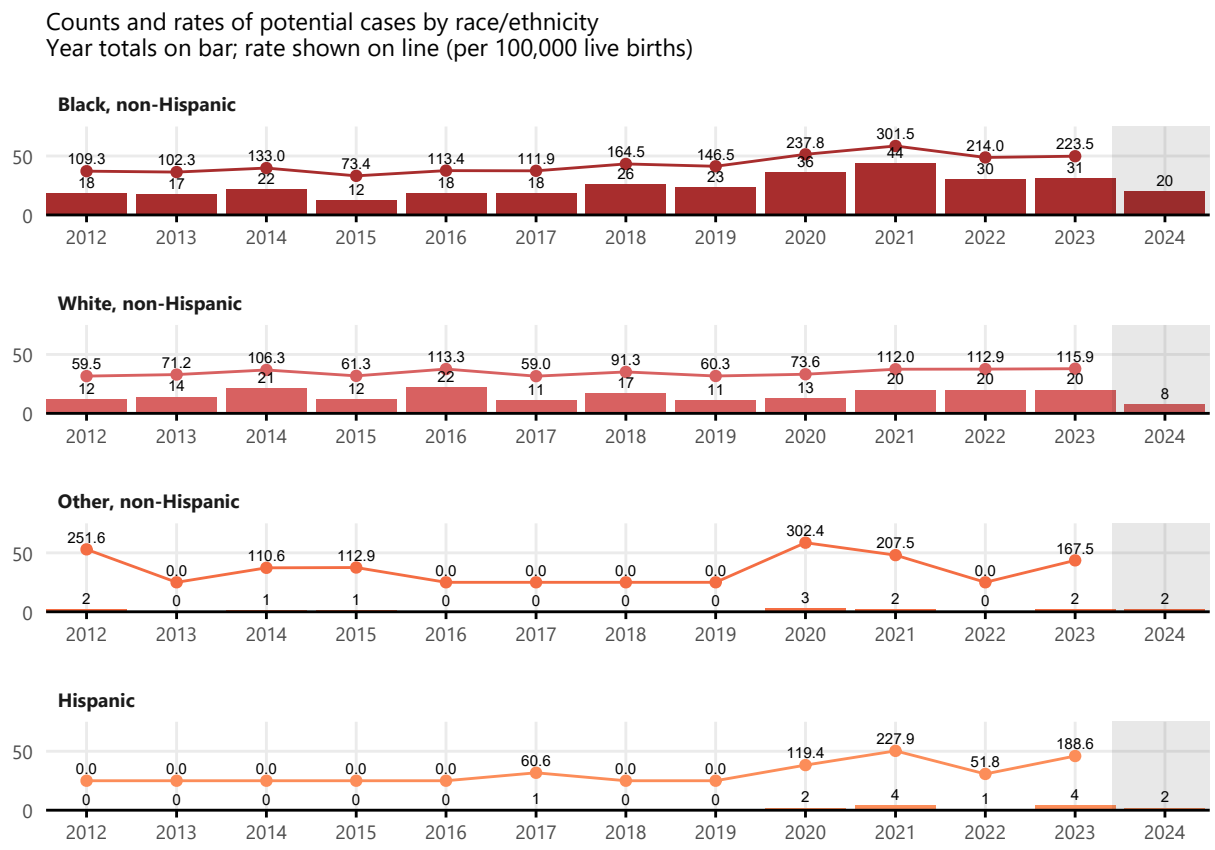
[2] Includes deaths with pregnancy within 42 days of death, matching birth or fetal death certificate (within 42 days of death), or with an underlying cause of death of A34, O00-O95, O98-O99

[3] Includes deaths with pregnancy within 42 days of death, or with an underlying cause of death of A34, O00-O95, O98-O99

[4] Rate calculated potential maternal deaths per 100,000 live births

[5] 3-year rolling rate calculated as total aggregate of listed year and previous two years

Figure 3: Potential Maternal Deaths in Mississippi by Race/Ethnicity



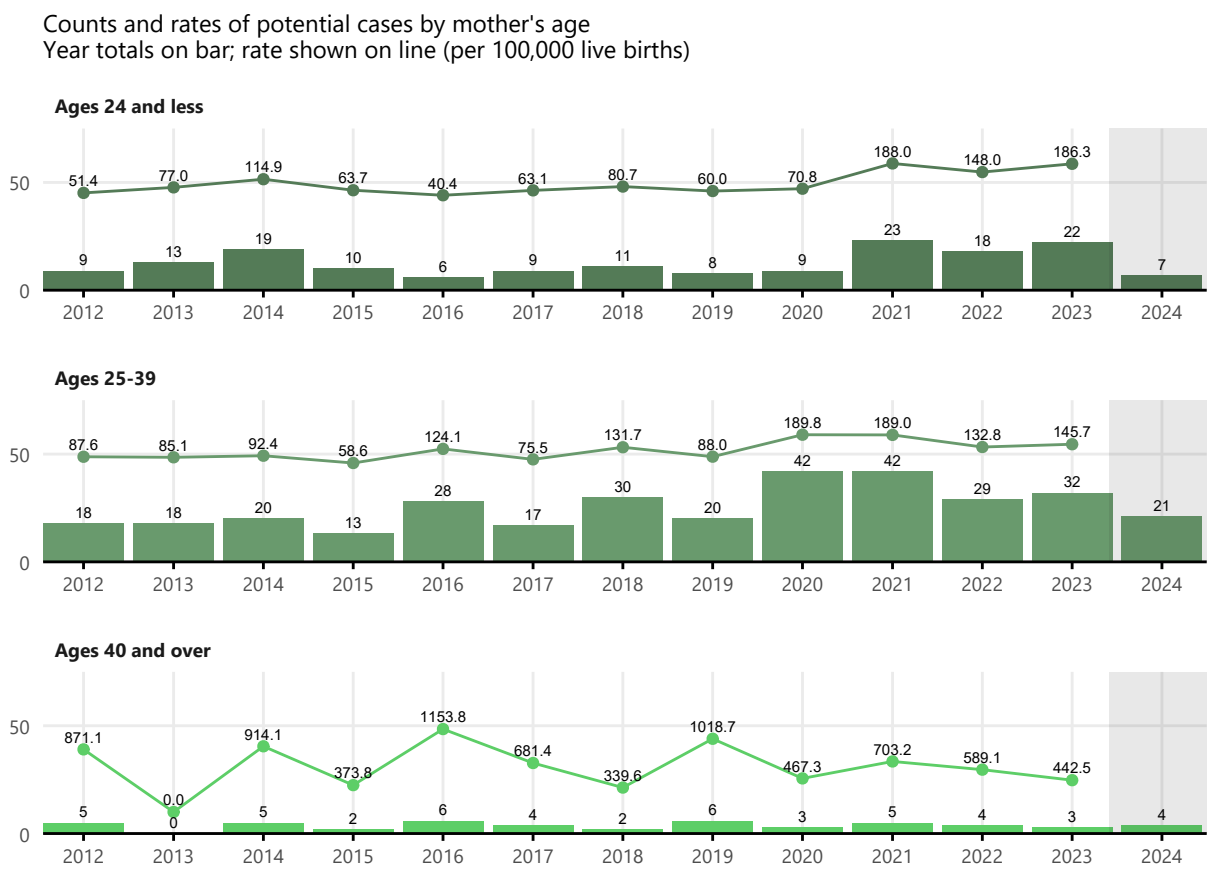
NOTE: Case counts may be incomplete and subject to change; shaded region more likely to be incomplete.

Table 3: Potential Maternal Deaths by Race/Ethnicity in Mississippi, All Criteria, 2012-2023

	All race/ethnicities		Black, NH		White, NH		Other, NH		Hispanic	
Year	Count	Rate	Count	Rate	Count	Rate	Count	Rate	Count	Rate
2023	**57**	**165.5**	31	223.5	20	115.9	2	167.5	4	188.6
2022	**51**	**147.1**	30	214.0	20	112.9	0	0.0	1	51.8
2021	**70**	**199.1**	44	301.5	20	112.0	2	207.5	4	227.9
2020	**54**	**152.2**	36	237.8	13	73.6	3	302.4	2	119.4
2019	**34**	**92.8**	23	146.5	11	60.3	0	0.0	0	0.0
2018	**43**	**116.2**	26	164.5	17	91.3	0	0.0	0	0.0
2017	**30**	**80.3**	18	111.9	11	59.0	0	0.0	1	60.6
2016	**40**	**105.5**	18	113.4	22	113.3	0	0.0	0	0.0
2015	**25**	**65.1**	12	73.4	12	61.3	1	112.9	0	0.0
2014	**44**	**113.6**	22	133.0	21	106.3	1	110.6	0	0.0
2013	**31**	**80.3**	17	102.3	14	71.2	0	0.0	0	0.0
2012	**32**	**82.9**	18	109.3	12	59.5	2	251.6	0	0.0

Note:
Shaded colors correspond to race/ethnicity-specific rates higher than the yearly rate for all race/ethnicities;
Counts and corresponding rates for an event size of less than 20 should be interpreted with caution;
Rate calculated as potential maternal deaths per 100,000 live births

Figure 4: Potential Maternal Deaths in Mississippi by Age Group



NOTE: Case counts may be incomplete and subject to change; shaded region more likely to be incomplete.

Table 4: Potential Maternal Deaths by Age Groups in Mississippi, All Criteria, 2012-2023

	All ages		Ages 24 and less		Ages 25 to 39		Ages 40 and over	
Year	Count	Rate	Count	Rate	Count	Rate	Count	Rate
2023	**57**	**165.5**	22	186.3	32	145.7	3	442.5
2022	**51**	**147.1**	18	148.0	29	132.8	4	589.1
2021	**70**	**199.1**	23	188.0	42	189.0	5	703.2
2020	**54**	**152.2**	9	70.8	42	189.8	3	467.3
2019	**34**	**92.8**	8	60.0	20	88.0	6	1018.7
2018	**43**	**116.2**	11	80.7	30	131.7	2	339.6
2017	**30**	**80.3**	9	63.1	17	75.5	4	681.4
2016	**40**	**105.5**	6	40.4	28	124.1	6	1153.8
2015	**25**	**65.1**	10	63.7	13	58.6	2	373.8
2014	**44**	**113.6**	19	114.9	20	92.4	5	914.1
2013	**31**	**80.3**	13	77.0	18	85.1	0	0.0
2012	**32**	**82.9**	9	51.4	18	87.6	5	871.1

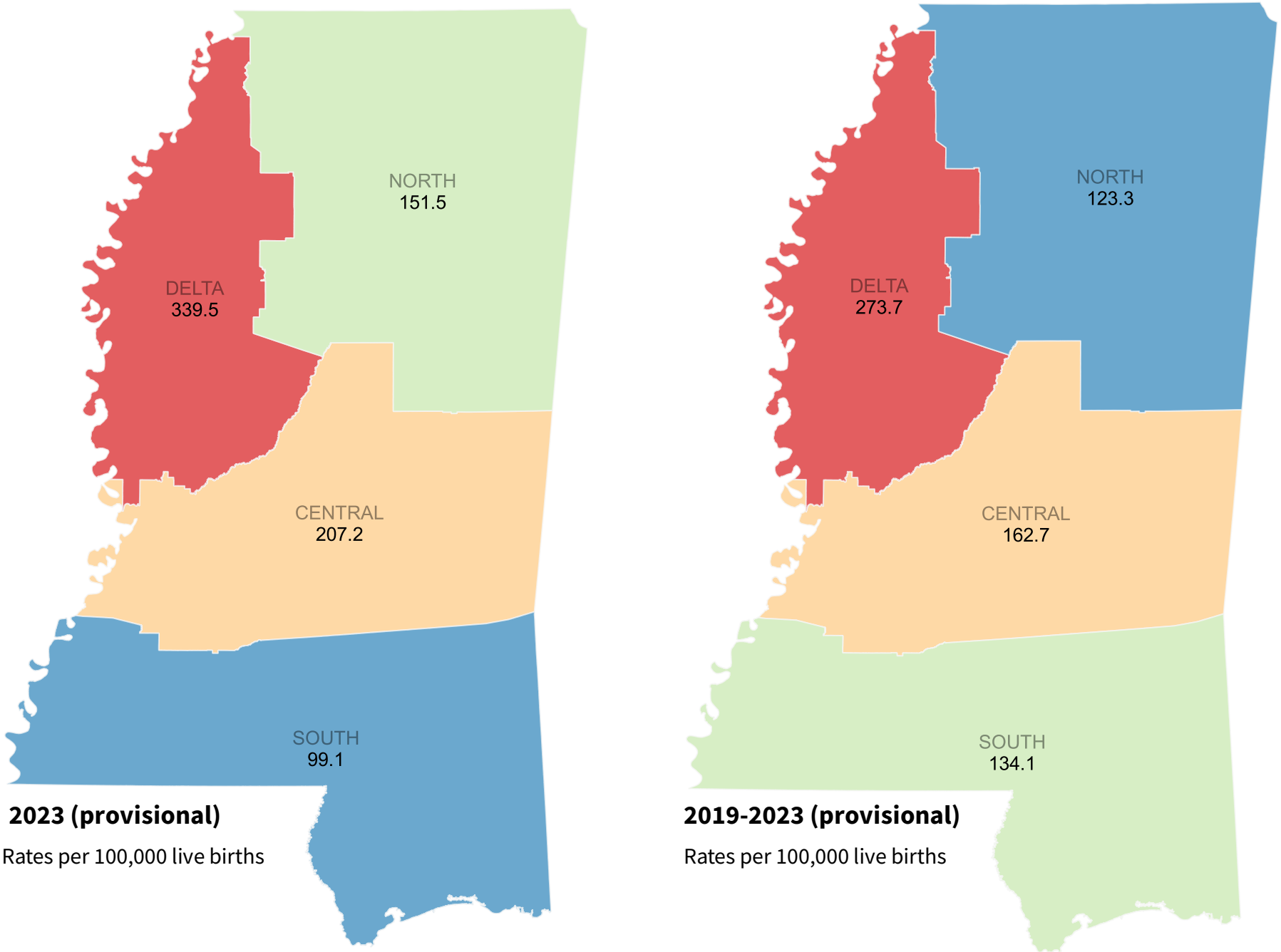
Note:
Shaded colors correspond to age-specific rates higher than the yearly rate for all ages;
Counts and corresponding rates for an event size of less than 20 should be interpreted with caution;
Rate calculated as potential maternal deaths per 100,000 live births

Table 5: Top 15 Leading Causes of Potential Maternal Deaths in Mississippi, 2021-2023

	All		Black, NH		White, NH		Other, NH		Hispanic	
Cause Group	Count	Rate	Count	Rate	Count	Rate	Count	Rate	Count	Rate
Indirect obstetric deaths	28	26.8	19	44.7	6	11.4	1	31.6	2	34.4
Accidental poisoning by and exposure to drugs and other biological substances	26	24.9	5	11.8	21	39.8	0	0.0	0	0.0
Assault (homicide) by discharge of firearms	25	24.0	21	49.4	4	7.6	0	0.0	0	0.0
Other deaths related to pregnancy, childbirth and the puerperium	23	22.1	15	35.3	5	9.5	1	31.6	2	34.4
Other and unspecified motor vehicle accidents	18	17.3	6	14.1	10	18.9	1	31.6	1	17.2
All other direct obstetric causes	8	7.7	5	11.8	2	3.8	1	31.6	0	0.0
Occupant of car, pickup truck or van involved in collision with other motor vehicle	6	5.8	4	9.4	1	1.9	0	0.0	1	17.2
All other and unspecified viral diseases	3	2.9	3	7.1	0	0.0	0	0.0	0	0.0
Eclampsia and pre-eclampsia	3	2.9	2	4.7	0	0.0	0	0.0	1	17.2
Occupant of motor vehicle involved in noncollision accident	3	2.9	0	0.0	3	5.7	0	0.0	0	0.0
Intentional self-harm (suicide) by discharge of firearms	3	2.9	1	2.4	2	3.8	0	0.0	0	0.0
Obstetric embolism	2	1.9	2	4.7	0	0.0	0	0.0	0	0.0
Other complications predominately related to the puerperium	2	1.9	1	2.4	1	1.9	0	0.0	0	0.0
Occupant of motor vehicle involved in collision with other (non-motorized) road vehicle, streetcar, animal or pedestrian	2	1.9	2	4.7	0	0.0	0	0.0	0	0.0
Septicemia	1	1.0	1	2.4	0	0.0	0	0.0	0	0.0

Note:
Cause groups based on the National Center for Health Statistics 358 mortality cause groupings;
Counts and corresponding rates for an event size of less than 20 should be interpreted with caution;
Rate calculated as potential maternal deaths per 100,000 live births

Potential Maternal and Pregnancy Associated Mortality, 2019-2023 (provisional) Rates per 100,000 births



This map defines “potential maternal deaths” as any death certificate with an indication of pregnancy at or within one year of death, OR matching a birth or fetal death certificate within one year of death, OR with an underlying obstetric or pregnancy-related ICD-10 underlying cause of death code of A34, O00-O95, O98-O99.

INTRODUCTION & BACKGROUND

MSDH

Introduction:

The Mississippi Maternal Mortality Review Committee (MMRC) was established in 2017 following passage of House Bill 494, which required the formal review of maternal deaths in Mississippi and secured protections for the confidentiality of the process. The intent of the legislation is to foster the reduction of maternal mortality and morbidity in Mississippi and to improve the health status of pregnant and postpartum women. The review of these fatalities provides insight on factors that lead to the death, trends and patterns, increases or decreases in the number of causes of death, and gaps in systems and policies that hinder the safety and well-being of pregnant and postpartum women. Through the review process, the MMRC develops recommendations on how to most effectively direct state and other resources to decrease maternal deaths in Mississippi.

The work of the MMRC:

- Facilitates an understanding of the drivers of maternal mortality and complications of pregnancy and better understand the associated disparities.
- Determines what interventions at patient, provider, facility, system, and community levels will have the most effect.
- Informs the implementation of initiatives in the right places for families and communities who need them most.

The MMRC was developed with guidance from the Centers for Disease Control and Prevention's (CDC) Division of Reproductive Health and modeled after well-established review committees in the United States. The committee includes representation from a broad range of physicians and nurses from multiple specialties (Obstetrics & Gynecology, Cardiology, Pulmonary Medicine, Anesthesiology, Maternal-Fetal Medicine, Public Health), community leaders, and other health/safety-related professionals who extensively review maternal deaths to identify opportunities for prevention. This report provides a description of the MMRC review process, statistics, findings from the MMRC, and recommendations for federal, state, and local government, healthcare systems/providers, communities and/or organizations, employers, regulatory organizations, and patients and families.

Maternal Mortality Review Process:

The Mississippi Maternal Mortality Review Committee (MMRC) is tasked with reviewing maternal deaths to identify opportunities for improvement and make recommendations to prevent future deaths. Probable maternal deaths (also known as pregnancy-associated deaths) are identified through a surveillance process and referred to the MMRC for extensive case review, follow-up, and analysis. Deaths due to automobile or transportation-related accidents are excluded from review.

To identify pregnancy-associated deaths that occurred in Mississippi (by residence), potential maternal deaths are first identified via the state Office of Vital Records. Pregnancy-associated deaths include any death certificate with an indication of pregnancy at or within one year of

death and/or matching a birth or fetal death certificate within one year of death, or with an underlying obstetric or pregnancy-related ICD-10 underlying cause of death code of A34, O00-O95, O98-O99. Each identified death certificate is evaluated for possible errors. If found not to be pregnancy-associated, these are removed, thus are not counted as a maternal death. Non-Mississippi resident pregnancy-associated deaths are also excluded from MMRC review.

After all pregnancy-associated deaths are identified, records pertinent to the pregnancy and maternal death are abstracted. Relevant records for review include prenatal records, hospital and emergency room records, medical transport records (if applicable), mental health records, coroner and autopsy reports, law enforcement reports, family interviews, news reports, and obituaries. A Community Vital Signs (CVS) report is also generated for each pregnancy-associated death. The CVS provides a synopsis of social determinants of health (SDOH) within the decedent's community, county, and/or neighborhood. Additionally, informant interviews are attempted and offered for every death reviewed. The informant interview is a process by which a trained interviewer engages with a surviving family member or close collateral contact of the decedent to gather more information about the decedent before she died, her interests, experiences, and encounters with healthcare and other providers. These interviews better inform the committee of potential precipitating and contributing factors to a woman's death, thereby supporting more tailored recommendations for preventing future poor maternal outcomes and deaths.

Once pregnancy-associated death cases have been selected for review, the MMRC has a responsibility to review the cases with all the de-identified information that is available to them for the primary purpose of determining whether a death was pregnancy-related, preventable, and if so, the recommendations for prevention or intervention to prevent future maternal deaths. The MMRC must assess and analyze each case and, when appropriate, make recommendations for improvements to laws, policies and practices which will support the safety of pregnant and post-partum women and prevent their deaths.

The Mississippi Maternal Mortality Review Committee (MMRC) uses the procedures from the CDC's Maternal Mortality Review Committee Decision Form to guide its evaluation of all deaths at committee meetings. In the maternal mortality review process, the committee seeks to answer five specific questions:

1. What was the cause of death?
2. Was the death "pregnancy-related"?
3. Was the death preventable and/or was there some chance to alter the outcome?
4. What were the contributing factors to the death?
5. What are the MMRC's recommendations for the contributing factors?

According to the MMRC process, members decide whether the death is pregnancy-related if at least one the following conditions are met:

- The death occurred during pregnancy or within one year of the end of pregnancy from a pregnancy complication.
- A chain of events initiated by pregnancy occurred.
- The aggravation of an unrelated condition caused the death due to the physiologic effects of pregnancy.

For deaths determined to be pregnancy-related, the committee determines if the death was preventable and if there was at least some chance, or a good chance, to alter the outcome. For the pregnancy-related deaths which are considered preventable, the committee also reviews potential contributing factors of the death(s). Recommendations are then generated by the MMRC aimed at preventing additional maternal deaths in Mississippi.

Purpose and Data Sources:

This annual report provides an overview of statistics and data related to maternal deaths, as well as the cases reviewed by the MMRC and its recommendations for prevention. This report is compiled using Mississippi Vital Statistics and Maternal Mortality Review Information Application (MMRIA). MMRIA is a CDC-designed and maintained web-based, secure data system, standardized and designed to support MMRC processes. Its primary purpose is to serve as a repository of medical and non-medical information needed for MMRC case review. Its secondary purpose is to standardize maternal mortality data collection so that it can be used for surveillance, monitoring, and analysis. MMRIA is only accessible to those granted secure access by CDC, charged with duties exclusive to MMRC administrative operations at a state or jurisdictional level.

The remainder of this report refers to pregnancy-related deaths which occurred from 2017-2021 as reviewed and determined by the MMRC.

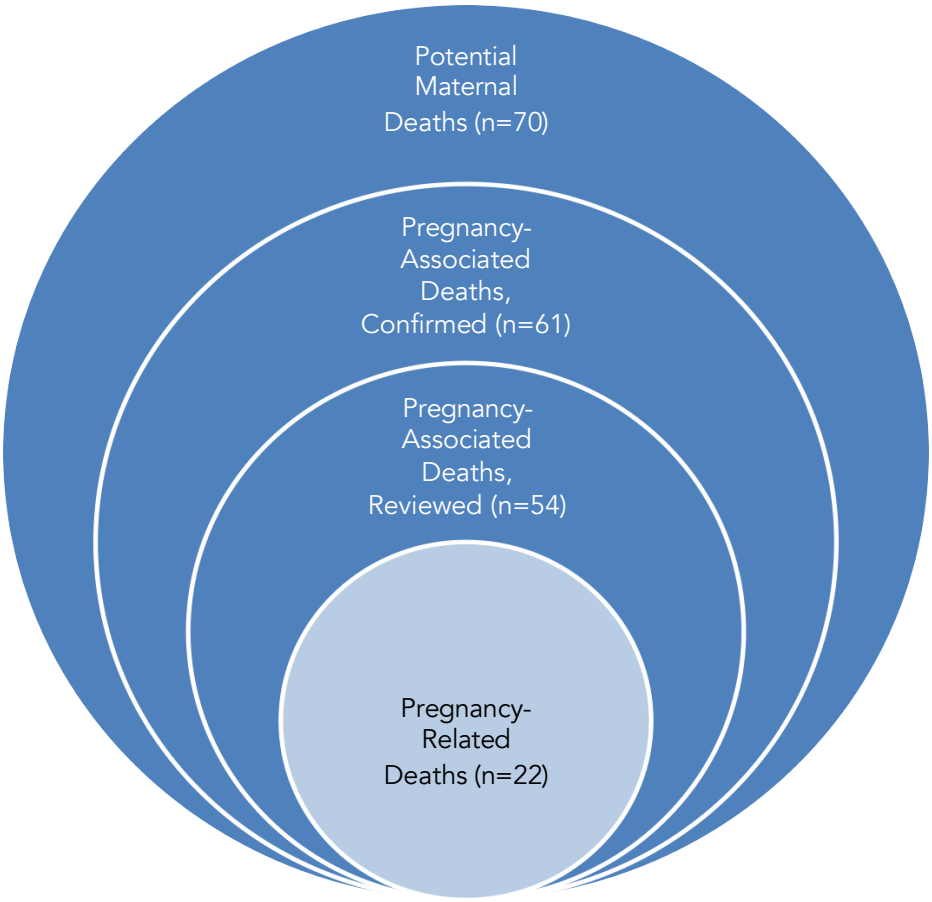
DISCLAIMER: Any pregnancy-associated/maternal death that was certified and/or confirmed after the MMRC's record abstraction processes were completed ARE NOT reflected in this report.

FINDINGS

FINDINGS

Of the 70 **potential** maternal deaths that occurred in 2021 identified by the MSDH Office of Vital Records and Public Health Statistics, 61 were confirmed to be **pregnancy-associated**. Of those, 54 (88%) were reviewed by the MMRC across six meetings in calendar year 2024. The remaining 7 (11%) were excluded from the review due to the deaths being attributed to motor- vehicle and/or related accidents. Of the 54 cases reviewed, 22 (36%) were deemed by the MMRC to be **pregnancy-related. For the purpose of this report, the findings of the 2021 pregnancy-related deaths are combined with the total number of pregnancy-related deaths from 2017-2020 (n=55).** The remainder of this report is based on the findings of 77 pregnancy related deaths which occurred from 2017-2021, all of which were reviewed and determined by the MMRC.

Figure 5 : Relationship between potential maternal deaths, pregnancy-associated deaths, and pregnancy-related deaths, 2021 Mississippi female resident deaths



Source: MSDH Office of Vital Statistics, MMRIA.

Race/Ethnicity and Age

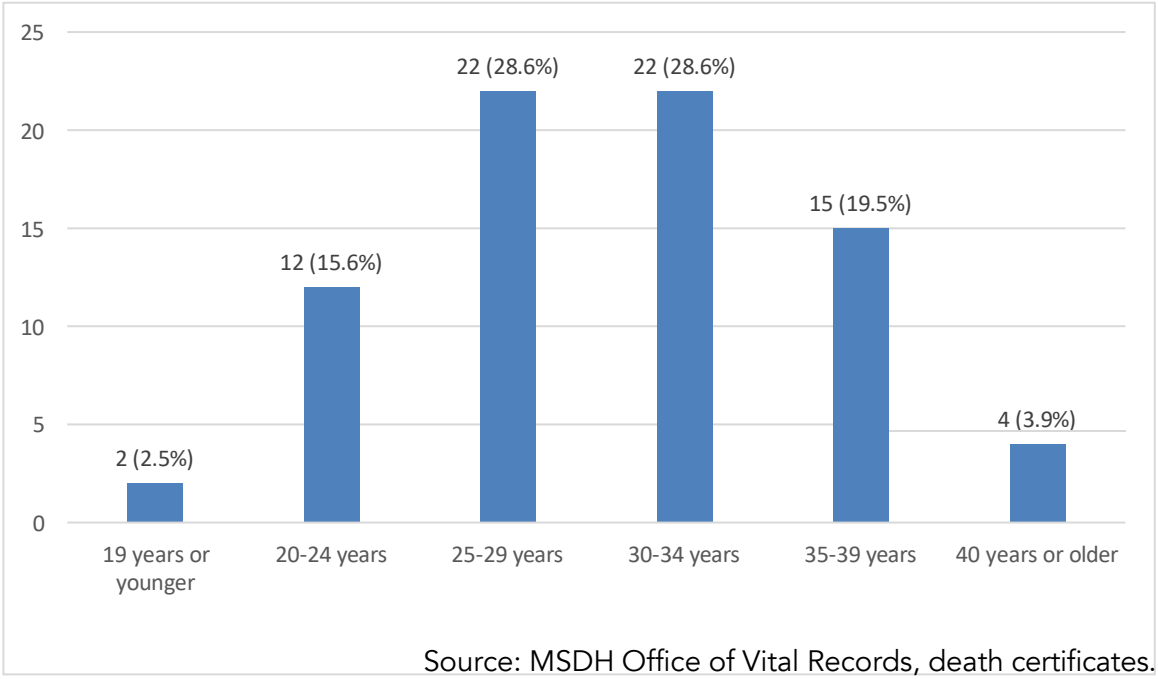
Of the 77 pregnancy-related deaths, the largest number occurred among women ages 25-34 years old (combined, n=44, 57%), followed by women ages 35-39 (n=15, 19%), women ages 20-24 (n=12, 16%), women over 40 (n=4, 5%), and women 19 or younger (n=2, 3%). Among the 77 pregnancy-related deaths occurring from 2017-2021, 60 (77.9%) were Black, Non-Hispanic, 13 (16.9%) were White, Non-Hispanic, 1 (1.3%) was Hispanic, All Races, and 3 (3.9%) were Other, Non-Hispanic or Race Unknown.

Table 6: Pregnancy-related deaths, 2017-2021 Mississippi female resident deaths

	2017-2021 Total	
	Count	Percentage
Total	77	100.0%
Age (years)		
19 years or younger	2	2.5%
20-24 years	12	15.6%
25-29 years	22	28.6%
30-34 years	22	28.6%
35-39 years	15	19.5%
40 years or older	4	5.2%
Race/Ethnicity		
Black, non-Hispanic	60	77.9%
White, non-Hispanic	13	16.9%
Other or Unknown, non-Hispanic	1	1.3%
Hispanic, all races	3	3.9%

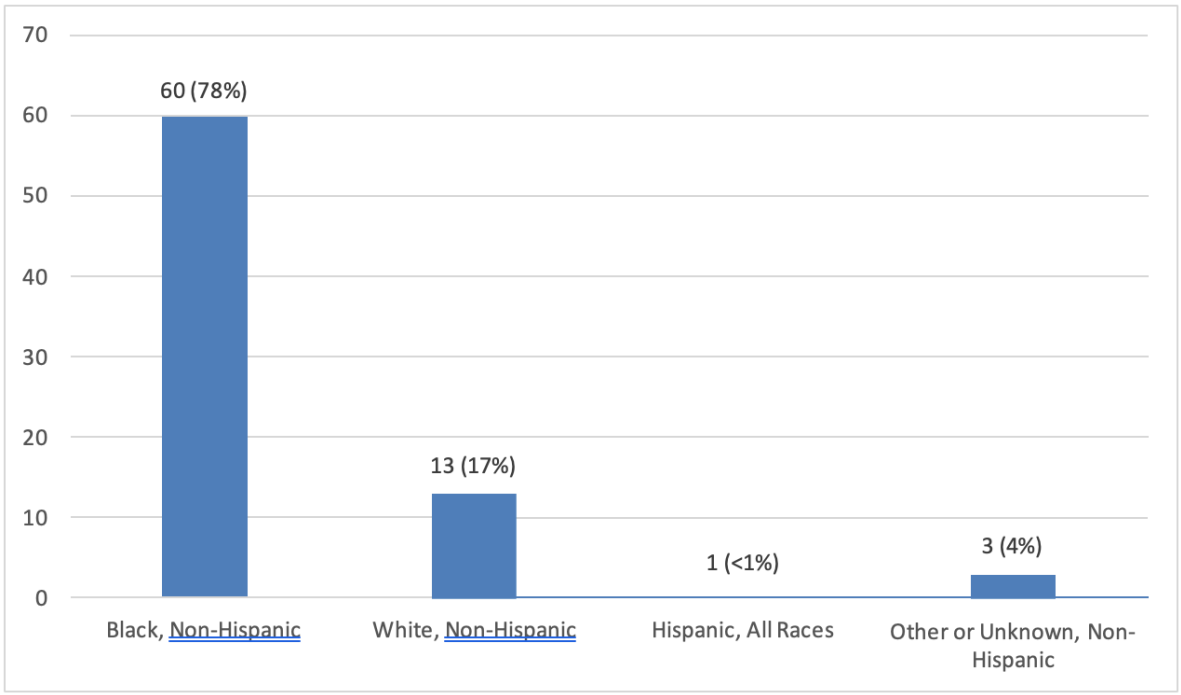
Source: MSDH Office of Vital Records, death certificates.

Figure 6 : Pregnancy-related deaths by age, 2017-2021 Mississippi female resident deaths



Source: MSDH Office of Vital Records, death certificates.

Figure 7 : Pregnancy-related deaths by age, 2017-2021 Mississippi female resident deaths



Source: MSDH Office of Vital Records, death certificates.

Setting of Death

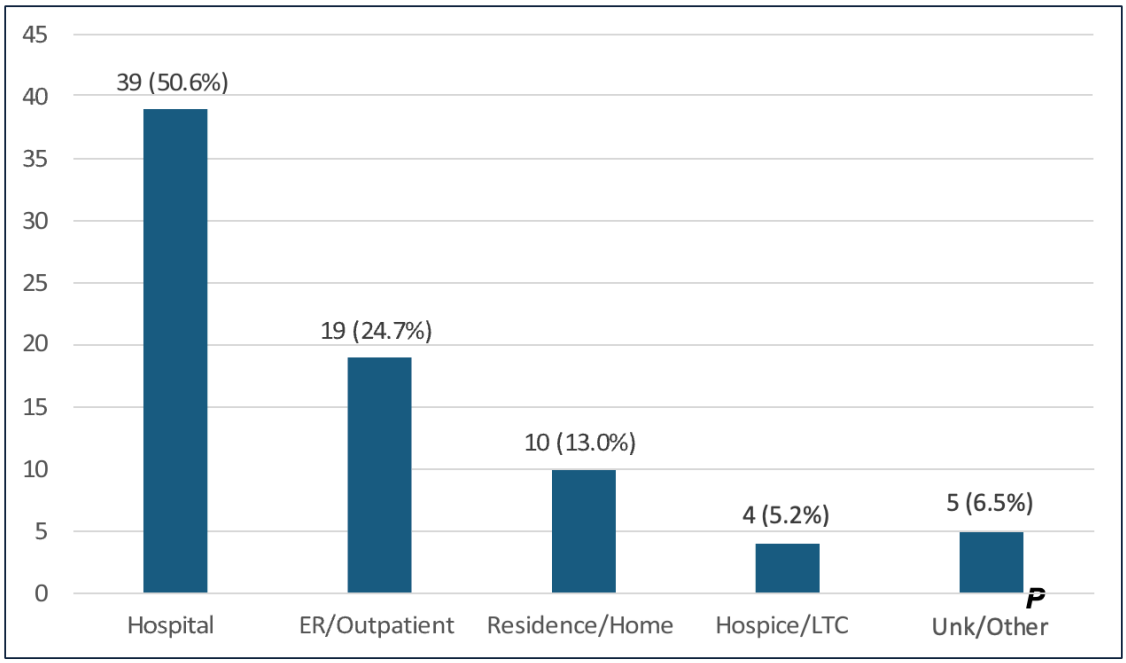
Among the 77 pregnancy-related deaths occurring from 2017-2021, as indicated on the death certificate, 39 (50.6%) occurred in a hospital and/or inpatient setting, 19 (24.7%) occurred in an emergency room or outpatient healthcare setting, 10 (13%) occurred at a residence or home of the decedent, and 4 (5.2%) occurred in a hospice (or related) setting. For 5 (6.5%) of the deaths, the setting was not indicated or was unknown in the women's records.

Table 7: Setting of pregnancy-related deaths, 2017-2021 Mississippi female resident deaths

	2017-2021 Total	
	Count	Percentage
Total	77	100.0%
Setting of Death		
Hospital	39	50.6%
Emergency Room/Outpatient	19	24.7%
Residence/Decedent's Home	10	13.0%
Hospice/Long Term Care Facility	4	5.2%
Unknown/Other Location	5	6.5%

Source: MSDH Office of Vital Records, death certificates.

Figure 8: Setting of pregnancy-related deaths, 2017-2021 Mississippi female resident deaths



Source: MSDH Office of Vital Records, death certificates

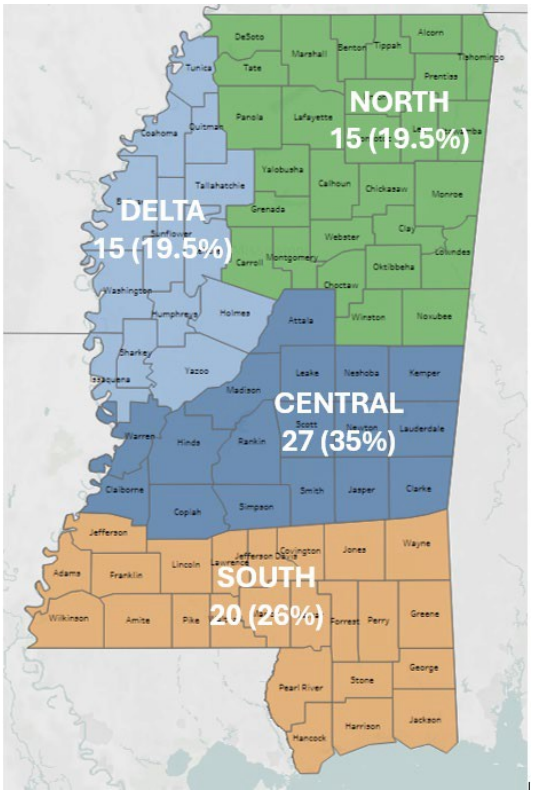
Geographic Location of Death

In 2024, the MSDH modified its service area map from the former nine Public Health Districts to four Public Health Regions. The new Public Health Regions are Central, Delta, North, and South regions. As indicated in the following table and figure, 35% (n=27) of the 77 pregnancy- related deaths that occurred from 2017-2021, were among women who resided in the Central Region of the state. The second largest percentage (26.0%, n=20) of pregnancy-related deaths occurred among women residing in the South(ern) Public Health Region, followed by the Delta and North(ern) Regions with 19.5% (n=15).

Table 8: Pregnancy-related deaths by Public Health Region, 2017-2021
Mississippi female resident deaths

	2017-2021 Total	
	Count	Percentage
Total	77	100.0%
Public Health Region		
North	15	19.5%
Delta	15	19.5%
Central	27	35.0%
South	20	26.0%

Source: MSDH Office of Vital Records, death certificates.



Source: MSDH Office of Vital Records, death certificates.

Timing of Prenatal Care

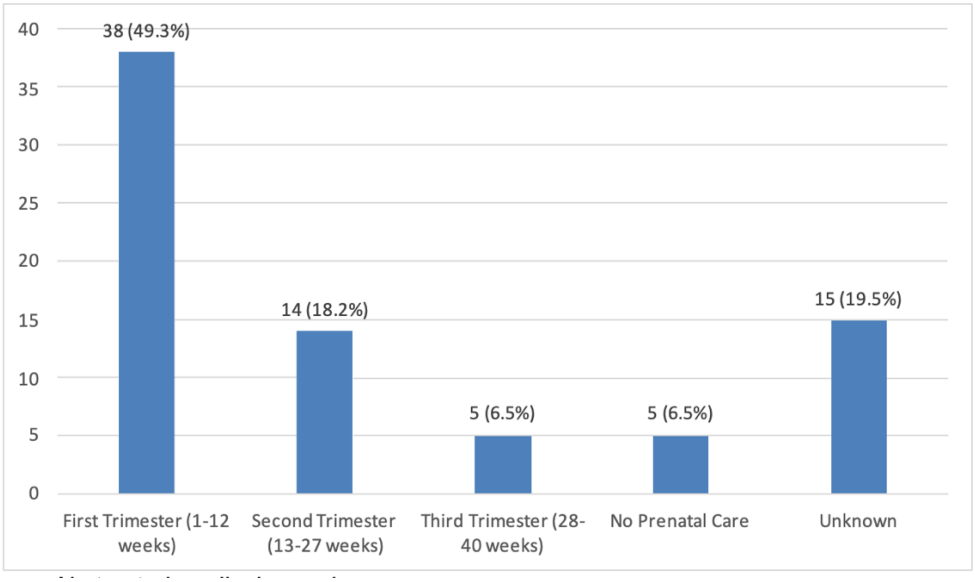
Of the 77 pregnancy-related deaths, 38 deaths (49.3%) occurred among women who began prenatal care in the first trimester, 14 (18.2%) occurred among women began prenatal care in the second trimester, and 5 (6.5%) occurred among women beginning prenatal care in the third trimester. There were 5 (6.5%) deaths that occurred whereby the women did not have any prenatal care. During the five-year period, there were 15 (19.5%) deaths that were unknown as to when or if the women entered prenatal care.

Table 9: Pregnancy-related deaths by timing of entry into prenatal care, 2017-2021 Mississippi female resident deaths

	2017-2021 Total	
	Count	Percentage
Total	77	100.0%
Entry to prenatal care by trimester		
First trimester (1-12 weeks)	38	49.3%
Second trimester (13-27 weeks)	14	18.2%
Third trimester (28-40 weeks)	5	6.5%
No prenatal care	5	6.5%
Unknown	15	19.5%

Source: Abstracted medical records.

Figure 9 : Pregnancy-related deaths by timing of entry into prenatal care, 2017-2021 Mississippi female resident deaths



Source: Abstracted medical records.

Timing of Death

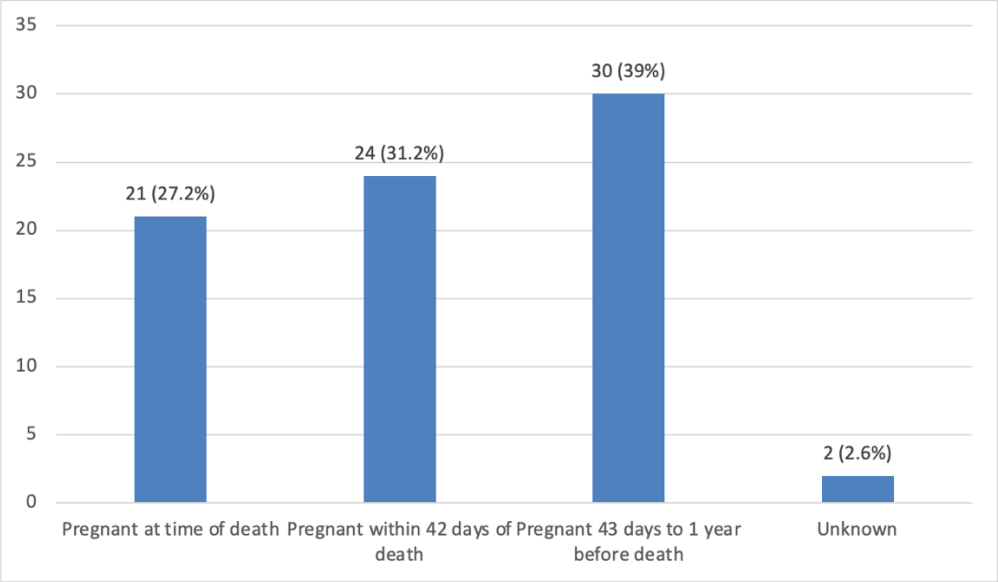
The total number of maternal deaths are summarized below using pregnancy status time periods indicated on the death certificate. Of the 77 pregnancy-related deaths, 21 deaths (27.2%) occurred among women who were pregnant at the time of their deaths, 24 (31.2%) occurred among women who had been pregnant within 42 days of their deaths, and 30 (2.6%) occurred among women who had been pregnant within 43 days to 1 year before their deaths. There were 2 (2.6%) deaths that occurred wherein timing was unknown or not indicated on the death certificate.

Table 10: Pregnancy-related deaths by timing of death, 2017-2021 Mississippi female resident deaths

	2017-2021 Total	
	Count	Percentage
Total	77	100%
Timing of Death		
Pregnant at time of death	21	27.2%
Pregnant within 42 days of death	24	31.2%
Pregnant 43 days to 1 year before death	30	39.0%
Unknown	2	2.6%

Source: MSDH Office of Vital Records, death certificates.

Figure 10 : Pregnancy-related deaths by timing of entry into prenatal care, 2017-2021 Mississippi female resident deaths



Source: MSDH Office of Vital records, death certificates.

Insurance Status

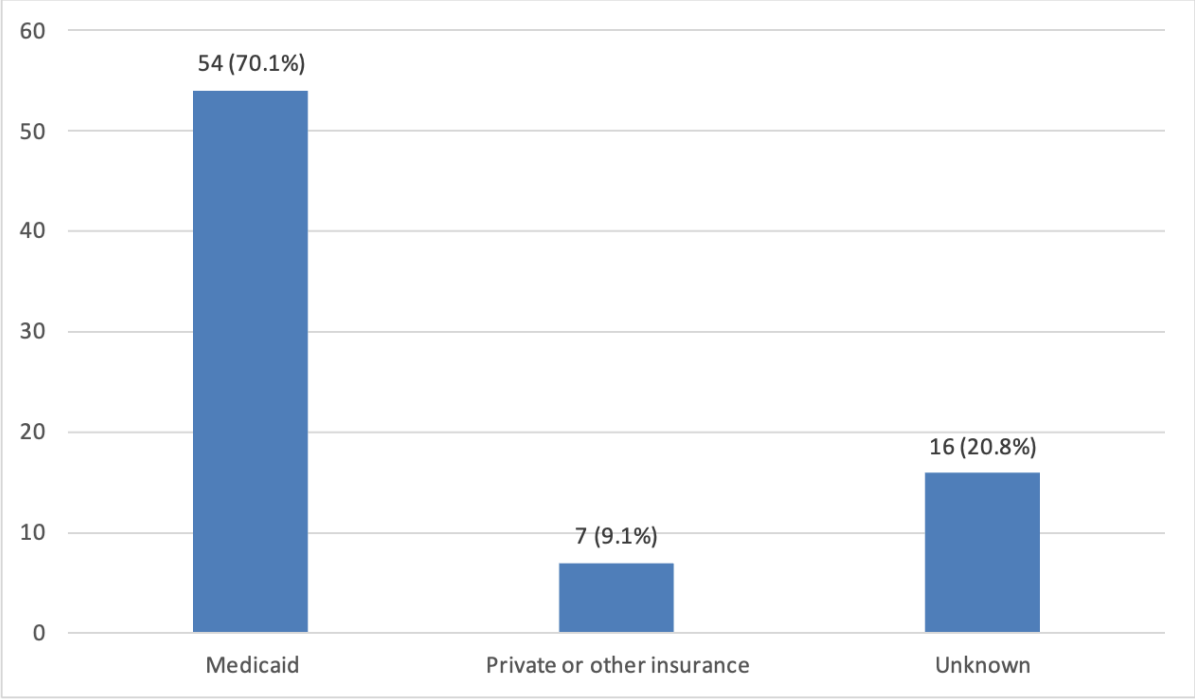
As indicated in the following table and figure, data from 2017-2021 pregnancy-related deaths indicated that 54 (70.1%) of pregnancy-related deaths were among women who had Medicaid coverage before or at the time of delivery. In addition, 7 (9.1%) had private and/or another insurer and 16 (20.8%) were unknown.

Table 11: Insurance status among pregnancy-related deaths, 2017-2021 Mississippi female resident deaths

	2017-2021 Total	
	Count	Percentage
Total	77	100.0%
Insurance status at time of delivery		
Medicaid	54	70.1%
Private or other insurance	7	9.1%
Unknown	16	20.8%

Source: MSDH Office of Vital Statistics, infant birth certificates. Abstracted medical records.

Figure 11 : Insurance status among pregnancy-related deaths, 2017-2021 Mississippi female resident deaths



Source: MSDH Office of Vital Statistics, infant birth certificates. Abstracted medical records.

Educational Status

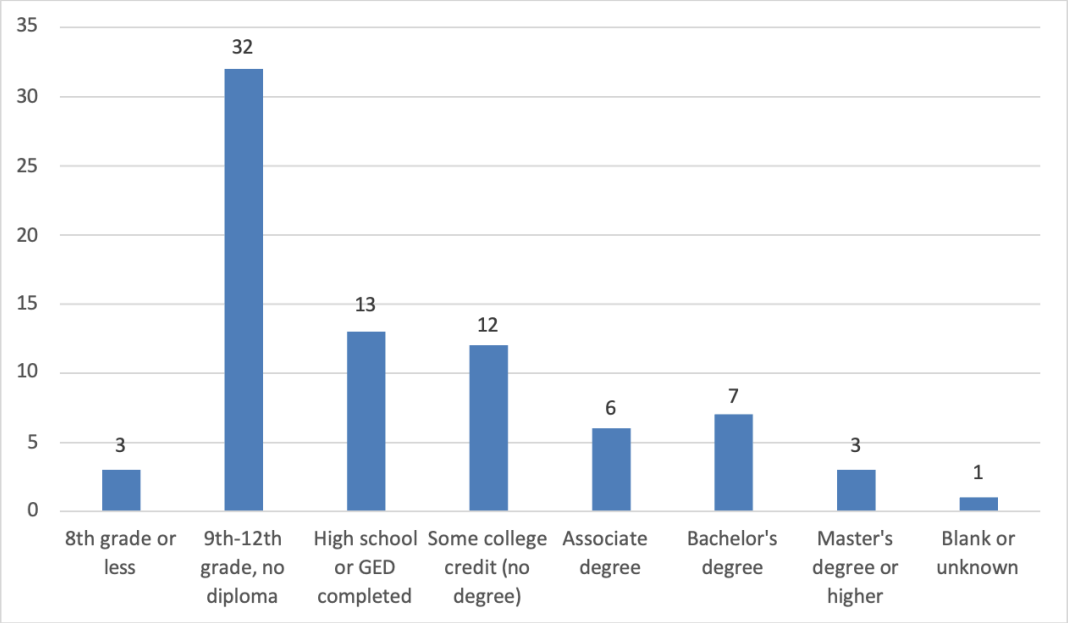
Education data are also captured in the MMRIA system for all pregnancy-related deaths and are grouped into the categories as followed in the table below. As indicated in the following table and figure, 41.6% of women whose death was pregnancy-related had a 9th-12th grade education, but no diploma.

Table 12: Educational status of decedents, 2017-2021 Mississippi female resident pregnancy- related deaths

	2017-2021 Total	
	Count	Percentage
Total	77	100.0%
Educational status		
8th grade or less	3	3.9%
9th-12th grade (no diploma)	32	41.6%
High school/GED completed	13	16.9%
Some college credit (no degree)	12	15.6%
Associate degree	6	7.8%
Bachelor's degree	7	9.1%
Master's degree or higher	3	3.9%
Blank or unknown	1	1.3%

Source: MSDH Office of Vital Records, death certificates.

Figure 12: Educational status of decedents, 2017-2021 Mississippi female resident pregnancy-related deaths



Source: MSDH Office of Vital Records, death certificates.

Leading Causes of Pregnancy-Related Deaths

During the review process, causes of death are grouped according to contributing factors. This grouping includes whether the cause of death as indicated on the death certificate was an underlying, contributing, immediate and/or other significant factor. The MMRIA system utilizes the Pregnancy Mortality Surveillance System (PMSS) maternal mortality cause of death lists and/or PMSS-MM codes. The PMSS-MM codes were developed by CDC and the American College of Obstetricians and Gynecologists (ACOG) Maternal Mortality Study Group classifying pregnancy-related deaths. Similar to the MMRC process, the PMSS defines a pregnancy-related death as a death during or within 1 year of the end of pregnancy from any cause related to or aggravated by the pregnancy.

Cardiovascular-Related Conditions continue to be the top primary cause of pregnancy related deaths in Mississippi.

Of the 77 pregnancy-related deaths which occurred 2017-2021, cardiovascular related conditions (excluding cardiomyopathy) and COVID-19 were the most common for primary underlying causes of death from 2017-2021. Excluding COVID-19, cardiovascular-related conditions continue to be the top primary cause of pregnancy related deaths in Mississippi.

The following table illustrates the top four (4) primary causes of pregnancy-related deaths by race from 2017-2021. As identified, in both Blacks and Whites (non-Hispanics), cardiovascular-related conditions and COVID-19 were the primary causes of pregnancy- related deaths. In addition, preeclampsia and postpartum/peripartum cardiomyopathy impacted pregnancy related deaths in Black, Non-Hispanic women. In White, Non-Hispanic women, embolisms (thrombotic), sepsis/septic shock, and diabetes mellitus were among the top four primary causes of pregnancy related deaths.

Table 13: Leading causes of pregnancy-related death by race, 2017-2021
Mississippi female resident deaths

Race	Top Four (4) Leading Causes	Count
Black, non-Hispanic	Cardiovascular Related (excluding cardiomyopathy)	8
	COVID-19/Pneumonia	8
	Preeclampsia	7
	Postpartum/Peripartum Cardiomyopathy	6
White, non-Hispanic	Cardiovascular Related (excluding cardiomyopathy)	3
	COVID-19	3
	Embolism-Thrombotic	2
	Sepsis/Septic Shock & Diabetes Mellitus	2
Hispanic, all races	-*	
Other or Unknown, non-Hispanic	-*	

Note: *Not shown due to small counts.
Source: MSDH Office of Vital Records, case reviews.

Preventability and Contributing Factors

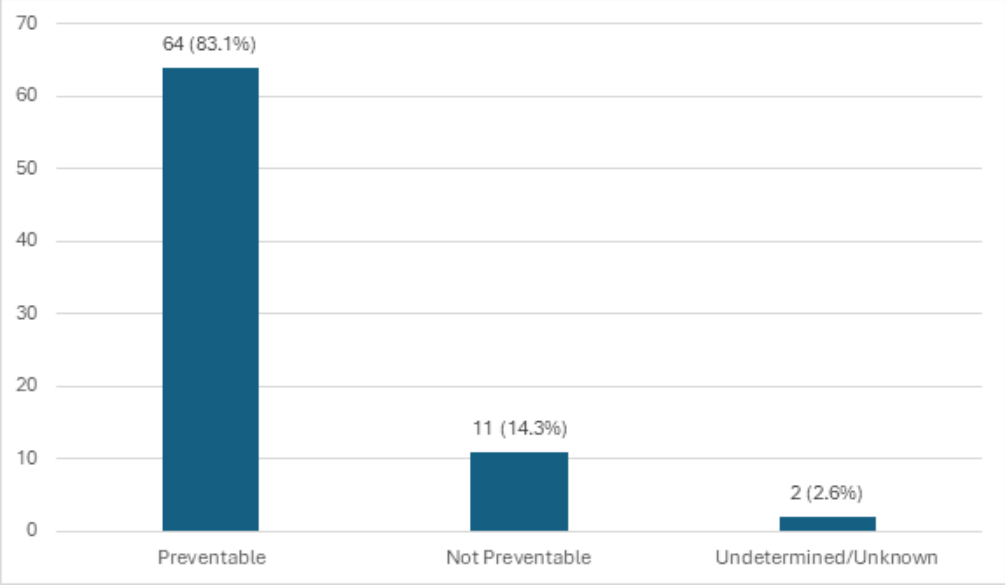
As indicated in the table and figure below, of the 77 pregnancy-related deaths reviewed by the MMRC from 2017-2021, 64 (83.1%) were determined by the committee to be preventable. A death is considered preventable if the committee determines that there was at least some chance of the death being averted by one of more reasonable changes to patient, family, provider, facility, system, and/or community factors.

Table 14: Preventability of pregnancy-related deaths, 2017-2021 Mississippi female resident deaths

	2017-2021 Total	
	Count	Percentage
Total	77	100.0%
Was the pregnancy-related death preventable?		
Yes	64	83.1%
No	11	14.3%
Undetermined or Unknown	2	2.6%

Source: Case reviews.

Figure 13 : Preventability of pregnancy-related deaths, 2017-2021 Mississippi female resident deaths



Source: Case reviews.

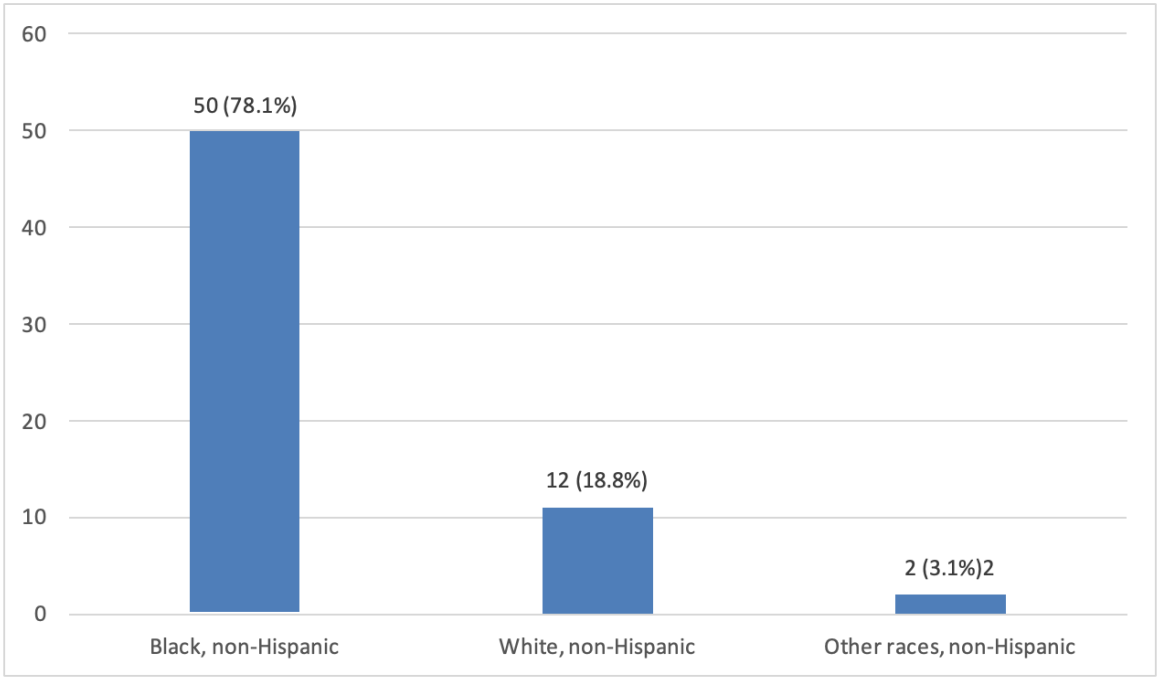
Among the 64 pregnancy-related deaths that were deemed preventable by the MMRC, 50 (78.1%) were among Black, non-Hispanic women,12 (18.8%) were among White, non-Hispanic women, and 2 (3.1%) were among women of Other races, non-Hispanic.

Table 15: Preventability of pregnancy-related deaths by race, 2017-2021 Mississippi female resident deaths

	2017-2021 Total	
	Count	Percentage
Total	64	100.0%
Race/Ethnicity		
Black, non-Hispanic	50	78.1%
White, non-Hispanic	12	18.8%
Other races, non-Hispanic	2	3.1%

Source: Case reviews.

Figure 14 : Preventability of pregnancy-related deaths by race, 2017-2021 Mississippi female resident deaths



Source: Case reviews

Chance to Alter Outcomes Among Preventable Pregnancy-Related Deaths

One of the major tasks of the MMRC is to determine if pregnancy-related deaths were not only preventable, but also assess available information to decide the chance of altering the outcome of death. The committee determines if:

(a) there was a good chance to alter the outcome;
(b) there was some chance to alter the outcome;
(c) there was no chance to alter the outcome; or
(d) it was undetermined if the outcome could/should have been altered.

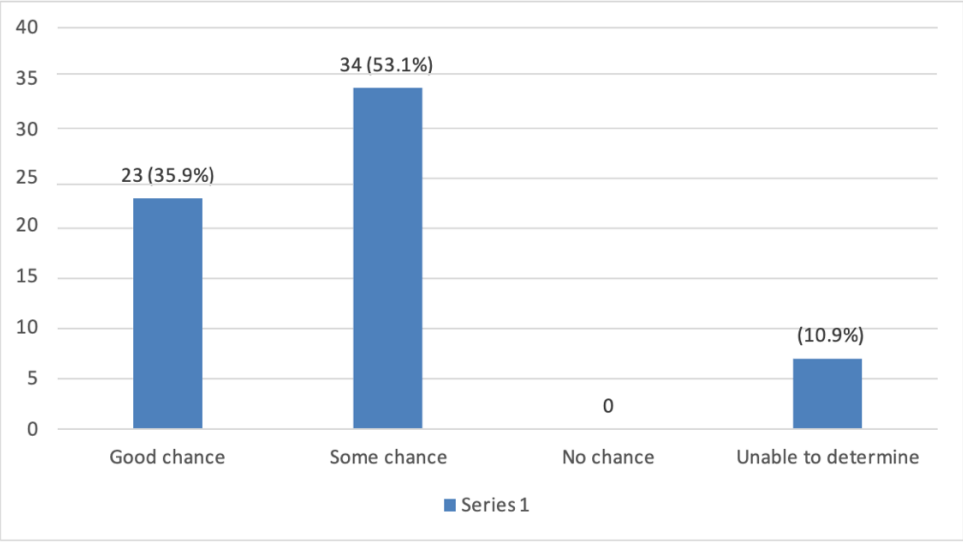
As indicated in the table and figure below, of the 64 preventable pregnancy- related deaths, a total of 57 cases (89%) had at least some level of chance to alter the outcome (death).

Table 16: Chance to alter outcomes among preventable pregnancy-related deaths by race, 2017-2021 Mississippi female resident deaths

	2017-2021 Total	
	Count	Percentage
	Pregnancy-Related Deaths	100.0%
What chance was there to alter outcome?		
Good chance	23	35.9%
Some chance	34	53.1%
No chance	0	0%
Unable to determine	7	10.9%

Source: Case reviews.

Figure 15: Chance to alter outcomes among preventable pregnancy-related deaths by race, 2017-2021 Mississippi female resident deaths



Source: Case reviews.

Contributing Factors of Pregnancy-Related Deaths

For all deaths deemed, pregnancy-related, the MMRC takes all available information to determine if there were specific contributing factors or circumstance surrounding a death. In doing so, the committee answers the following questions:

1. Did obesity contribute to the death?
2. Did discrimination contribute to the death?
3. Did mental health conditions other than substance use disorder contribute to the death?
4. Did substance use disorder contribute to the death?
5. Was this death a suicide?
6. Was this death a homicide?

The table and figure below illustrate the contributing causes (circumstances surrounding death) of death as identified by the MMRC utilizing death certificates, abstracted medical records, and other supporting documentation. The surveillance data extracted from the MMRIA system were analyzed based on the MMRC's decision responses of "yes" and "probably" as to whether the factors contributed to the deaths. Contributing factors are not mutually exclusive. A single death may have multiple contributing factors. As indicated, obesity was the highest contributing factor for pregnancy related deaths in Mississippi from 2017-2021, identified in over half of all cases.

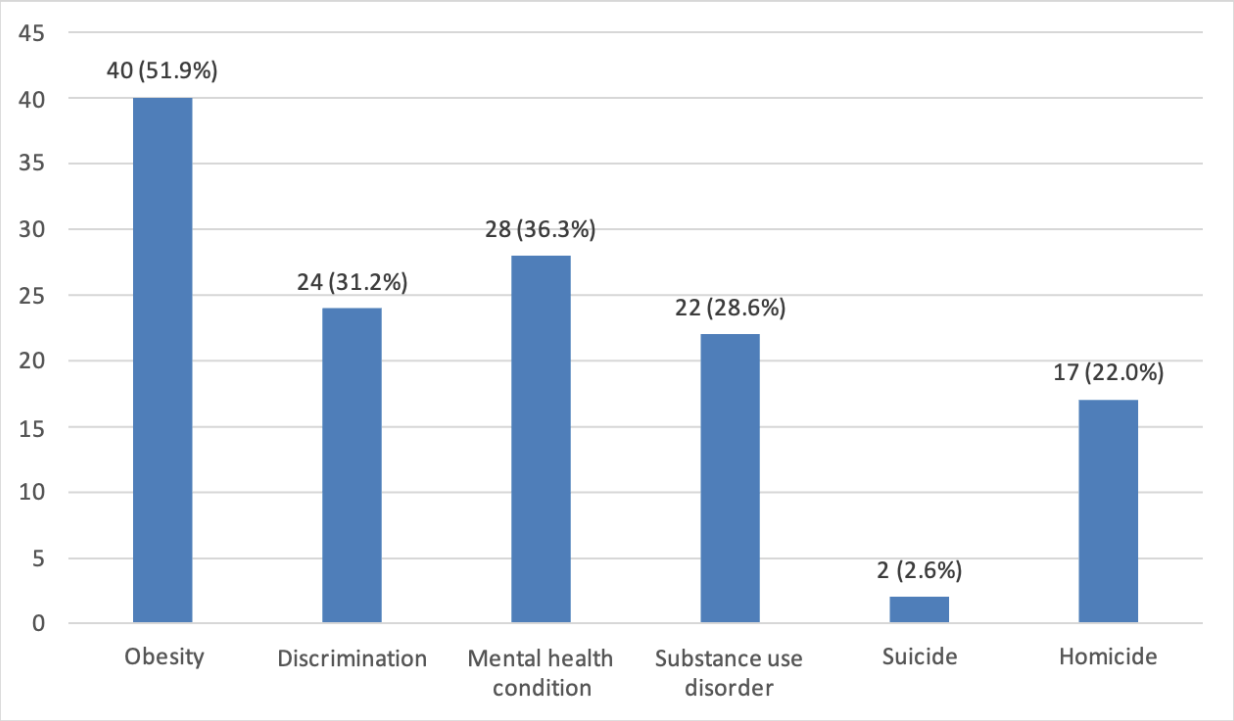
Table 17: Contributing factors among pregnancy-related deaths, 2017-2021 Mississippi female resident deaths

2017-2021 Total

	Count	Percentage
Total	77	100%
Contributing Factors		
Obesity contributed to the death	40	51.9%
Discrimination contributed to the death	24	31.2%
Mental health conditions contributed to the death (excluding substance use disorders)	28	36.3%
Substance use disorder (SUD) contributed to the death	22	28.6%
Death was by suicide	2	2.6%
Death was by homicide	17	22%

Source: Case reviews.

Figure 16: Contributing factors among pregnancy-related deaths, 2017-2021 Mississippi female resident deaths.



RECOMMENDATIONS

MMRC RECOMMENDTIONS FOR PREVENTING MATERNAL DEATHS

The MMRC makes the following recommendations to the Chairmen of the House Public Health and Human Services Committee and the Senate Public Health and Welfare Committee, as well as others engaged in caring for and supporting pregnant and postpartum women.

Federal, State, and Local Governments

- The state should implement a policy requiring autopsies for all maternal-related deaths within one year post-delivery to investigate the cause of death. The state will ensure that 100% of such deaths undergo an autopsy, with collaboration from medical examiners and healthcare providers.
- The state should implement measures to ensure that all maternal death certificates contain accurate information, incorporating safeguards for thorough confirmation and verification. (Standardized Verification Process, Mandatory Data Confirmation, Training and Compliance Measures, Transparency and Reporting, Legislative and Regulatory Support).
- Local and state entities should increase funding and resources for substance abuse treatment, ensuring sustainable and impactful support for vulnerable populations.
- The state should enact Medicaid expansion to improve healthcare access for vulnerable population and to support rural hospitals.
- Develop a coordinated system between law enforcement and healthcare providers to address intimate partner violence. Establish a secure digital platform for case sharing and implement mandatory IPV screenings in healthcare settings. Measure success through improved case coordination and victim support.

Healthcare Systems and Providers

- Implement IPV screenings for all pregnant and postpartum women during each visit. Provide educational resources and support services for women who screen positive to improve support for affected women and their children.
- Educate pregnant and postpartum women about the harms of tobacco and vaping, and screen for use. Provide cessation support and resources.
- Educate healthcare providers on blood pressure monitoring in pregnancy, preeclampsia, and maternal warning signs to improve early detection and intervention.
- To enhance quality care and improve outcomes, ensure all urgent care and emergency providers/clinicians have access to pregnancy specific hypertension emergency treatment protocols, preeclampsia education, and maternal warning signs.
- Ensure maternal care providers identify and educate at-risk pregnant women on the importance of low-dose aspirin for preeclampsia prevention, thus improving maternal and fetal health.
- Maternal care providers should recognize the significance of shortness of breath in pregnant and postpartum women and assess and investigate these complaints for high-risk cardio-pulmonary conditions.

- Ensure maternal care providers educate themselves and patients about the link between hypertensive disorders of pregnancy and cardiovascular disease and provide appropriate referrals for surveillance.
- Ensure pregnant and postpartum women are screened for mental health throughout their care, with resources and referrals provided to those who screen positive. Educate providers on referral processes and state/local resources.
- Healthcare facilities should provide social support to vulnerable mothers and families. This includes those with extended/prolonged illness or hospitalization.
- Ensure healthcare personnel are trained in cultural competence, bias mitigation, and communication with diverse populations to decrease health disparities.
- Ensure high-risk patients have follow-up appointments scheduled before discharge and seen within 7 days, with education provided on the importance of follow-up care.
- Healthcare systems should implement a system for real time notification of admission, discharge, and transfers for primary care providers, coordinated care organizations, and case management systems.
- Healthcare systems should increase telehealth capacity and expand access to remote areas through technology investments, provider training, and partnerships with internet providers. This may be utilized in a variety of settings with demonstrated need, including but not limited to subspecialty referrals and mental health.
- Increase training for healthcare providers on the fundamentals of acute and chronic pain management in pregnant women, with local resources shared and accessible to those in need.
- Providers and community leaders will educate individuals on contraceptive options, ensuring access and information for those who seek it.
- Clinicians will provide medically accurate vaccination information and provide the current recommendations to all individuals who seek it.
- Clinicians providing emergency care should receive training to increase awareness, consideration, and diagnosis of pregnancy-related conditions and emergencies.

Communities/Organizations

- Information on treatment options for substance use disorder will be readily available in the community through local resources and outreach programs.
- Communities should collaborate to enhance confidence in vaccinations and their health benefits through targeted education and outreach programs, especially among those most vulnerable.
- Expand resources/funding for shelters to allow for enhanced capacity, collaborative partnerships and implementation of best practices. By focusing on these strategies, communities can work together, ensuring that more victims of interpersonal violence receive the support and assistance they need.

- Communities should collaborate to provide educational resources for men, women, and children on identifying unhealthy relationships, recognizing harmful behaviors, and implementing risk mitigation strategies, thereby fostering a safer and more supportive environment for all.
- Communities should collaborate to enhance awareness and education on maternal early warning signs and appropriate responses, aiming to empower individuals to recognize and act upon critical health indicators during pregnancy and the postpartum period.

Universities and School Systems

- Educational systems should partner with parents to implement policies promoting comprehensive sex education, ensuring students receive medically-accurate, age-appropriate information on sexuality, sexual health, and relationships.
- Educational systems should implement policies to provide students with education on violence prevention, self-esteem, healthy relationships, and boundaries, ensuring that resources for assistance are readily available.

Licensing and Regulatory Agencies/Organizations

- Authorities and health-related organizations should collaborate with social workers to assess and support families and children who have experienced the death of a parent, ensuring access to appropriate resources and interventions. By implementing these strategies, authorities and health-related organizations can provide comprehensive support to families and children coping with the loss of a parent, facilitating healing and resilience.

Patients and Families

- Education regarding identification and response to maternal early earning signs should be provided for families of pregnant and postpartum people.
- Patients and their families should have increased access to remote blood pressure monitoring services and equipment, particularly in rural areas, to enhance healthcare access and management.

Maternal Health Burden of COVID-19

In early 2020, the SARS-CoV-2 (COVID-19) pandemic emerged as a public health emergency. As 2020 progressed, it became apparent that pregnant and postpartum patients were at increased risks for moderate and severe COVID-19 infection as well as maternal death due to this disease. Progressing to 2021, COVID-19 deaths increased in Mississippi particularly due to the onset of the Delta variant that developed during the Spring of that year. This trend of increasing overall COVID-19 deaths was followed by a spike in pregnancy- associated deaths. In general, COVID-19 highlights the importance of continued robust support of the state's public health entities to study, track, and prevent emerging infectious diseases to reduce transmission of potentially deadly conditions/infections especially among vulnerable populations such as pregnant and postpartum patients.

In 2020 and 2021, there were a total of 109 pregnancy-associated deaths in Mississippi. Of this number, **19 (17%)** of the deaths were either immediately caused by and/or were attributed to COVID-19. Among the number of deaths that were attributed to COVID-19, 58% were Non-Hispanic Black, 16% were Non-Hispanic White, 16% were Hispanic, and 10% were Other Races. During these two years, 26% of the women were pregnant at the time of death among the COVID-19 deaths.

When examined by age group, 37% of pregnancy-associated COVID-19 deaths occurred among women who were between the ages of 35-39 in Mississippi.

After reviews of 2020 and 2021 cases by the MMRC, 79% of COVID-19 deaths were deemed pregnancy-related; out of the pregnancy-related COVID-19 deaths, 47% were deemed preventable. The MMRC did take into consideration the public health policies that were established during those years. Emphasis was placed on prioritizing patients who were diagnosed with COVID-19 due to the rapidity of progression of death among some patients, especially those with other vulnerabilities and/or pre-existing conditions. In addition, the lack of hospital resources added additional burdens, thus allowing facilities to reserve critical units for COVID-19 patients versus those with other illnesses and/or health conditions.

Interpersonal Violence (IPV) among Pregnancy-Associated Deaths, 2017-2021 (n=27)

Interpersonal Violence (IPV) may be defined as the intentional use of force or power against other persons by an individual or small group of individuals (Mercy, et. al, 2017). Inclusive of IPV, intimate partner violence is defined as the abuse or aggression that occurs in romantic relationships which may involve current and former spouses and/or dating partners (CDC, 2024). During 2017- 2021, Mississippi had 27 **pregnancy-associated** deaths related to IPV in the form of homicides. These IPV deaths **were not** pregnancy-related homicides. Of note, national data indicate that less than half of violent victimizations are ever reported to the police (Morgan & Truman, 2020), thus suggesting that IPV rates and cases may be higher.

For the period of 2017-2021, the majority (56%) of IPV cases reviewed by the MMRC during this period were caused by intimate partners. IPV affected younger women, with most of the cases (48%) impacting women ages 17-24.

A more comprehensive and broader assessment of IPV and pregnancy and infant health outcomes can be reviewed at:
https://www.cdc.gov/mmwr/volumes/73/wr/pdfs/mm7348a1-H.pdf

Mississippi State Department of Health

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