MSDH

MISSISSIPPI MATERNAL MORTALITY REPORT

Annual Report: Review of 2019-2023 Maternal Deaths

Publication Date: December 2025

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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:

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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, healthcare professionals, 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

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 vital work of the Maternal Mortality Review Committee (MMRC) and includes findings for maternal deaths that occurred from 2019–2023. The goal of this report is to identify statewide patterns in maternal health and provide actionable recommendations for key stakeholders to help prevent maternal mortality and morbidity. Further, this report highlights the factors and social determinants of health that contribute to maternal health outcomes and the health disparities and inequities observed in Mississippi.

We at MSDH appreciate that this report serves as an important tool to inform elected officials, policy advocates, community leaders, medical providers, foundations, and the public about approaches that can collectively drive meaningful change in maternal health.

The MMRC—consisting of professionals from a variety of organizations, disciplines, and backgrounds—met six times in calendar year 2025 to review 69 maternal deaths from 2022 and 2023. This work, as challenging as it may be, remains critical to improving health outcomes for all women, children, and families. However, the work of the MMRC and the data it produces cannot impact change in isolation; deliberate and collaborative action on the recommendations is essential to improving outcomes of pregnant and postpartum women.in Mississippi.

I commend the work of the Maternal and Infant Health Bureau (MIHB) staff, who provide administrative and operational support for the MMRC, and extend heartfelt gratitude to the leadership and volunteer members of the MMRC who have worked tirelessly in exploring the causes of these deaths and how they might have been prevented. Most importantly, I want to acknowledge the Mississippi women who lost their lives from 2019-2023 while pregnant or postpartum. I extend my deepest condolences to their loved ones and remain hopeful 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

Greetings,
It is hard to believe that it is once again time to share another report from the Maternal Mortality Review Committee (MMRC). As Chair, I want to begin by honoring the many lives our committee has reviewed. Behind every statistic in this report is a beloved mother, daughter, sister, and friend — a person whose loss continues to be deeply felt by her family, her community, and all who knew her. The deaths represented here have left 115 children without their mothers, a heartbreaking reminder of why this work is so important.
In reflecting on the cases we reviewed, our committee faced a number of significant and deeply concerning issues. As the healthcare system continued to recover from the challenges of the COVID-19 pandemic, maternal deaths persisted — thankfully at lower rates than during the height of the crisis. Yet, even as the world began to heal, we saw a troubling rise in deaths related to mental health conditions and gun violence. Of particular concern, 17 of the maternal deaths reviewed this past year were the result of gun violence.

While scientific studies have long identified homicide as a leading cause of pregnancy-associated mortality — and have highlighted that pregnancy itself can increase the risk of violence toward women — this information comes as a surprise to many. These findings also shed light on the profound impact of mental health struggles and intimate partner violence, challenges that too often intensify during pregnancy and the postpartum period. Each story we reviewed serves as a call to action to strengthen our systems of care, compassion, and support for mothers and families.

Despite these emerging trends, our work to prevent other causes of maternal mortality — including those related to cardiac disease, hypertension, and hemorrhage — continues. We remain challenged to find innovative solutions to the persistent access barriers that affect our state. However, there is hope! We are deeply grateful for the many partners across multiple sectors who have been touched by these data and moved to action. Your efforts have not gone unnoticed, and together, we are making meaningful strides toward our shared goal of a healthier future for the families of Mississippi.

Finally, I want to express my deepest gratitude to the families who assisted us in our efforts to honor the lives of their loved ones. Your strength and openness allow us to learn, reflect, and improve. I also extend heartfelt thanks to the incredible committee members and staff who have dedicated their time, expertise, and compassion to this work. Because of your commitment, these lives were not lost in vain; through your efforts, new opportunities for life-saving interventions can and will emerge.

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

EXECUTIVE SUMMARY & KEY FINDINGS

MSDH

Executive Summary

Maternal mortality in Mississippi remains an urgent public health crisis—and one that is overwhelmingly preventable. This 2025 Maternal Mortality Report, produced by the Mississippi State Department of Health (MSDH) and the Maternal Mortality Review Committee (MMRC), examines maternal deaths occurring from **2019–2023** and identifies the systemic, clinical, and community-level factors that continue to place Mississippi mothers at risk.

The 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).

Mississippi's MMRC reviewed 224 pregnancy-associated deaths, ultimately determining 73 deaths or 33% to be pregnancy-related over the five-year period. Their findings demonstrate that maternal mortality is overwhelmingly preventable, heavily influenced by social determinants of health, and strongly shaped by inequities and systemic gaps in care.

The findings show that **82% of pregnancy-related deaths were preventable**. Improvements to healthcare access, coordination, and quality—combined with strategic investments in maternal health infrastructure and safety—can significantly reduce maternal deaths statewide.

Key Findings

1. Maternal deaths are overwhelmingly preventable.

- **82%** of pregnancy-related deaths had at least some chance of being averted.
- **53%** had a *good* chance of preventability.

Recommendation: Mississippi can dramatically reduce maternal mortality by strengthening postpartum care, standardizing clinical procedures, and improving coordination across health systems.

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2. **Leading causes of death are treatable.**

Primary causes include:

- **Hypertensive disorders of pregnancy**
- **Infections (including COVID-19)**
- **Other cardiovascular conditions**
- **Mental health conditions**

Recommendation: Expand statewide adoption of evidence-based clinical protocols for hypertension, infection control, mental health, and emergency response for pregnant and postpartum women.

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3. **Postpartum period is the most vulnerable timeframe.**

- **32%** occurred within the **first 42 days postpartum**.
- **38%** of deaths occurred **43 days to 1 year postpartum**

Recommendation: Continued support for extended postpartum coverage, postpartum visit requirements, telehealth, and remote monitoring is essential.

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4. **Community conditions are affecting maternal mortality.**

- Homicide and injury-related deaths are rising among pregnant and postpartum women.
- Social determinants such as obesity, discrimination, and lack of access to safe environments contribute heavily to risk.

Recommendation: Consider domestic violence awareness and prevention initiatives, firearm safety strategies, and community health investments as maternal health interventions.

DEFINITIONS & TERMS

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.

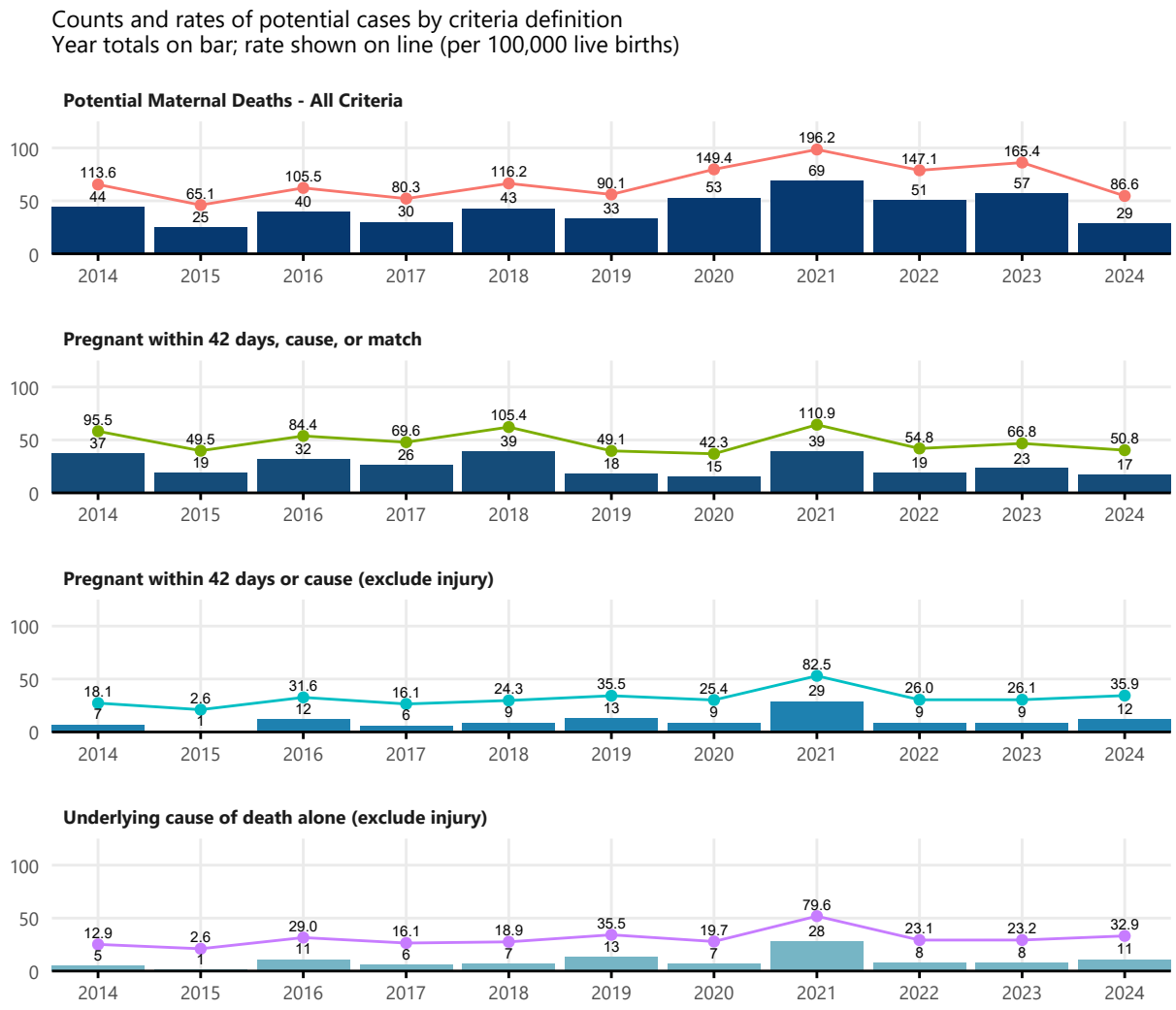
Pregnancy-Related Deaths: Deaths occurring during pregnancy or within one year of the end of pregnancy from a chain of events initiated by pregnancy, or the aggravation of an unrelated condition by the physiological effects of pregnancy.

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

DATA

- 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, 2014-2024



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

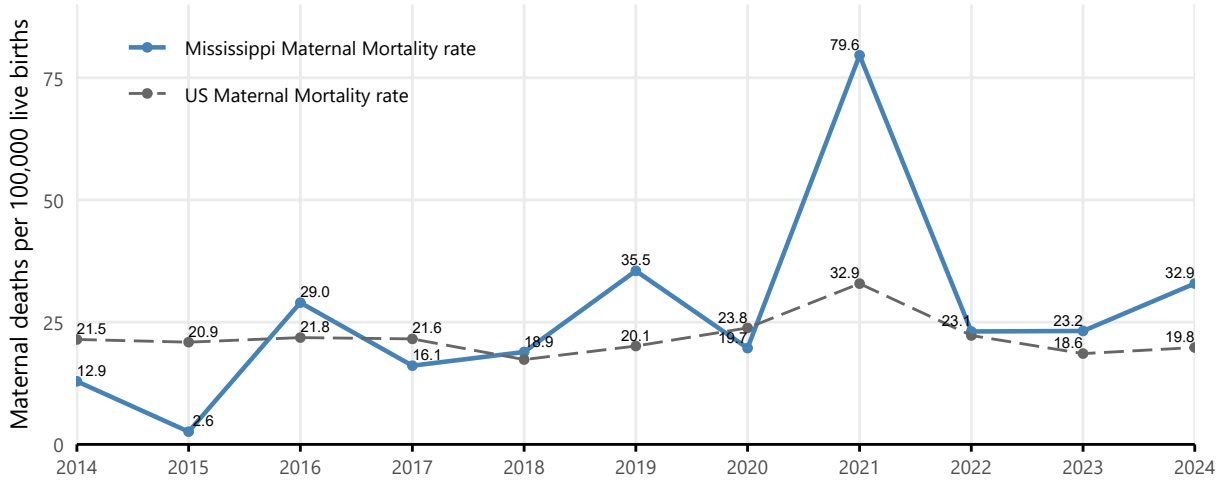
Comparing Mississippi to US Maternal Mortality

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, 2014-2024



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

Table 1: Mississippi and United States Maternal Mortality, 2014-2024

Year	Mississippi Maternal Mortality Rate	US Maternal Mortality Rate
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	35.5	20.1
2020	19.7	23.8
2021	79.6	32.9
2022	23.1	22.3
2023	23.2	18.6
2024	32.9	19.8

[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, 2014-2024

	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]
2024	29	86.6	133.5	17	50.8	57.5	12	35.9	29.2	11	32.9	26.3
2023	57	165.4	169.7	23	66.8	77.7	9	26.1	45.1	8	23.2	42.2
2022	51	147.1	164.3	19	54.8	69.3	9	26.0	44.6	8	23.1	40.8
2021	69	196.2	144.5	39	110.9	67.1	29	82.5	47.5	28	79.6	44.7
2020	53	149.4	118.2	15	42.3	66.0	9	25.4	28.4	7	19.7	24.7
2019	33	90.1	95.5	18	49.1	74.8	13	35.5	25.2	13	35.5	23.4
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	–	19	49.5	–	1	2.6	–	1	2.6	–
2014	44	113.6	–	37	95.5	–	7	18.1	–	5	12.9	–

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

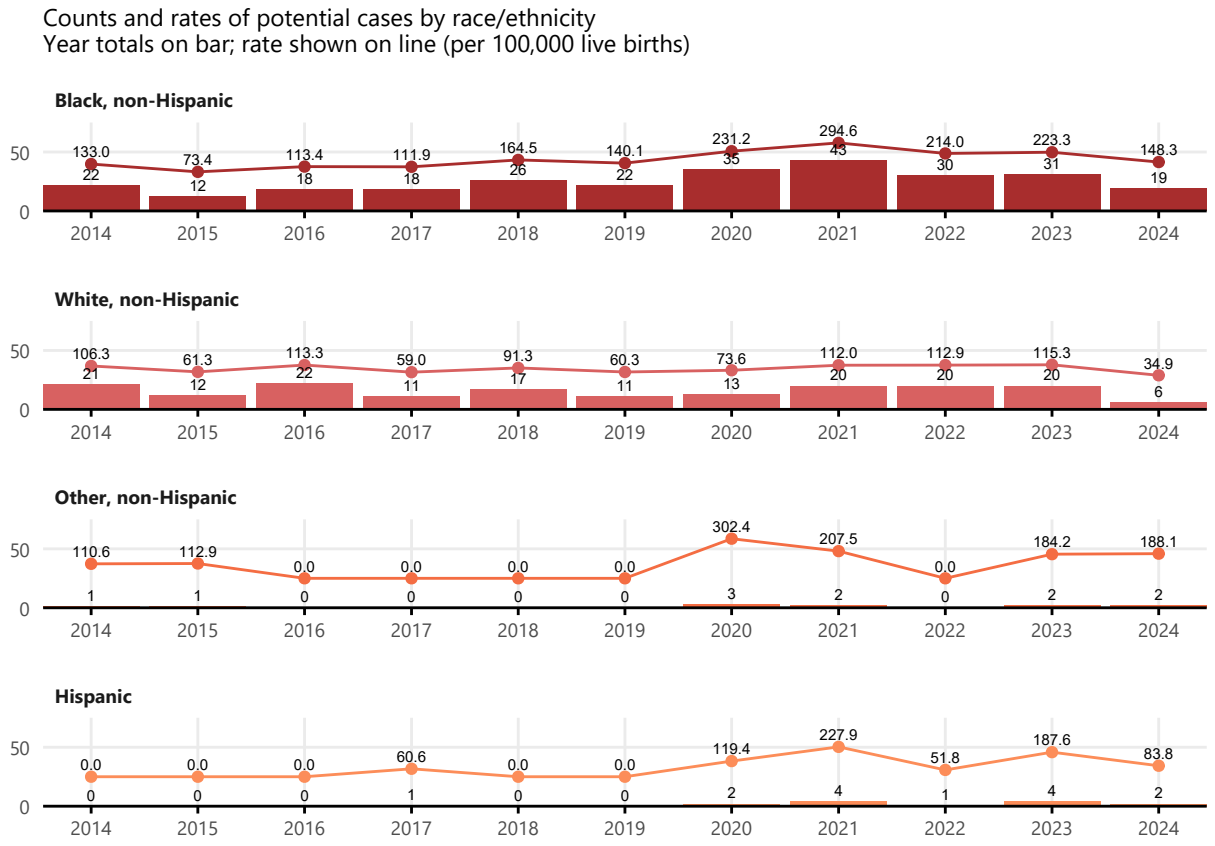
[2] Includes deaths with pregnancy within 42 days of death, matching birth or fetal death certificate (within 42 days of death), or with an underlying cause of death of A34, O00-O95, O98-O99

[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



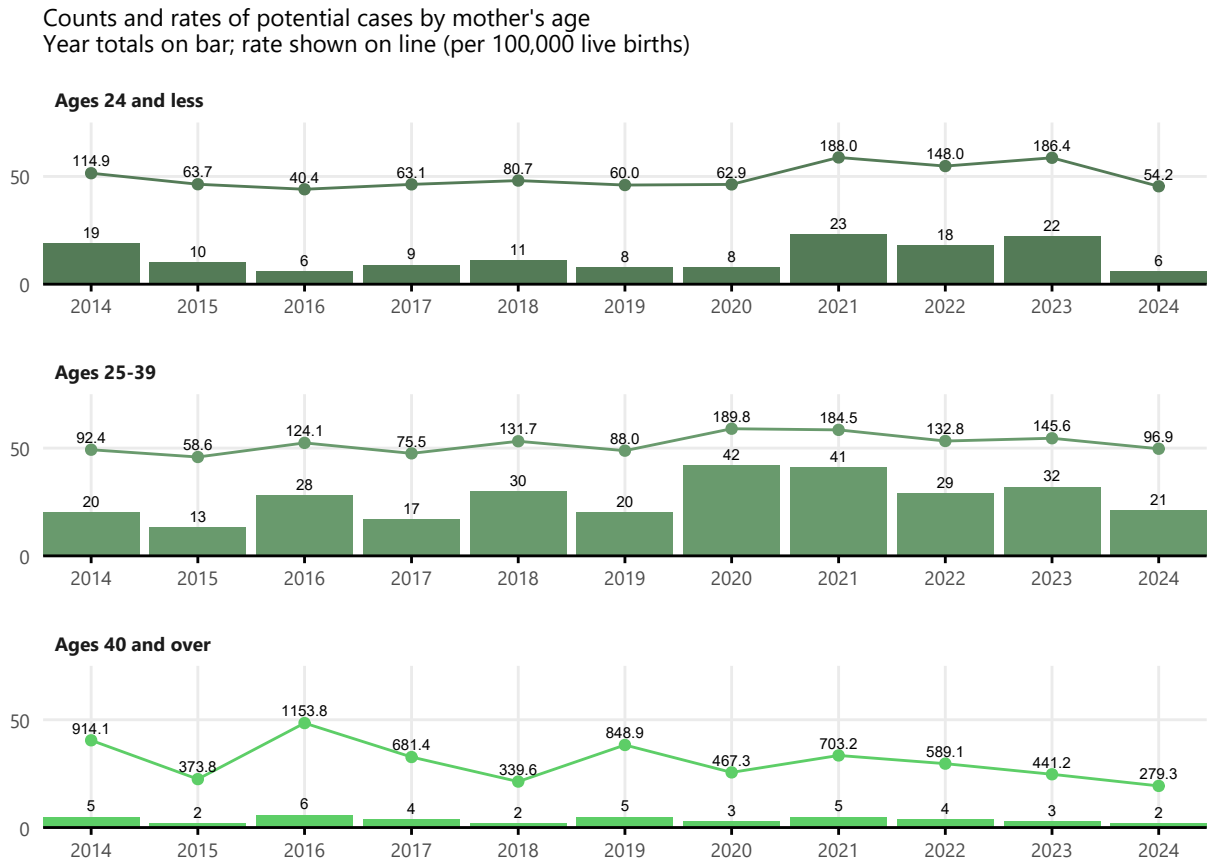
NOTE: Case counts may be incomplete and subject to change; shaded region more likely to be incomplete.

Table 3: Potential Maternal Deaths by Race/Ethnicity in Mississippi, All Criteria, 2014-2024

	All race/ethnicities		Black, NH		White, NH		Other, NH		Hispanic	
Year	Count	Rate	Count	Rate	Count	Rate	Count	Rate	Count	Rate
2024	**29**	**86.6**	19	148.3	6	34.9	2	188.1	2	83.8
2023	**57**	**165.4**	31	223.3	20	115.3	2	184.2	4	187.6
2022	**51**	**147.1**	30	214.0	20	112.9	0	0.0	1	51.8
2021	**69**	**196.2**	43	294.6	20	112.0	2	207.5	4	227.9
2020	**53**	**149.4**	35	231.2	13	73.6	3	302.4	2	119.4
2019	**33**	**90.1**	22	140.1	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

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, 2014-2024

	All ages		Ages 24 and less		Ages 25 to 39		Ages 40 and over	
Year	Count	Rate	Count	Rate	Count	Rate	Count	Rate
2024	**29**	**86.6**	6	54.2	21	96.9	2	279.3
2023	**57**	**165.4**	22	186.4	32	145.6	3	441.2
2022	**51**	**147.1**	18	148.0	29	132.8	4	589.1
2021	**69**	**196.2**	23	188.0	41	184.5	5	703.2
2020	**53**	**149.4**	8	62.9	42	189.8	3	467.3
2019	**33**	**90.1**	8	60.0	20	88.0	5	848.9
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

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, 2022-2024

	All		Black, NH		White, NH		Other, NH		Hispanic	
Cause Group	Count	Rate	Count	Rate	Count	Rate	Count	Rate	Count	Rate
Assault (homicide) by discharge of firearms	23	22.4	19	46.7	3	5.7	1	31.7	0	0.0
Accidental poisoning by and exposure to drugs and other biological substances	21	20.5	3	7.4	18	34.4	0	0.0	0	0.0
Other deaths related to pregnancy, childbirth and the puerperium	19	18.5	13	31.9	3	5.7	1	31.7	2	31.0
Other and unspecified motor vehicle accidents	15	14.6	6	14.7	7	13.4	1	31.7	1	15.5
Indirect obstetric deaths	12	11.7	10	24.6	2	3.8	0	0.0	0	0.0
All other direct obstetric causes	5	4.9	4	9.8	1	1.9	0	0.0	0	0.0
Occupant of car, pickup truck or van involved in collision with other motor vehicle	5	4.9	2	4.9	2	3.8	0	0.0	1	15.5
Other complications predominately related to the puerperium	4	3.9	2	4.9	2	3.8	0	0.0	0	0.0
Eclampsia and pre-eclampsia	3	2.9	2	4.9	0	0.0	0	0.0	1	15.5
Spontaneous abortion	2	1.9	1	2.5	0	0.0	1	31.7	0	0.0
Occupant of motor vehicle involved in collision with other (non-motorized) road vehicle, streetcar, animal or pedestrian	2	1.9	2	4.9	0	0.0	0	0.0	0	0.0
Occupant of motor vehicle involved in noncollision accident	2	1.9	0	0.0	2	3.8	0	0.0	0	0.0
Intentional self-harm (suicide) by hanging, strangulation and suffocation	2	1.9	1	2.5	1	1.9	0	0.0	0	0.0
Intentional self-harm (suicide) by discharge of firearms	2	1.9	1	2.5	1	1.9	0	0.0	0	0.0
Septicemia	1	1.0	1	2.5	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

COMMITTEE FINDINGS

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 understanding the associated disparities.
- Determines what interventions at the patient, provider, facility, system, and community levels will have the most effect.
- Informs the implementation of initiatives in the right places for individuals, 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 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 **(N = 224, 2019-2023)** 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 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 and charged with duties exclusive to MMRC administrative operations at a state or jurisdictional level.

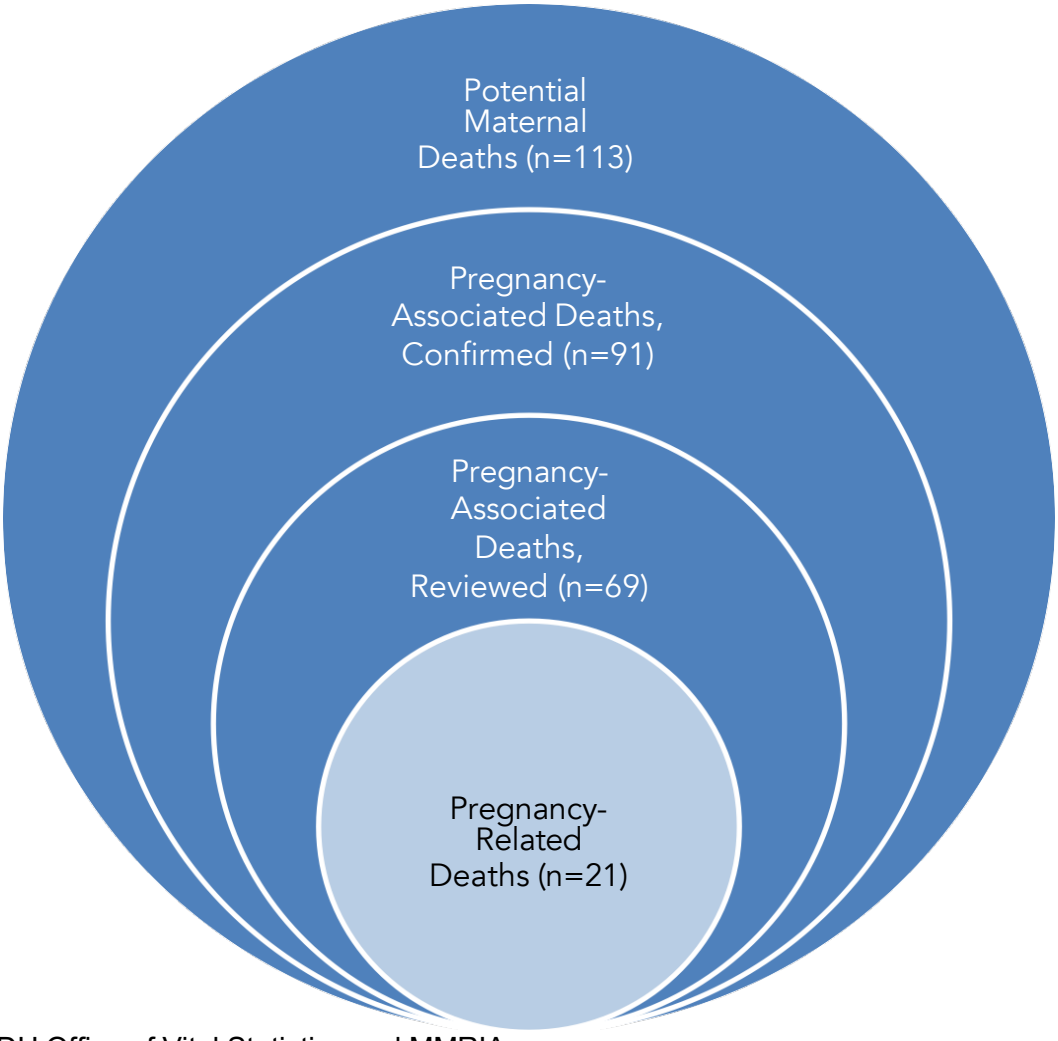
The remainder of this report refers to pregnancy-related deaths which occurred from 2019-2023 as reviewed and determined by the MMRC.

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 AND OVERVIEW

Of the 113 **potential** maternal deaths that occurred in calendar years 2022 and 2023 identified by the National Office of Vital Records and Statistics, 91 were confirmed to be **pregnancy-associated**. Of the confirmed cases, 69 (76%) were reviewed by the MMRC across six meetings in calendar year 2025. The remaining 22 (24%) were excluded from the reviews due to the deaths being attributed to motor-vehicle or related accidents and/or were lacking evidence of being categorized as a "true" pregnancy- associated death. Of the 69 cases reviewed, 21 (30%) were deemed by the MMRC to be p**regnancy-related.** For the purpose of this report, the findings of the **2022 and 2023 pregnancy-related deaths (n=21)** are combined with the total number of **pregnancy-related deaths from 2019-2021 (n=52).** The remainder of this report is based on the findings of **73 pregnancy related deaths which occurred from 2019-2023**, all of which were reviewed and determined by the MMRC.

Figure 5: Relationship between potential maternal deaths, pregnancy-associated deaths, and pregnancy-related deaths, **2022 and 2023 (combined)** Mississippi female resident deaths



Source: MSDH Office of Vital Statistics and MMRIA.

Race/Ethnicity and Age

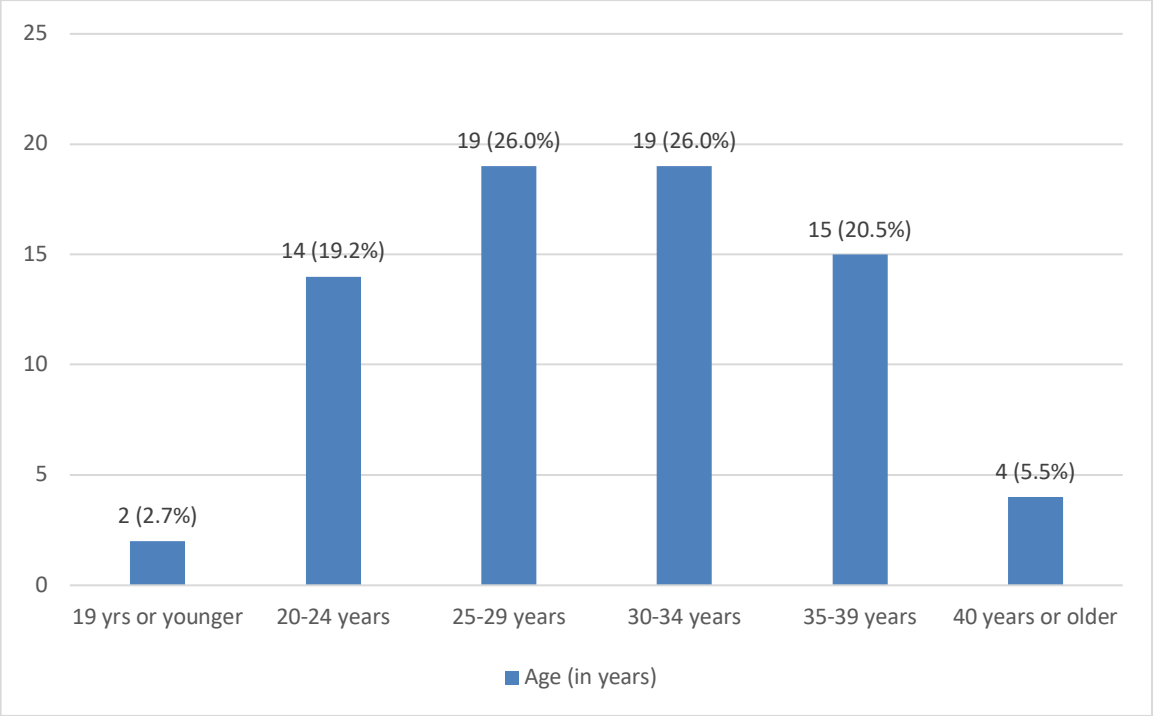
Of the 73 pregnancy-related deaths, the largest number occurred among women ages 25-34 years old (combined, n=38, 52%), followed by women ages 35-39 (n=15, 20.5%), women ages 20-24 (n=14, 19.2%), women over 40 (n=4, 5.5%), and women 19 or younger (n=2.7, 3%). Among the 73 pregnancy-related deaths occurring from 2019-2023, 55 (75.3%) were Black, Non- Hispanic, 12 (16.4%) were White, Non-Hispanic, 2 (2.7%) were Hispanic, all Races, and 4 (5.5%) were Other, Non-Hispanic or Race Unknown.

Table 6: Pregnancy-related deaths, 2019-2023 Mississippi female resident deaths

	2019-2023 Totals	
	Count	Percentage
Total	73	100.0%
Age (years)		
19 years or younger	2	2.7%
20-24 years	14	19.2%
25-29 years	19	26.0%
30-34 years	19	26.0%
35-39 years	15	20.5%
40 years or older	4	5.5%
Race/Ethnicity		
Black, non-Hispanic	55	75.3%
White, non-Hispanic	12	16.4%
Other or Unknown, non-Hispanic	4	5.5%
Hispanic, all races	2	2.7%

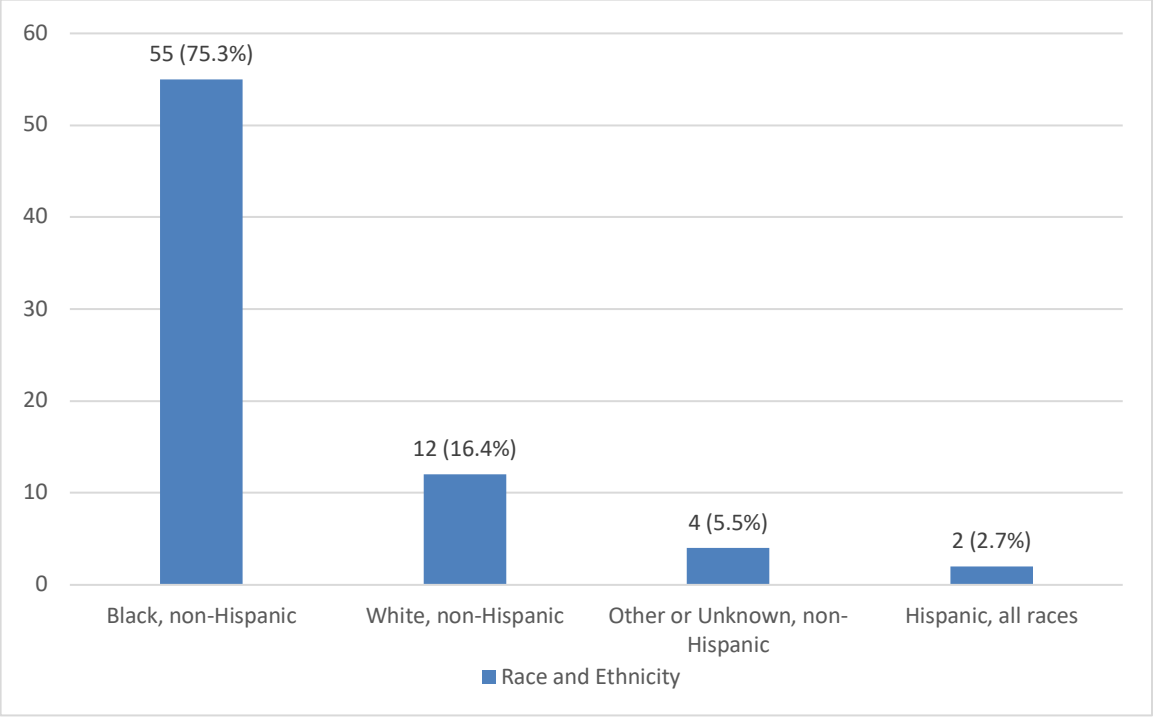
Source: MSDH Office of Vital Records, death certificates.

Figure 6: Pregnancy-related deaths by age, 2019-2023 Mississippi female resident deaths



Source: MSDH Office of Vital Records, death certificates.

Figure 7: Pregnancy-related deaths by race, 2019-2023 Mississippi female resident deaths



Source: MSDH Office of Vital Records, death certificates.

Setting of Death

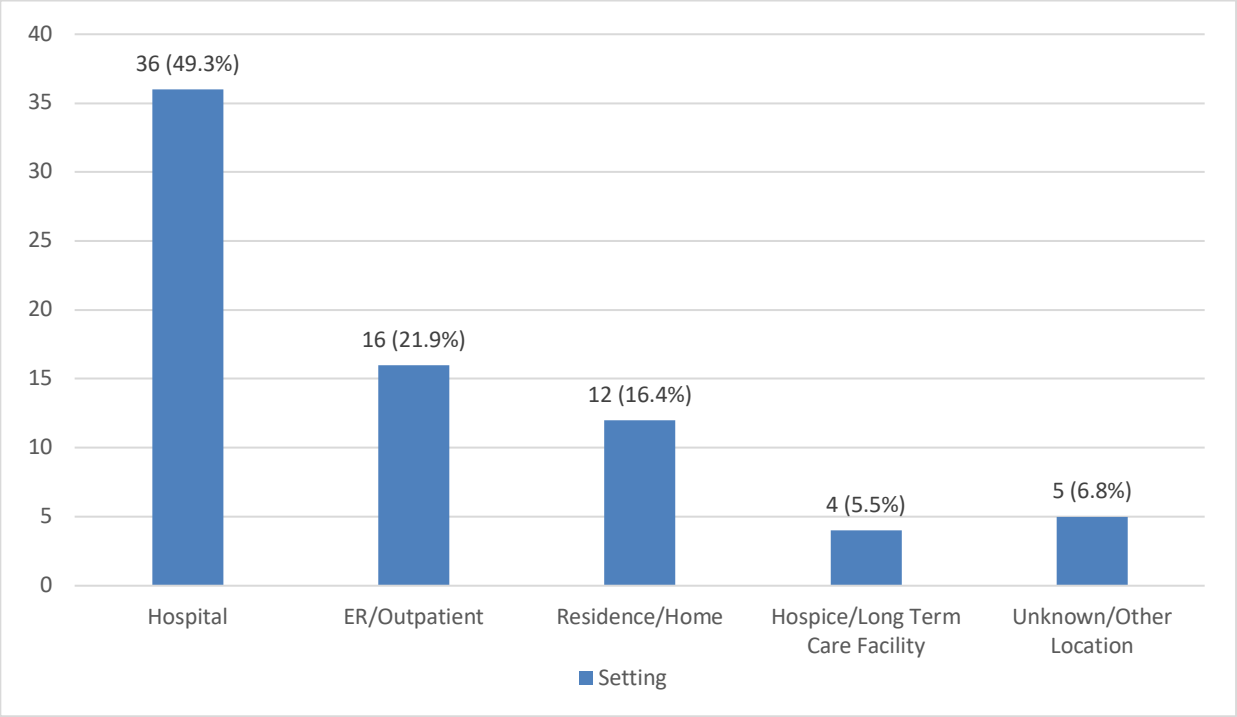
Among the 73 pregnancy-related deaths occurring from 2019-2023, as indicated on the death certificate, 36 (49.3%) occurred in a hospital and/or inpatient setting, 16 (21.9%) occurred in an emergency room or outpatient healthcare setting, 12 (16.4%) occurred at a residence or home of the decedent, and 4 (5.5%) occurred in a hospice (or related long-term care) setting. For 5 (6.8%) of the deaths, the setting was unknown or represented via another location in the women's records.

Table 7: Setting of pregnancy-related deaths, 2019-2023 Mississippi female resident deaths

	2019-2023 Total	
	Count	Percentage
Total	73	100.0%
Setting of Death		
Hospital	36	49.3%
Emergency Room/Outpatient	16	21.9%
Residence/Decedent's Home	12	16.4%
Hospice/Long Term Care Facility	4	5.5%
Unknown/Other Location	5	6.8%

Source: MSDH Office of Vital Records, death certificates.

Figure 8: Setting of pregnancy-related deaths, 2019-2023 Mississippi female resident deaths



Source: MSDH Office of Vital Records, death certificates.

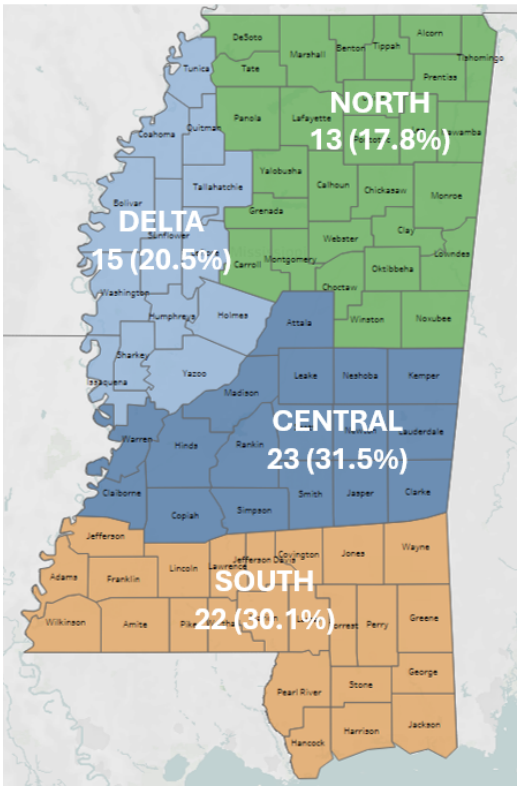


Figure 9: Pregnancy-related deaths by Public Health Regions, 2019-2023 Mississippi

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 figure and table, 31.5% (n=23) of the 73 pregnancy-related deaths that occurred from 2019-2023 were among women who resided in the Central Region of the state. The second largest percentage (30.1%, n=22) of pregnancy-related deaths occurred among women residing in the South(ern) Public Health Region, followed by the Delta Region at 20.5% (n=15) and North(ern) Region with 17.8% (n=13).

Table 8: Pregnancy-related deaths by Public Health Regions, 2019-2023 Mississippi

	2019-2023 Total	
	Count	Percentage
Total	73	100.0%
Public Health Region		
North	13	17.8%
Delta	15	20.5%
Central	23	31.5%
South	22	30.1%

Source: MSDH Office of Vital Records, death certificates.

Timing of Prenatal Care

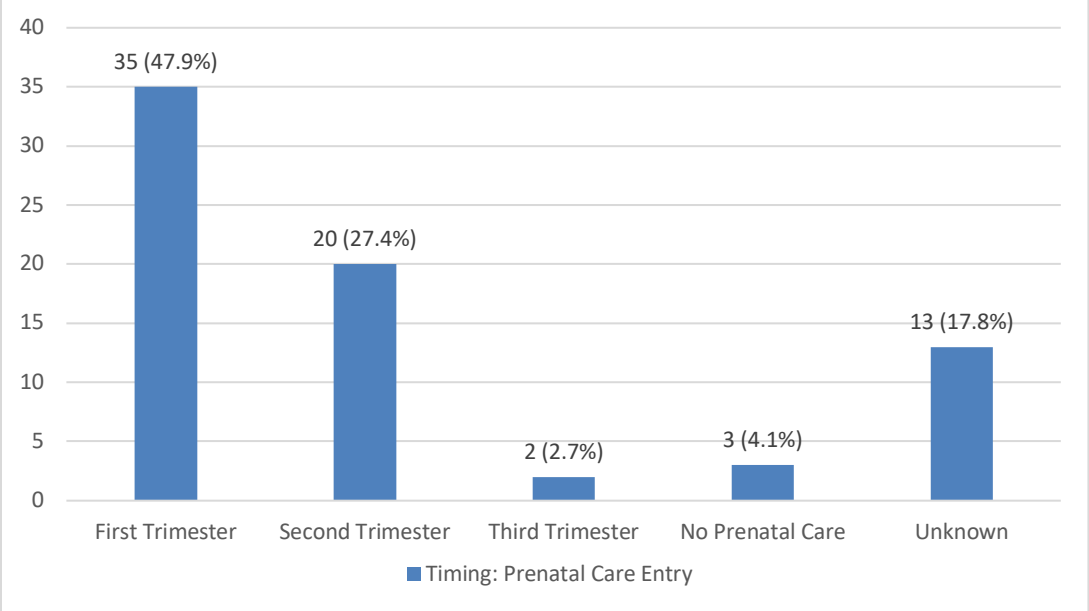
Of the 73 pregnancy-related deaths, 35 deaths (47.9%) occurred among women who began prenatal care in the first trimester, 20 (27.4%) occurred among women began prenatal care in the second trimester, and 2 (2.7%) occurred among women beginning prenatal care in the third trimester. There were 3 (4.1%) deaths that occurred whereby the women did not have any prenatal care. During the five-year period, there were 13 (17.8%) 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, 2019-2023 Mississippi female resident deaths

	2019-2023 Total	
	Count	Percentage
Total	73	100.0%
Entry to prenatal care by trimester		
First trimester (1-12 weeks)	35	47.9%
Second trimester (13-27 weeks)	20	27.4%
Third trimester (28-40 weeks)	2	2.7%
No prenatal care	3	4.1%
Unknown	13	17.8%

Source: Abstracted medical records.

Figure 10: Pregnancy-related deaths by timing of entry into prenatal care, 2019-2023 Mississippi female resident deaths



Source: Abstracted medical records.

Timing of Death

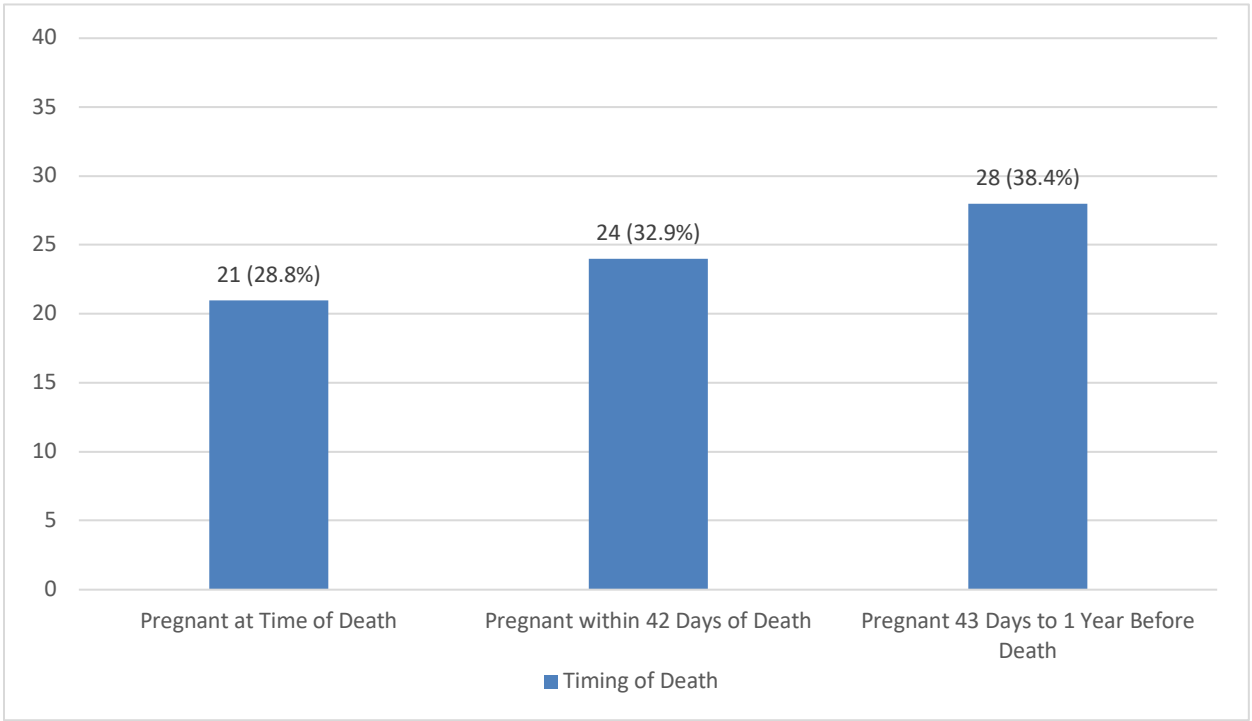
The total number of pregnancy-related deaths are summarized below using pregnancy status time periods indicated on the death certificate. Of the 73 pregnancy-related deaths, 21 deaths (28.8%) occurred among women who were pregnant at the time of their deaths; 24 (32.9%) occurred among women who had been pregnant within 42 days of their deaths; and 28 (38.4%) occurred among women who had been pregnant within 43 days to 1 year before their deaths.

Table 10: Pregnancy-related deaths by timing of death, 2019-2023 Mississippi female resident Deaths

	2019-2023 Total	
	Count	Percentage
Total	73	100%
Timing of Death		
Pregnant at time of death	21	28.8%
Pregnant within 42 days of death	24	32.9%
Pregnant 43 days to 1 year before death	28	38.4%

Source: MSDH Office of Vital Records, death certificates.

Figure 11: Pregnancy-related deaths by timing of death, 2019-2023 Mississippi female resident deaths



Source: MSDH Office of Vital records, death certificates.

Insurance Status

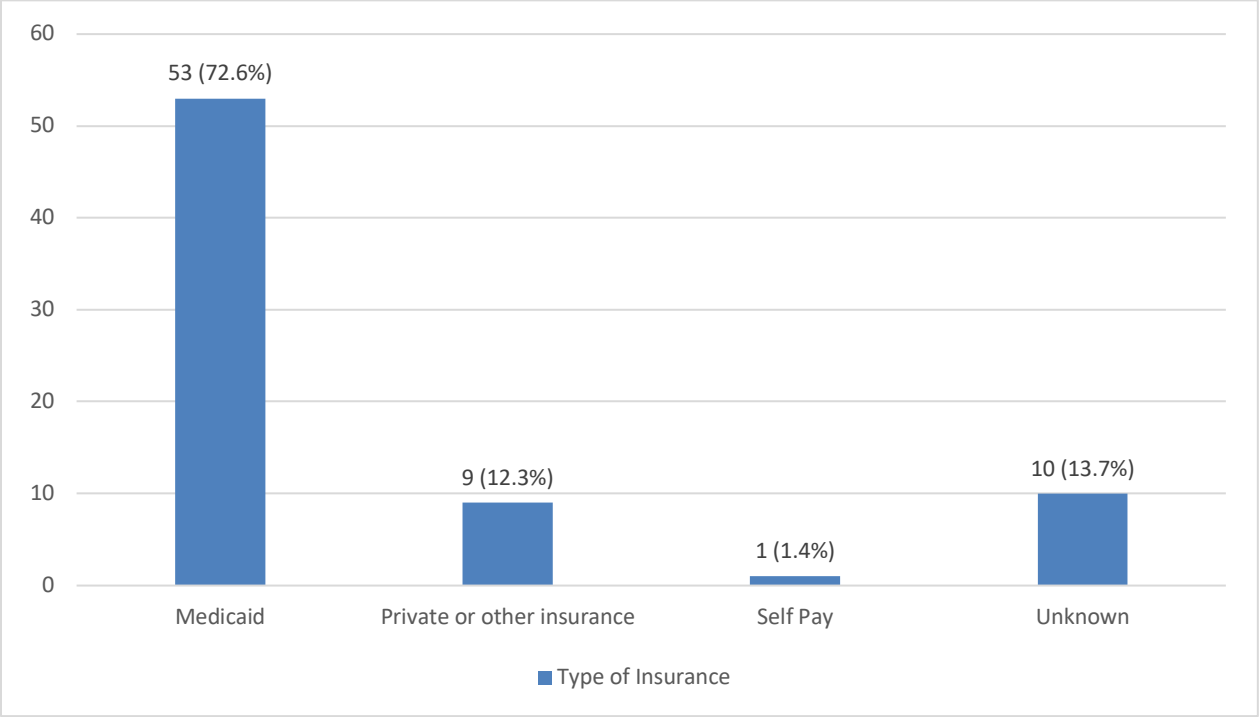
As indicated in the following table and figure, data from 2019-2023 pregnancy-related deaths indicated that 53 (72.6%) of pregnancy-related deaths were among women who had Medicaid coverage before or at the time of delivery. In addition, 9 (12.3%) had private and/or another insurer, 1 (1.4%) was self-pay, and 10 (13.7%) were unknown.

Table 11: Insurance status among pregnancy-related deaths, 2019-2023 Mississippi female resident deaths

	2019-2023 Total	
	Count	Percentage
Total	73	100.0%
Insurance status at time of delivery		
Medicaid	53	72.6%
Private or other insurance	9	12.3%
Self Pay	1	1.4%
Unknown	10	13.7%

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

Figure 12: Insurance status among pregnancy-related deaths, 2019-2023 Mississippi female resident deaths



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

Educational Status

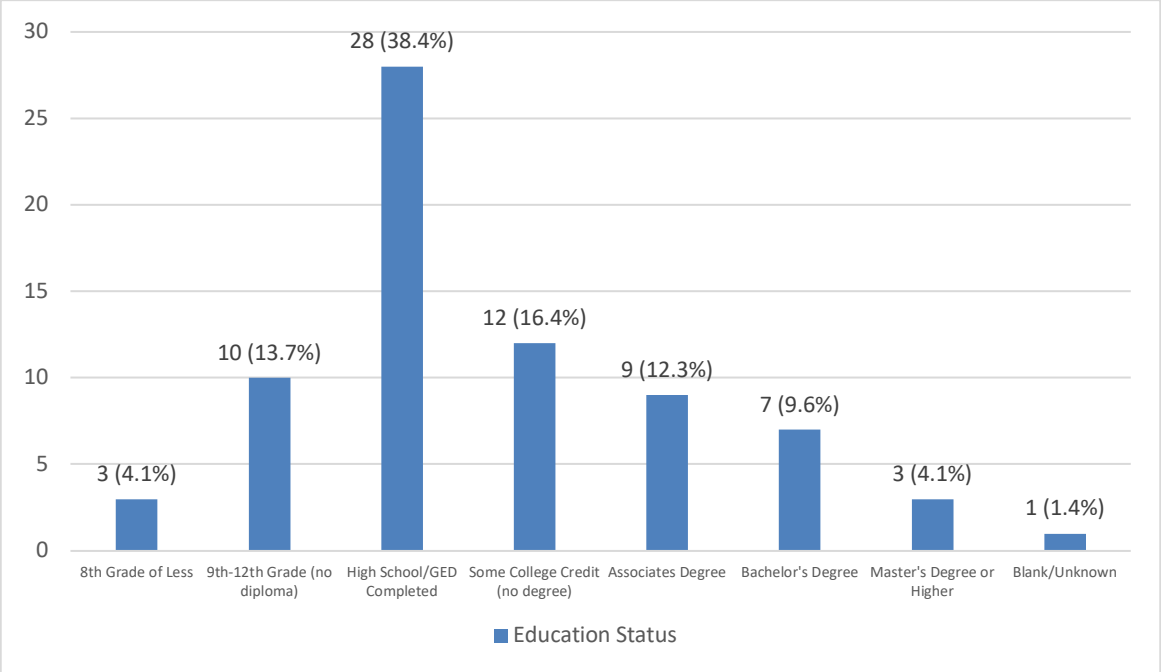
Education data are also captured in the MMRIA system for all pregnancy-related deaths and are grouped into the following categories in the table below. As indicated in the following table and figure, the majority (38.4%) of women whose death was pregnancy-related completed high school and/or GED program.

Table 12: Educational status of decedents, 2019-2023 Mississippi female resident pregnancy-related deaths

	2019-2023 Total	
	Count	Percentage
Total	73	100.0%
Educational status		
8th grade or less	3	4.1%
9th-12th grade (no diploma)	10	13.7%
High school/GED completed	28	38.4%
Some college credit (no degree)	12	16.4%
Associate degree	9	12.3%
Bachelor's degree	7	9.6%
Master's degree or higher	3	4.1%
Blank or unknown	1	1.4%

Source: MSDH Office of Vital Records, death certificates.

Figure 13: Educational status of decedents, 2019-2023 Mississippi female resident pregnancy-related deaths



Source: MSDH Office of Vital Records, death certificates.

Method of Delivery

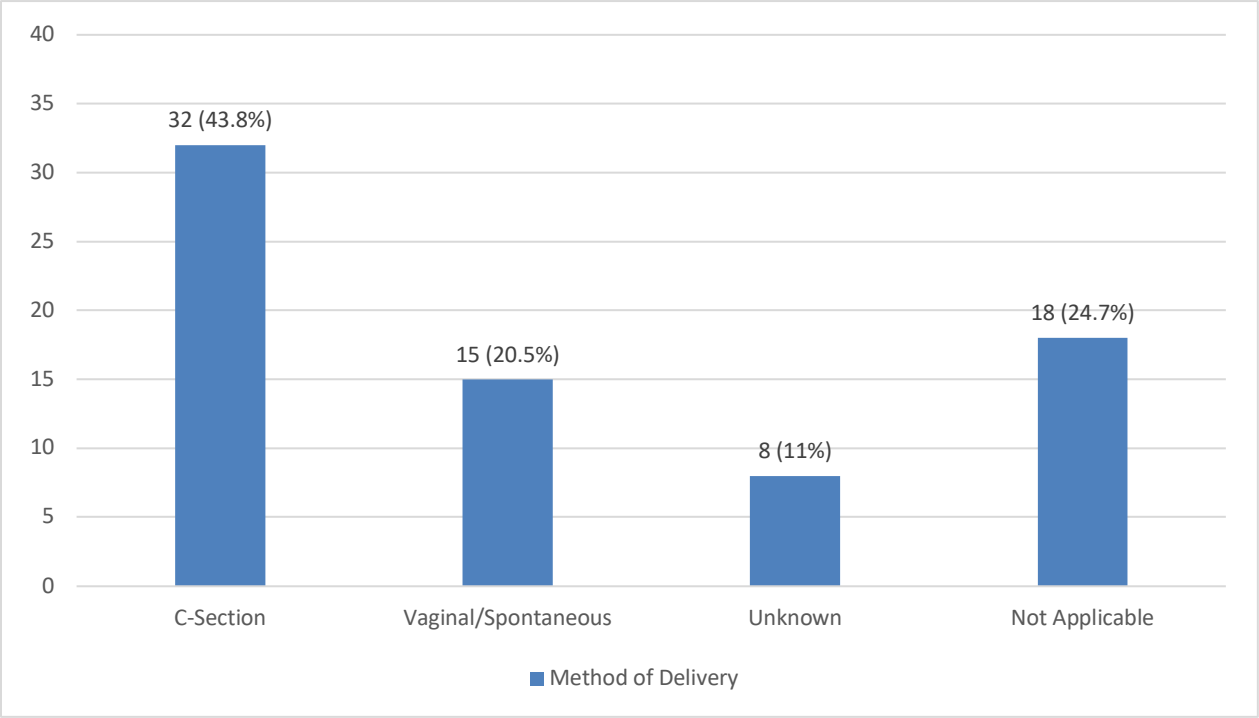
Type of delivery data among decedents from 2019-2023 data indicate that 43.8% of women had a caesarean delivery (C-Section), and 20.5% had a vaginal/spontaneous delivery. As noted in the table and figure, 26 (36%) were unknown and/or did not have an actual delivery. Most of these were due to the women being pregnant at the time of death.

Table 13: Method of delivery among decedents, 2019-2023 Mississippi female resident pregnancy-related deaths

	2019-2023 Total	
	Count	Percentage
Total	73	100.0%
Method of Delivery		
C-Section	32	43.8%
Vaginal/Spontaneous	15	20.5%
Unknown	8	11.0%
Not Applicable (no actual delivery)	18	24.7%

Source: MSDH Office of Vital Records, death certificates.

Figure14: Method of delivery among pregnancy-related deaths, 2019-2023 Mississippi female resident deaths



Source: MSDH Office of Vital Records, linked birth and 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, also known as 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.

To date, the PMSS-MM codes are categorized within the following 21 pregnancy-related clinical groups:

- Hemorrhage (Excludes Aneurysms or CVA)
- Infection
- Embolism (Excludes Cerebrovascular)
- Amniotic Fluid Embolism
- Hypertensive Disorders of Pregnancy (HDP)
- Anesthesia Complications
- Cardiomyopathy
- Hematologic
- Collagen Vascular/Autoimmune Diseases
- Conditions Unique to Pregnancy
- Injury
- Cancer
- Other Cardiovascular Conditions (excluding cardiomyopathy, HDP, and CVA)
- Pulmonary Conditions (Excludes ARDS-Adult Respiratory Distress Syndrome)
- Neurologic/Neurovascular Conditions (Excluding CVA)
- Renal Disease
- Cerebrovascular Accident (CVA) not Secondary to HDP
- Metabolic/Endocrine
- Gastrointestinal Disorders
- Mental Health Conditions
- Unknown Cause of Death

Of the 73 pregnancy-related deaths which occurred 2019-2023, Hypertensive Disorders of Pregnancy and Infections were the most common for primary underlying causes of death from 2019-2023.

The following table illustrates the top five (5) primary causes of pregnancy- related deaths

by race from 2019-2023 using the PMSS-MM codes. *Hypertensive Disorders of Pregnancy* and *Infections* were the major leading causes of pregnancy-related deaths in Non-Hispanic Black women, whereas *Infection* and *Mental Health Conditions* were the leading causes of pregnancy-related deaths in Non-Hispanic White women.

Table 14: Top Five leading causes of pregnancy-related death by race using PMSS-MM Codes, 2019-2023, Mississippi female resident deaths

Top Five Leading Causes Pregnancy-Related Deaths, By Race			
PMSS-MM Condition	**Number Black (nonHisp)**	**Number White (nonHisp)**	**Number Other Race (including Hispanics)**
Hypertensive Disorders of Pregnancy	11	0	0
Other Cardiovascular Conditions (excl. cardiomyopathy, HDP, and CVA)	8	1	0
Hemorrhage	3	0	4
Infection	**11	3	2
Mental Health Conditions	2	4	0

Source: CDC MMRIA, 2025

** As a note of reference, COVID-19 is categorized within the *Infection* PMSS-MM Codes. COVID-19 cases were most prominent in Mississippi during the 2020 and 2021 calendar years.

Preventability and Contributing Factors

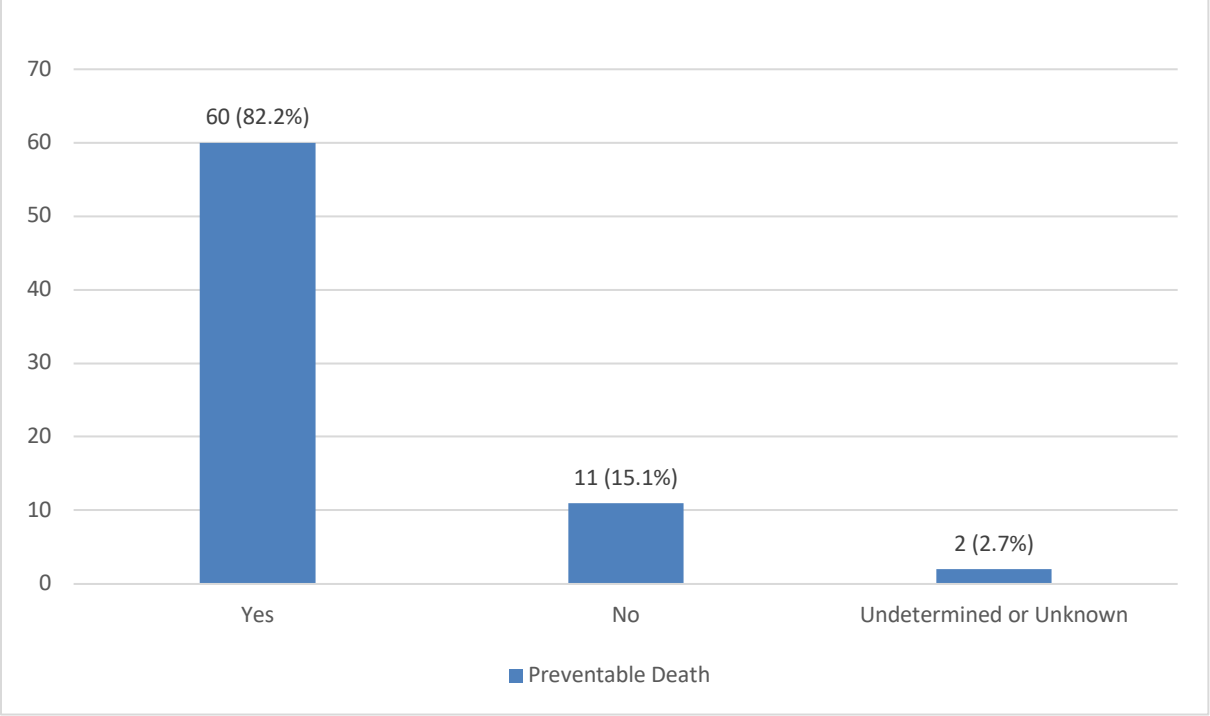
As indicated in the table and figure below, of the 73 pregnancy-related deaths reviewed by the MMRC from 2019-2023, 60 (82.2%) were determined by the committee to be preventable. A death is considered preventable if the committee determines that there was at least some chance of the death being averted by one of more reasonable changes to patient, family, provider, facility, system, and/or community factors.

Table 15: Preventability of pregnancy-related deaths, 2019-2023 Mississippi female resident deaths

	2019-2023 Total	
	Count	Percentage
Total	73	100.0%
Was the pregnancy-related death preventable?		
Yes	60	82.2%
No	11	15.1%
Undetermined or Unknown	2	2.7%

Source: MMRIA, MMRC Case reviews.

Figure 15: Preventability of pregnancy-related deaths, 2019-2023, Mississippi female resident deaths



Source: Case reviews.

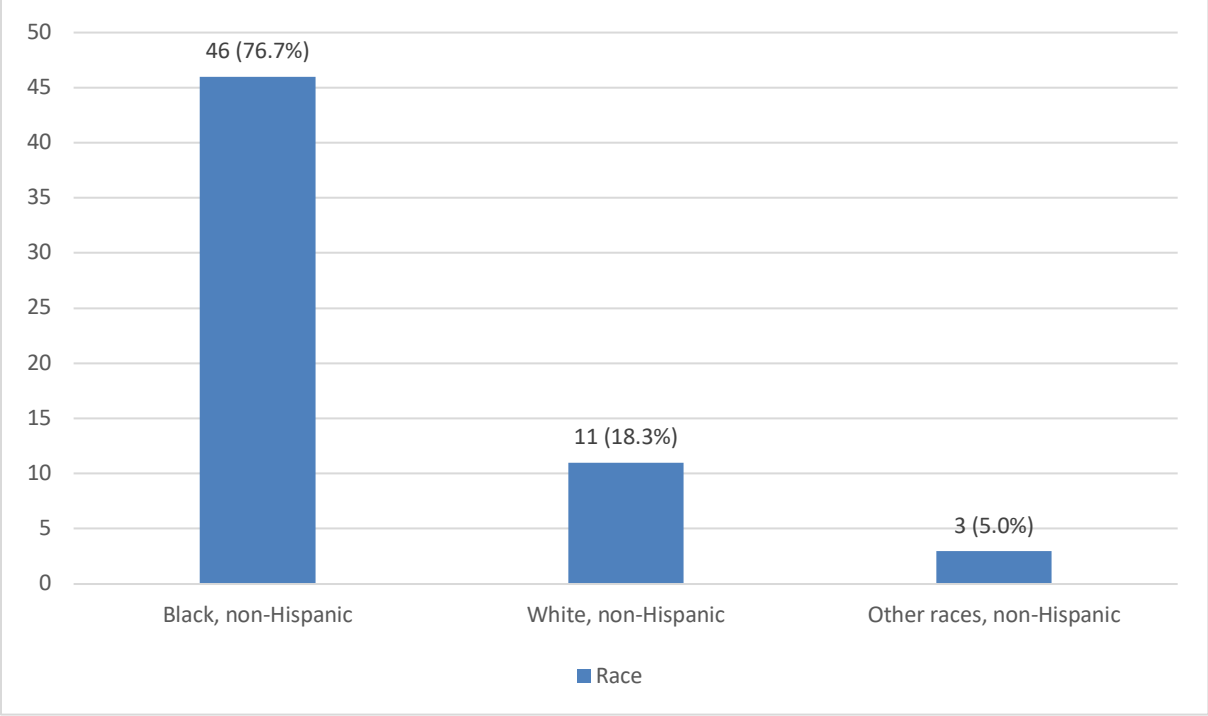
Among the 60 pregnancy-related deaths that were deemed preventable by the MMRC, 46 (76.7%) were among Black, non-Hispanic women,11 (18.3%) were among White, non-Hispanic women, and 3 (5.0%) were among women of Other races, non-Hispanic.

Table 16: Preventability of pregnancy-related deaths by race, 2019-2023 Mississippi female resident deaths

	2019-2023 Total	
	Count	Percentage
Total	60	100.0%
Race/Ethnicity		
Black, non-Hispanic	46	76.7%
White, non-Hispanic	11	18.3%
Other races, non-Hispanic	3	5.0%

Source: MMRIA, MMRC Case reviews.

Figure 16: Preventability of pregnancy-related deaths by race, 2019-2023 Mississippi female resident deaths



Source: MMRC 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.

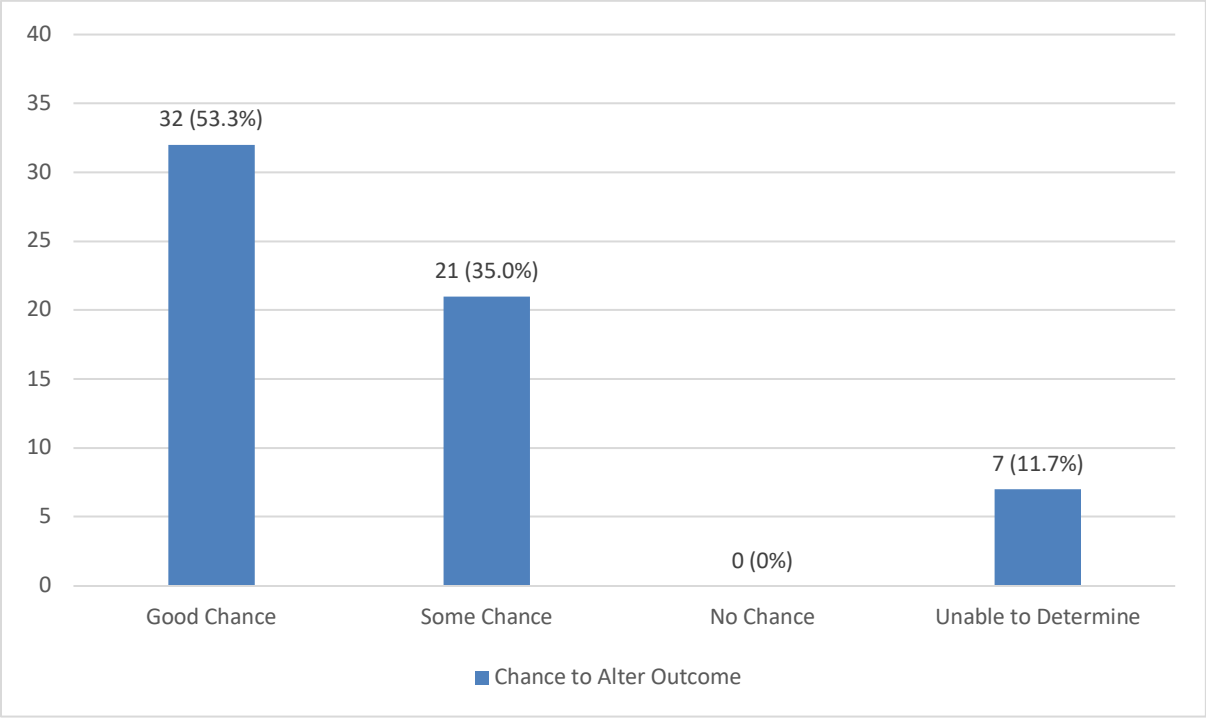
As indicated in the table and figure below, of the 60 preventable pregnancy- related deaths, a total of 53 cases (88.3%) had at least some level of chance to alter the outcome (death).

Table 17: Chance to alter outcomes among preventable pregnancy-related deaths by race, 2019-2023 Mississippi female resident deaths

	2019-2023 Total	
	Count	Percentage
Total	60	100.0%
What chance was there to alter outcome?		
Good chance	32	53.3%
Some chance	21	35.0%
No chance	0	0%
Unable to determine	7	11.7%

Source: Case reviews.

Figure 17: Chance to alter outcomes among preventable pregnancy-related deaths by race, 2019-2023 Mississippi female resident deaths



Source: MMRC 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, other supporting documentation, and informant interviews. 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 2019-2023.

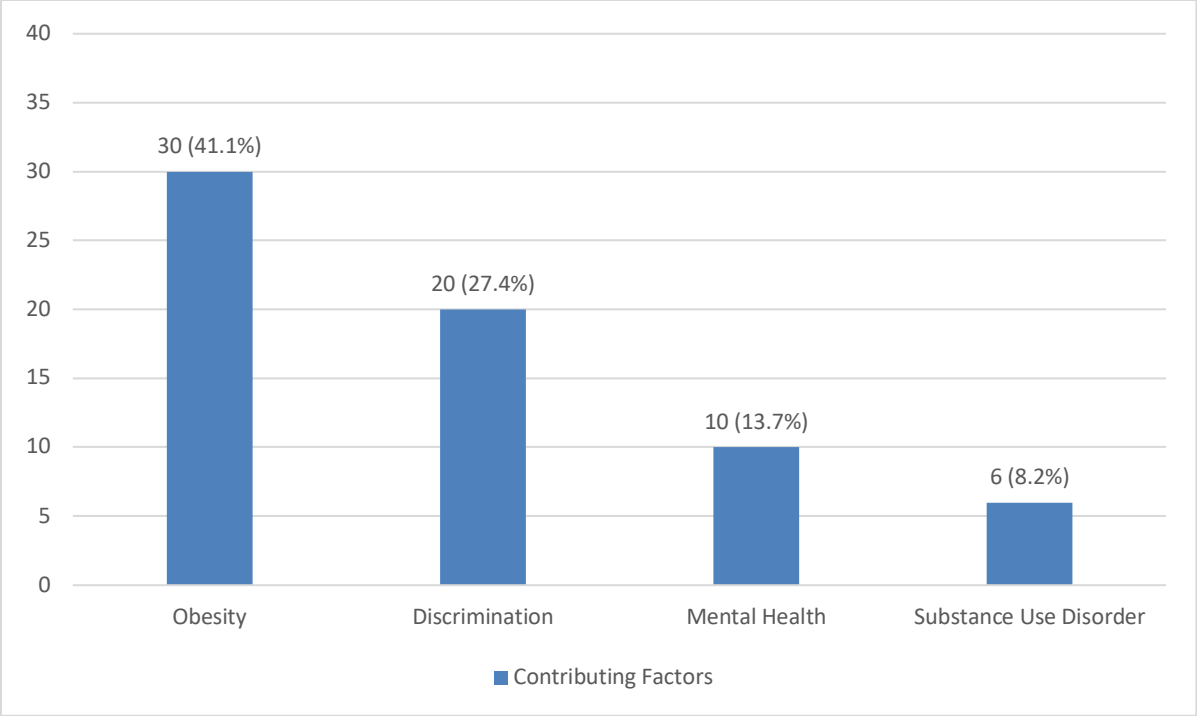
Table 18: Contributing factors among pregnancy-related deaths, 2019-2023
Mississippi female resident deaths

	2019-2023 Total	
	Count	Percentage
Total	73	100%
Contributing Factors		(% of total count or pregnancy-related deaths)
Obesity contributed to the death	30	41.1%
Discrimination contributed to the death	20	27.4%
Mental health conditions contributed to the death (excluding substance use disorders)	10	13.7%
Substance use disorder (SUD) contributed to the death	6	8.2%

Source: Case reviews.

Note: Individual contributing factors could have been selected for each, any, and/or none of the pregnancy-related deaths reviewed by the MMRC.

Figure 18: Contributing factors among pregnancy-related deaths, 2019-2023 Mississippi female resident deaths (percentage representative of total pregnancy-related deaths)



Source: MMRC Case Reviews.

Note: Individual contributing factors may represent each, any, and/or none of the reviewed pregnancy-related deaths.

RECOMMENDATIONS

Recommendations:

1. Education & Awareness
    - Educate social workers on the warning signs of maternal health complications.
    - Provide continuous education for hospital staff to better inform patients.
    - Offer ongoing training for physicians on unconscious bias in maternal care.
    - Educate patients on how to monitor their vitals and recognize warning signs.
    - Increase public awareness of drug use and its impact on maternal health.
    - Promote awareness of opioid overdose rescue medication (i.e., naloxone) availability and its use in emergency situations.
    - Provide teen education on healthy relationships and reproductive health.
    - Expand education on maternal health and maternity care across communities.
2. Support for High-Risk Mothers
    - Encourage the presence of advocates for high-risk and postpartum mothers.
    - Strengthen partnerships with organizations that support high-risk pregnancies.
    - Ensure availability of resources before, during, and after pregnancy.
    - Improve communication and education from clinical staff to high-risk mothers.
    - Provide resources and support for second victims (e.g., healthcare providers affected by adverse events).
    - All mothers should be universally screened for substance use and trauma exposure during prenatal care.
3. Access to Care
    - Increase access to postpartum visits, including virtual options.
    - Review and optimize the timeline for follow up visits after delivery.
    - Address gaps in pharmacy and Medicaid coverage for essential medications.
    - Improve facility equipment to support quality maternal care. (Rural areas)

4. Community & Environmental Health
    - Inform communities about creating and maintaining healthy environments.
    - Raise awareness about the impact of workforce and labor conditions on maternal health.
    - Advocate for domestic violence awareness and prevention.
    - Support sensible firearm injury prevention measures to enhance maternal and family safety.
5. Standardization & System Improvements
    - Promote standardized care protocols to reduce complications and improve outcomes.
    - Foster continuous learning and quality improvement across healthcare systems.
    - Require autopsies for all maternal deaths occurring during pregnancy or within the postpartum period to ensure accurate identification of causes and contributing factors.