



2020

Maternal
Mortality
Review

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This report may be viewed at the following web address:
<https://www.alabamapublichealth.gov/perinatal/maternal-mortality-review.html>

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We would also like to acknowledge our partners and stakeholders who work so diligently to change the fate of these mothers, children, and families. This report would not be possible without their collaborative efforts.

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We thank you all.

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LETTER FROM THE ALABAMA STATE HEALTH OFFICER

Dear Colleagues,

It is my honor to present to you the 2020 Annual Maternal Mortality Review Report. Since its inception in 2018, the Alabama Maternal Mortality Review Committee (AL-MMRC) – consisting of professionals from various organizations, disciplines, and backgrounds – has met quarterly to review maternal deaths throughout the state. In the past 2 years (2019 and 2020), the committee has reviewed medical records of 80 maternal deaths that occurred in 2016 and 2017.

Maternal mortality is a national crisis with sobering statistics. The U.S. Maternal Mortality Rate has increased from 17.4 per 100,000 births in 2018 to 20.1 per 100,000 births in 2019.

In 2020, Alabama had the third-highest Maternal Mortality Rate in the nation, at 36.4 per 100,000 live births. The underlying causes can be complex, such as access to healthcare, social determinants, and racial disparities. The hope of the AL-MMRC is that by reviewing each death and developing actionable recommendations, the rate of maternal mortality in Alabama will begin to decrease.

The Alabama Department of Public Health is grateful to our dedicated volunteers who serve on the AL-MMRC for devoting their time and expertise to this important work and to the State Legislature for its continued funding. Because of your ongoing support, Alabama families can look to a healthier future.

Sincerely,

Scott Harris, MD, MPH
State Health Officer

PURPOSE OF THE ALABAMA MATERNAL MORTALITY REVIEW COMMITTEE¹

“THE PURPOSE OF THE AL-MMRC is not to find fault or assign blame to individual providers or hospitals but to look for opportunities to prevent maternal mortality within and across cases for population level action. The AL-MMRC makes specific recommendations for individual cases, but the AL-MMRC realizes that the recommendations would improve maternal outcomes universally.

WE ADOPT THE STANCE that if there are recommendations for improvement whether it is at the level of the patient and families, providers and facilities, or community and system, there would be at least some chance to alter outcome, and the death would be preventable.”

¹ Some components of this statement come from Review to Action guidance. <https://reviewtoaction.org/implement/getting-started/authority-and-protections>

KEY TERMS, ABBREVIATIONS, AND ACRONYMS

KEY TERMS

To provide a consistent, objective method of reviewing maternal mortality cases, the AL-MMRC used the definitions below during case reviews:

TERM	DEFINITION	SOURCE
Pregnancy-associated	The death of a woman during pregnancy or within one year of the end of pregnancy from a cause that is not related to pregnancy.	CDC Maternal Mortality Review Committee Decisions Form and Guidance
Pregnancy-related	The death of a woman during pregnancy or within one year of the end of pregnancy from a pregnancy complication, a chain of events initiated by pregnancy, or the aggravation of an unrelated condition by the physiologic effects of pregnancy.	
Preventability	A death is considered preventable if the committee determines that there was at least some chance of the death being averted by one or more reasonable changes to patient, family, community, provider, facility, and/or systems factors.	

ABBREVIATIONS AND ACRONYMS

ADMH	Alabama Department of Mental Health
ADPH	Alabama Department of Public Health
AL-MMRC	Alabama Maternal Mortality Review Committee
BFHS	Bureau of Family Health Services
CDC	Centers for Disease Control and Prevention
CF	Contributing factors
HIPAA	Health Insurance Portability and Accountability Act
ICD-10	International Classification of Diseases, 10th Revision
MMRC	Maternal Mortality Review Committee
MMRIA	Maternal Mortality Review Information Application
NVSS	National Vital Statistics System
PRMR	Pregnancy-related mortality rate
UAB	University of Alabama at Birmingham
SAS	Statistical Analysis System

EXECUTIVE SUMMARY

MATERNAL HEALTH IS CRITICAL to the overall health and well-being of children, families, and communities. Death during this timeframe is traumatic for the family, community, healthcare providers, and others who cared for the individual who died. Maternal loss can have generational impacts.

MATERNAL MORTALITY, LIKE INFANT MORTALITY, IS AN INDICATOR of population health at national, state, and local levels. It is a measure that signals the priority of the health and well-being of women, children, and families. It indicates the investment in and importance of these populations. Maternal mortality is higher in the United States than in any other high-income country and has increased over time, while it has decreased in other countries.¹

IDENTIFYING SPECIFIC CAUSES OF MATERNAL MORTALITY IS KEY to creating changes. These changes range from a focus on policies to healthcare delivery at the local level. Maternal Mortality Review Committees (MMRCs) are essential in understanding and addressing adverse maternal health outcomes from a multidisciplinary lens. These committees perform comprehensive reviews of every death during pregnancy, childbirth, and the first year after delivery and help identify factors that contributed to the individual deaths to determine if a death could have been prevented with the overarching goal of developing policies and initiatives aimed at preventing additional deaths.

THE AL-MMRC WAS LAUNCHED IN 2018. Under the leadership of the at the Alabama Department of Public Health (ADPH), Bureau of Family Health Services (BFHS), the AL-MMRC aims to identify specific causes of maternal mortality and give actionable recommendations that can positively affect maternal outcomes.

THIS MULTIDISCIPLINARY COMMITTEE has completed the review of selected maternal deaths that occurred in 2016 and 2017. The goal of the work is to understand the causes and preventability of maternal mortality and suggest ways to improve maternal health.

USING THE CDC'S DEFINITION OF MATERNAL MORTALITY as the death of a woman during pregnancy and within one year of delivery resulted in maternal mortality statistics that differ greatly from those traditionally reported by the National Vital Statistics System (NVSS) and some other data systems. NVSS data focus only on women up to 42 days postpartum and uses death certificate coding.

THE MATERNAL MORTALITY REVIEW INFORMATION APPLICATION (MMRIA) used by MMRCs nationwide, including Alabama, is more comprehensive than the NVSS and includes clinical and non-clinical information to determine if the death was related to pregnancy, if the death was preventable, factors contributing to the death, and recommendations to prevent future deaths.

¹ Source: Eugene Declercq and Laurie Zephyrin, Maternal Mortality in the United States: A Primer (Commonwealth Fund, Dec. 2020). <https://doi.org/10.26099/ta1q-mw24>

Key Findings of Pregnancy-Associated and Pregnancy-Related Deaths (Alabama, 2016-17)

During the years 2019 and 2020, the AL-MMRC reviewed 80 maternal deaths that occurred during pregnancy or within one year of the end of pregnancy in the years 2016 and 2017. Among those deaths associated with pregnancy, 8 out of 10 deaths occurred 6 weeks after delivery. Among those deaths directly related to pregnancy, 6 out of 10 deaths occurred within 6 weeks of delivery.



- **Cardiovascular-related events, substance use, and infections** were the leading **causes of death**.
- About **50 percent of deaths** reviewed had documented **autopsies**.
- **More than 55 percent of deaths** among pregnant women who delivered were determined to be **preventable**² by the review committee.
- **More than 75 percent of deaths identified as preventable** had modifiable contributing factors which presented **some opportunities to alter death outcomes**.
- **Most of the deaths (86.3 percent)** had multiple contributing factors:
 - **Patient/family-level factors** include delay in referral or access to care, substance use disorder, limited knowledge or understanding related to significance of health event or needed treatment/follow-up, adherence to medical recommendations.
 - **Provider-level factors** include knowledge related to care or evaluation, lack of referral to needed services or consultation, clinical skills/quality of care, and failure to screen/inadequate assessment of risk.
 - **System-level factors** include lack of access/financial resources, poor communication, limited continuity of care, lack of standardized policies/procedure, and limited resources related to substance use disorders.

² See Key Terms defined on Page 8

Summary of Key Recommendations and Plans

DURING THE REVIEW AND DISCUSSION of each death, the committee provided recommendations related to prevention. Strategies continue to be explored and developed to reduce maternal deaths in Alabama.

Specific recommendations and plans include:

- *Engage state and regional partners* such as the Alabama Hospital Association, March of Dimes, regional hospitals, and medical providers to strengthen regionalization of care, ensuring women deliver their infants at the most appropriate level of care for mother and baby.
- *Recommend increasing insurance/Medicaid coverage* for postpartum care from 60 days after delivery to one year. The AL-MMRC record reviews have shown that complications leading to death can occur several months after delivery.
- *Increase capacity* to treat pregnant and postpartum women with substance use disorders.
- *Increase family engagement* to develop a deeper understanding of the underlying causes of death and complete the story of women who have died by establishing a staff position to interview their family members.
- *Seek continued legislative funding* to accomplish the AL-MMRC's mission.

SEVERAL INITIATIVES ARE IN PLACE to address these identified issues. Specifically, legislative funding now funds ADPH MMR program staff and a program that will offer autopsies for maternal deaths.

THERE HAS BEEN AN INCREASED FOCUS on mental health resources and substance use disorders with strengthened partnerships across agencies. The Governor's Initiative to Reduce Infant Mortality was launched in 2018 in three pilot counties with a focus on the physical and mental health of women.



INTRODUCTION AND BACKGROUND

The U.S. maternal mortality rate for **2016 was 12.8 deaths per 100,000** live births; for **2017**, it was **17.4**. Additionally, there are disproportionately **more deaths among women of color** compared to white women.²



ALTHOUGH UNACCEPTABLE, these increasing trends and disparities have led to increased resources, such as funding and supportive legislation, to gain a better understanding of causes and implement evidence-based prevention strategies. The Preventing Maternal Deaths Act of 2018 authorized CDC to commit resources to support state and tribal Maternal Mortality Review Committees (MMRCs).³

MMRCS PLAY AN ESSENTIAL ROLE in understanding and addressing maternal health outcomes. In many states and cities, these multidisciplinary committees perform comprehensive reviews of every death during pregnancy, childbirth, and the first year after delivery. Although information from vital records, such as death certificates and other sources, can provide some information, MMRCs help identify factors that contributed to the individual deaths to determine if a death could have been prevented. The AL-MMRC, formed in 2018, is comprised of experts and stakeholders in maternal health who are familiar with the unique context of Alabama, its systems, and resources.

THE ALABAMA MATERNAL MORTALITY REVIEW PROGRAM STAFF first gathers extensive information about each maternal mortality case that is reviewed. After the team compiles the narrative, the AL-MMRC convenes to understand the story and answer the question, “What happened?”. The committee then discusses and identifies factors that contributed to each death and develops recommendations to prevent a similar experience in the future. The review focuses on best practices in preventing events from recurring and navigating away from establishing who is to blame.⁴

² Source: National Center for Health Statistics, National Vital Statistics System, Mortality and Natality

³ See Key Terms defined on Page 8

⁴ See Key Terms defined on Page 8

METHODS

ADPH STAFF IDENTIFIED WOMEN AGES 15-56 YEARS who died in 2016 and 2017, during pregnancy or within one year of delivery. After reviewing all records, the Maternal Mortality Review Program staff determined eligibility for committee review based on the following criteria:

- International Classification of Disease, 10th Revision (ICD-10) Codes
- Pregnancy status associated with verified linkages of birth and fetal death records
- Pregnancy check box indicator on the death certificate
- Alabama resident
- Death not caused by homicide or motor vehicle accident

INITIALLY, THERE WERE 167 MATERNAL DEATHS FOR POTENTIAL REVIEW for both years. Fifty-four women were excluded from the study due to not being pregnant or inability to confirm pregnancy status. Additional exclusions (N=33) included women who were non-Alabama residents and those who died due to homicide or motor vehicle accident (total excluded = 87).

THERE WAS A COMBINED TOTAL OF 80 CASES REVIEWED by the AL-MMRC committee from the years 2016 and 2017. For the cases found to be eligible, pertinent documents, including medical records, autopsy reports, and other evidence, were gathered and summarized into individual, de-identified case narratives. These narratives were then reviewed by the AL-MMRC, using the CDC’s MMRIA Committee Decisions form.

Maternal Mortality Review Information Application

FOR EACH CASE, the committee used the CDC’s MMRIA Committee Decisions form to capture important information, including cause of death, contributing factors, and preventability from multiple data sources. Through these retrospective comprehensive reviews, recommendations were developed with the confidence that, if implemented, the landscape of maternal mortality in Alabama would be enhanced to improve maternal health and related outcomes.

FIGURE 1 shows the sources of information, if available, that were provided to the MMR staff, and are included in the review process.

Figure 1: Potential Data Sources for Reviews

Data Source Types	
Death Certificate	Mental Health Records
Autopsy Report	Hospital Records
Birth Certificate or Fetal Death Certificate	Emergency Department Visits
Prenatal Records Including Office Visits	Medical Transport Records
Law Enforcement Records	

Committee Decision Process

Key Decisions Made by the Committee

1. Was the death pregnancy-related?
2. What was the underlying cause of death?
3. Was the death potentially preventable?
4. What were the factors that contributed to the death?
5. What are the recommendations and actions that address those contributing factors?

During its deliberation, the committee makes these key decisions for each death reviewed:

1. Was the death pregnancy-related?
2. What was the underlying cause of death?
3. Was the death potentially preventable?
 - a. Determine Preventability
 - i. Yes
 - ii. No
 - b. Determine Chance to Alter Outcome *
 - i. Unable to Determine
 - ii. Good Chance
 - iii. Some Chance
 - iv. No Chance

*A case was considered to have some or good chance to alter the outcome when specific and feasible actions, if implemented, might have changed the course of the woman's disease trajectory, and potentially prevented the death.

4. What were the factors that contributed to the death?

Contributing factors to the death were categorized into the following five levels: 1) patient/family, 2) provider, 3) facility, 4) community, and 5) system.

- Patient/family factors include circumstances, risk factors, or health behaviors.
- Provider factors include actions involving diagnosis, treatment, and communication processes.
- Facility factors include the physical location where direct care is provided.
- Community factors are those related to place or identity.
- System factors are those interacting support services, policies, programs, and other contextual issues that have influence before, during, or after a pregnancy.

For the purposes of this report, facility, community, and system factors were combined into the system contributing factor level.

5. What are the recommendations and actions that address those contributing factors?

Recommendations and actions included quality improvement opportunities, defined as alternative approaches to recognition, diagnosis, treatment, or follow-up, which, if implemented, may have led to better patient care or a better outcome.

METHODS

AFTER THE COMMITTEE REVIEWS EACH CASE, the record is updated in MMRIA. The comprehensive record includes data from the sources listed above along with committee decisions. This information is then extracted and analyzed using Statistical Analysis Software (SAS), Microsoft Excel, and Microsoft Access.

OVER THE COURSE OF THE 2016 AND 2017 CASE REVIEWS, more than 400 recommendations were recorded. These recommendations were analyzed using NVivo 12 Plus to identify common themes. This process was guided by the themes included in the 2016 report and new themes were defined as necessary.

THE FOLLOWING SECTIONS PROVIDE THE DATA AND RELATED RECOMMENDATIONS for Alabama's 2016 and 2017 maternal deaths. In accordance with HIPAA and ADPH data reporting guidelines on small numbers, some reporting was suppressed. Most data represented in this report include all reviewed cases, regardless of pregnancy-relatedness. In some instances, data may be disaggregated by a select category to provide additional insight.



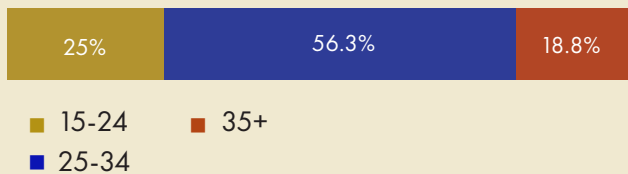
RESULTS

MORE THAN 56 PERCENT of the maternal mortality cases reviewed were between 25 and 34 years of age; almost 19 percent were among women over the age of 35. The distribution of age for maternal mortality cases shifts toward older women. Women over age 35 made up only 11 percent of live births.

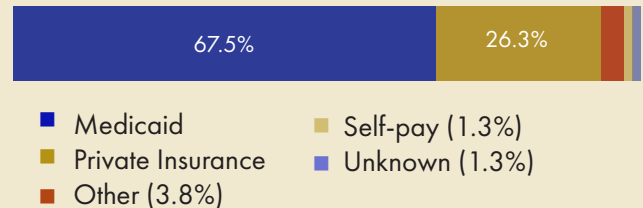
AMONG THE MATERNAL MORTALITY CASES, 55 percent were identified as non-Hispanic White and 36.3 percent as non-Hispanic Black. Almost 60 percent of maternal mortality cases had a high school education or less, compared to 46.1 percent of live births. Roughly two-thirds of the maternal mortality cases were among women who lived in urban areas and who had Medicaid as the payment source for care and delivery. Although almost 80 percent of maternal mortality cases had prenatal care in the first or second trimester, 11.3 percent had no prenatal care, compared to slightly more than 2 percent of women who delivered live births. More than two-thirds (68.8%) of the deaths reviewed had documented pre-existing medical conditions.

Figure 2: Summary of Demographics of Cases Reviewed (n=80)

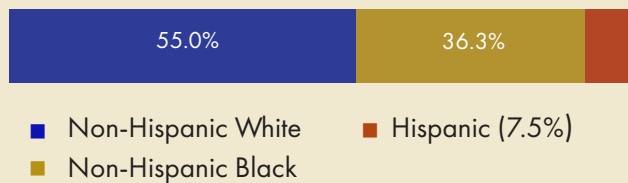
Age Group in Years



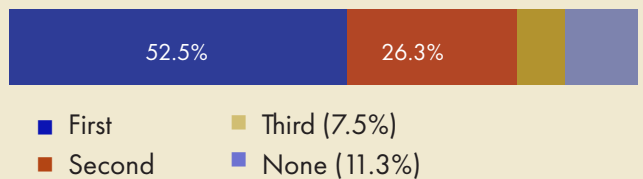
Payment Source



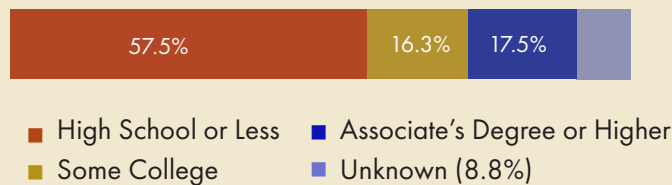
Race/Ethnicity



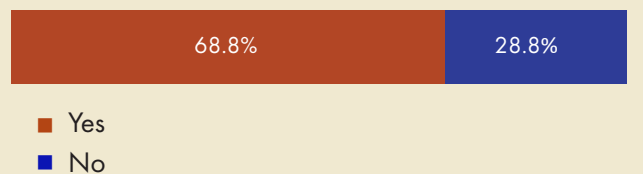
Trimester of First Prenatal Care Visit



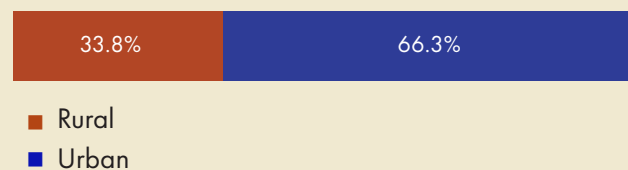
Education Level



Pre-existing Conditions



Rural/Urban



*Note: Percentages may not sum to 100% due to rounding.

RESULTS

TABLE 1 PROVIDES THE DEMOGRAPHIC INFORMATION for reviewed maternal deaths that occurred during pregnancy or within one year of the end of the pregnancy, regardless of whether the cause of death was related to pregnancy (both pregnancy-related and pregnancy-associated deaths). Table 1 also includes the percentage of select characteristics of women who delivered live births during the same period.

Table 1*: Demographics of Pregnancy-Associated and Pregnancy-Related Maternal Morbidity Cases Reviewed by the Committee, 2016-2017

	Number of cases reviewed (Percentage) {N=80}	Alabama Live Births-Certificate of Birth Status (Percentage) {N=118,026}
Age Groups (Years)		
15-24	20 (25.0%)	40,549 (34.4%)
25-34	45 (56.3%)	64,245 (54.4%)
35+	15 (18.8%)	13,140 (11.1%)
Race/Ethnicity		
Non-Hispanic White	44 (55.0%)	70,760 (60.0%)
Non-Hispanic Black	29 (36.3%)	36,265 (30.7%)
Hispanic	6 (7.5%)	8,238 (7.0%)
Maternal Education Level		
High School or Less	46(57.5%)	54,360 (46.1%)
Some College	13 (16.3%)	25,984 (22.0%)
Associate's Degree or Higher	14 (17.5%)	37,416 (31.7%)
Unknown	7 (8.8%)	266 (0.2%)
Alabama Rural Health Association (ARHA) Rural/Urban Designation		
Rural	27 (33.8%)	48,768 (41.3%)
Urban	53 (66.3%)	69,258 (58.7%)
Payment Source		
Medicaid	54 (67.5%)	58,961 (50.0%)
Private Insurance	21 (26.3%)	51,958 (44.0%)
Other	3 (3.8%)	4,482 (3.8%)
Self-pay	1 (1.3%)	2,559 (2.2%)
Unknown	1 (1.3%)	66 (0.1%)
Trimester of First Prenatal Care Visit		
First	42 (52.5%)	78,146 (66.2%)
Second	21 (26.3%)	29,614 (25.1%)
Third	6 (7.5%)	7,062 (6.0%)
None	9 (11.3%)	2,541 (2.2%)
Documented Pre-existing Medical Conditions		
Yes	55 (68.8%)	--

* Note: In cases reviewed, only the listed variables were considered when documenting the numbers and percentages of cases. Some cases reviewed did not have all of the information for the variables included in the records that were received by the MMRP.

* Source: 2016 and 2017 Annual Birth File for Alabama Residents, ADPH Center for Health Statistics. Sums and percentages may not be equivalent to the number of total live births or 100 because categories and variables presented here are not exhaustive when compared to source data. Data for Documented Preexisting Medical Condition (s) not included due to differences in data collections and methodology between data sources.

RESULTS

TABLE 2 PRESENTS THE TIMING OF DEATH by pregnancy-relatedness. Seven women (8.8%) of the reviewed 80 deaths were pregnant at the time of death. More than half of reviewed deaths (57.5%), both pregnancy-associated and pregnancy-related, occurred 43-365 days postpartum. Of those during the same period postpartum, 80.0 percent were pregnancy-associated. However, among those deaths that occurred within 42 days postpartum, 62.9 percent were pregnancy-related.

Table 2: *Timing of Death and Critical Factors*

Timing of Death	Total n (%)	Pregnancy-Associated n (%)	Pregnancy-Related n (%)
Pregnant at Time of Death	7 (8.8%)	*	*
Died within 42 Days Postpartum	27 (33.8%)	5 (11.1%)	22 (62.9%)
Died 43-365 Days Postpartum	46 (57.5%)	36 (80.0%)	10 (28.6%)

*Categories with fewer than 5 cases have been suppressed to protect anonymity.

Causes of and Contributors to Deaths

CARDIOVASCULAR-RELATED EVENTS, SUBSTANCE OVERDOSE/TOXICITY, AND INFECTIONS were the leading causes of death in the 80 cases reviewed during this period. Amniotic fluid embolism and disseminated intravascular coagulation were also contributors to death in these cases. Only half of these deaths included an autopsy report. Autopsies are critical in the reviews, providing greater clinical insight on cause of death as well as potential preventative measures.

Preventability and Contributing Factors

Table 3 shows the distribution of maternal mortality cases by preventability. Of the 80 cases reviewed, **more than half (56.3%) were deemed as preventable**. Of those preventable deaths, 43 (95.6%) were identified as having a “good” or “some” chance (shown in Table 4) of the course of the outcome being altered.

Table 3: *Death Preventability (Pregnancy-Related and Pregnancy-Associated Combined)*

Death Preventability	N=80	%
Preventable	45	56.3%
Not Preventable	33	41.3%
Unable to Determine	2	2.5%

RESULTS

Table 4: Chance to Alter Preventable Only Outcomes (Pregnancy-Related and Pregnancy-Associated Combined)

Chance to Alter Preventable Only Outcome	N=45	%
Good Chance	8	17.8%
Some Chance	35	77.8%
Unable to Determine	2	4.4%

MATERNAL MORTALITY IS RARELY DUE TO ONE SINGLE FACTOR. Typically, there is a compilation of issues that influence the outcomes. For the maternal deaths in 2016-2017, more than 86 percent of the deaths had more than one factor identified at more than one level of contributing factors (patient/family, provider, system). For example, a woman may have had a significant chronic disease, but she also may have had issues with access to care because of no insurance or no referral to a needed specialty provider. **Table 5** provides a summary of the top contributing factors assigned by the AL-MMRC within the patient/family, provider, and system levels among the cases reviewed.



RESULTS

Table 5: Definitions of the Contributing Factors as listed on the MMRIA form

Patient/Family	Provider	System
<p>Delay: The provider or patient was delayed in referring or accessing care, treatment, or follow-up care/ action.</p>	<p>Knowledge Related to Clinical Care: The provider or patient did not receive adequate education or lacked knowledge or understanding regarding the significance of a health event (e.g., shortness of breath as a trigger to seek immediate care) or lacked understanding about the need for treatment/follow-up after evaluation for a health event (e.g., needed to keep appointment for psychiatric referral after an ED visit for exacerbation of depression).</p>	<p>Lack of Access/Financial Resources: Systemic barriers, e.g., lack or loss of healthcare insurance or other financial duress, as opposed to noncompliance, impacted their ability to care for themselves (e.g., did not seek services because unable to miss work or afford postpartum visits after insurance expired). Other barriers to accessing care: insurance non-eligibility, provider shortage in their geographical area, and lack of public transportation.</p>
<p>Substance Use Disorder, Alcohol/Drugs: Substance use disorder is characterized by recurrent use of alcohol and/or drugs causing clinically and functionally significant impairment, such as health problems or disability. The committee may determine that substance use disorder contributed to the death when the disorder directly compromised their health status (e.g., acute methamphetamine intoxication exacerbated pregnancy-induced hypertension, or they were more vulnerable to infections or medical conditions).</p>	<p>Lack of Referral to Needed Services or Consultation: Specialists were not consulted or did not provide care; referrals to specialists were not made.</p>	<p>Poor Communication/Lack of Continuity of Care/Lack of Care Coordination or Management: Care was fragmented (i.e., uncoordinated or not comprehensive) among or between healthcare facilities or units, (e.g., records not available between inpatient and outpatient or among units within the hospital, such as Emergency Department (ED) and Labor and Delivery).</p>
<p>Knowledge: The provider or patient did not receive adequate education or lacked knowledge or understanding regarding the significance of a health event (e.g., shortness of breath as a trigger to seek immediate care) or lacked understanding about the need for treatment/follow-up after evaluation for a health event (e.g., needed to keep appointment for psychiatric referral after an ED visit for exacerbation of depression).</p>	<p>Clinical Skills/Quality of Care: Personnel were not appropriately skilled for the situation or did not exercise clinical judgment consistent with standards of care (e.g., error in the preparation or administration of medication or unavailability of translation services).</p>	<p>Lack of Standardized Policies/ Procedure: The facility lacked basic policies or infrastructure germane to the individual's needs (e.g., response to high blood pressure, or a lack of or outdated policy or protocol).</p>
<p>Adherence to Medical Recommendations: The provider or patient did not follow protocol or failed to comply with standard procedures (i.e., non-adherence to prescribed medications).</p>	<p>Failure to Screen/Inadequate Assessment of Risk: Factors placing the individual at risk for a poor clinical outcome recognized, and they were not transferred/ transported to a provider able to give a higher level of care.</p>	<p>Substance Use Disorder, Alcohol/ Drugs: Substance use disorder is characterized by recurrent use of alcohol and/or drugs causing clinically and functionally significant impairment, such as health problems or disability. The committee may determine that substance use disorder contributed to the death when the disorder directly compromised their health status (e.g., acute methamphetamine intoxication exacerbated pregnancy-induced hypertension, or they were more vulnerable to infections or medical conditions).</p>

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Table 5 (continued): Definitions of the Contributing Factors as listed on the MMRIA form

Patient/Family	Provider	System
<p>Chronic Disease: Occurrence of one or more significant pre-existing medical conditions (e.g., obesity, cardiovascular disease, or diabetes).</p>	<p>Substance Use Disorder, Alcohol/Drugs: Substance use disorder is characterized by recurrent use of alcohol and/or drugs causing clinically and functionally significant impairment, such as health problems or disability. The committee may determine that substance use disorder contributed to the death when the disorder directly compromised their health status (e.g., acute methamphetamine intoxication exacerbated pregnancy-induced hypertension, or they were more vulnerable to infections or medical conditions).</p>	



IMPLICATIONS AND RECOMMENDATIONS

Recommendations for Patients/Families

Patient Education

ONE SIGNIFICANT ASPECT TO SAFEGUARD MATERNAL HEALTH IS EDUCATION of the patient regarding important health topics related to preconception, interconception, and postpartum care. Most of the cases reviewed involved many “Patient/Family” level contributing factors associated with the maternal death. Improving education for patients and families, as well as ensuring that all patients receive adequate care are important steps to preventing maternal deaths.

Specifically, the committee recommends:

1. PROVIDE EDUCATIONAL MATERIALS.

- a. These resources should include information on specific medical conditions, preconception and interconception counseling, and healthcare and community resources available to them.
- b. Additionally, these resources should help patients understand the importance of attending prenatal and postpartum visits, medication adherence, and maintenance of ongoing medical conditions.

2. PROVIDE PATIENTS AND FAMILIES WITH EDUCATION ON THE SIGNS AND SYMPTOMS OF POTENTIALLY SERIOUS CONDITIONS during pregnancy, mental illness, and substance use disorder.

Recommendations for Providers

PROVIDERS WHO WORK DIRECTLY WITH MATERNAL PATIENTS are often a pregnant woman’s first line of contact within the healthcare system and play an important role in the prevention of maternal deaths. All providers, including those outside of the obstetric specialty, should be equally educated on important topics which impact maternal health, such as condition-specific protocols, patient care, and the management of patient needs.

Specifically, the committee recommends:

1. **PROPERLY SCREEN FOR CONDITIONS** (including mental health and substance use disorders, signs of severe maternal morbidity and mortality, chronic conditions) during pregnancy and throughout postpartum.
2. **ADDRESS CONTRACEPTION** for patients and preconception health, as well as provide resources related to maternal health.
3. **TRAIN PROVIDERS TO FOLLOW EVIDENCE-BASED PROTOCOLS** for optimal health outcomes during pregnancy and postpartum, including the provision of case management and referrals to specialists as necessary.

Recommendations for Facilities

HOSPITAL PRACTICES AND POLICIES HAVE AN INCREDIBLE IMPACT on maternal mortality and the preventability of maternal deaths. A lack of communication regarding patient care both within and between facilities can lead to inadequate delivery of services. Hospitals and providers should work to provide patient-centered care that would promote health among all women. There should also be an emphasis placed on the facility’s role in helping patients navigate the healthcare system; creating a system of care coordination, including one specifically for pregnant and postpartum patients, could reduce the likelihood of maternal deaths.

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Specifically, the committee recommends:

1. **INCORPORATE SOCIAL SERVICES** into postpartum care and implement the adoption of safety bundles.
2. **IMPLEMENT PROTOCOL MANAGEMENT** of pregnant/postpartum women with complicated cases, including designation of who admits patients to hospitals, in all EDs.
3. **INCREASE ACCESS TO SERVICES AND PROVIDE QUALITY CARE** to all patients through evidence-based policies and protocols.
4. **IMPLEMENT PROTOCOLS FOR MANAGEMENT** of hypertension, massive transfusion, and sepsis.

Recommendations for Communities

Improve Public Health Programs

COMMUNITY-BASED ORGANIZATIONS AND PUBLIC HEALTH AGENCIES can act as a powerful resource for women and their families outside of the immediate healthcare system. Creating a network of robust public health programs that focuses on the social determinants of health can promote maternal well-being. Education on chronic health conditions, promotion of positive social-emotional environments, and creation of safe communities for all can be addressed by various entities.

Specifically, the committee recommends:

1. **CREATE PUBLIC HEALTH PARTNERSHIPS** with local organizations to sponsor health events in the community, specifically for preconception, interconception, prenatal, and postpartum resources.
2. **INCREASE FUNDING FOR AND ACCESS TO COMMUNITY SUPPORT PROGRAMS** for obesity, smoking-related disease, and drug/alcohol use.

Recommendations for System/State

Institute Maternal Levels of Care

EXISTING NATIONAL STANDARDS REGARDING LEVELS OF MATERNAL CARE SHOULD BE ADOPTED, as they are critical to reducing maternal morbidity and mortality and ensuring the provision of risk-appropriate care that is specific to the needs of women. This includes determining who is responsible for patient hospital admissions; the unit/department which is most appropriate to ensure quality of care; and usage of telemedicine and/or phone consults for transferal of patients to higher levels of care. Providers should know when to make appropriate referrals to ensure a multidisciplinary approach to care that includes specialists and work collaboratively to provide needed resources for patients to have adequate medical care.

SPECIFICALLY, THE COMMITTEE RECOMMENDS that the state should adopt a system of maternal levels of care, under which providers can refer complicated maternal cases to higher levels of care early in pregnancy to ensure the best health outcomes.

Improve Access to Healthcare Coverage

THROUGHOUT THE CASE REVIEW PROCESS, the committee found that barriers to accessing healthcare and using prenatal/postpartum services remain a significant issue in addressing maternal mortality. Many of the cases reviewed by the committee were identified as women receiving coverage through the state's Medicaid program. Removing the barriers to obtaining Medicaid could improve continuity of care during the pregnancy and postpartum periods. Findings from the review process show that most maternal deaths occurred 43 to 365

IMPLICATIONS AND RECOMMENDATIONS

days after the end of pregnancy. Ensuring that women maintain Medicaid coverage through this timeframe could decrease maternal deaths. Additionally, many women in the postpartum period seek counseling and family planning services through their providers. However, public and private coverage options have different restrictions on the provision of long-acting reversible contraception (LARC) and other family planning options. To honor the reproductive rights of all women, it's important that contraception and family planning services be offered/provided equally.

Specifically, the committee recommends:

1. **MEDICAID EXPANSION** up to one year postpartum and improved reimbursement for providers.
2. **WAIVE THE EXISTING MEDICAID WAITING PERIOD** for women requesting a postpartum bilateral tubal ligation.

Improve Data Collection and MMR Process

ADPH and the AL-MMRC play an important and essential role in the data collection process, the dissemination of findings, and the provision of support for programs/policies aimed to prevent maternal deaths. The AL-MMRC works with other state agencies and healthcare professionals to provide meaningful feedback on each maternal death. However, there are several aspects of the process that could be improved.

Specifically, the committee recommends:

1. **PROVIDE ABSTRACTORS WITH GREATER ACCESS TO PATIENT INFORMATION** as it relates to maternal mortality. All facilities, providers, coroners, and relevant authorities should provide records to the MMR staff when requested to allow for a comprehensive review of each case by the AL-MMRC.

Recommendations Across Levels

Substance Use and Mental Health Disorders

THE COMMITTEE FOUND SIGNIFICANT GAPS in the provision of care and treatment services for women struggling with substance use and/or mental health disorders. Substance use treatment beds for pregnant women are an urgent need, yet only a limited number of beds are available within the state. Access to mental health services, treatment, and providers must be improved to allow women with such conditions to receive care. Punitive measures for pregnant women with mental health and substance use disorders must be eliminated to create an environment that encourages them to seek assistance during pregnancy. Out of fear of negative consequences (e.g., incarceration or losing custody of children), women avoid accessing appropriate care, which leads to missed opportunities for treatment of both the mother and baby.

Specifically, the committee recommends:

1. **INCREASE ACCESS TO AND AWARENESS OF SUBSTANCE USE DISORDER PROGRAMS** for pregnant and postpartum patients; increase number of beds at substance abuse facilities and providers who treat SUD in pregnancy; and include patient's social network to provide closer surveillance of patients with a history of SUD and/or mental illness during pregnancy and postpartum periods.
2. **DECREASE CRIMINALIZATION MEASURES** against pregnant women with substance use disorder and release providers from liability of mandatory reporting to law enforcement if there is concern for chemical endangerment.
3. **EXPAND AND IMPROVE MENTAL HEALTH SERVICES STATEWIDE**, including screening protocols for pregnant and postpartum women and the inclusion of wraparound services for mental healthcare.

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Autopsies for Maternal Deaths

TO BETTER UNDERSTAND THE CAUSES OF AND CONTRIBUTORS TO MATERNAL MORTALITY, it is important that autopsies are conducted. Autopsies serve to document diseases and injuries, determine cause of death, provide clinicopathologic correlation for healthcare providers, and can help give closure to family members. Strongly encouraging autopsies on maternal deaths, especially to underserved families, would help ensure that vital information is not lost that would contribute to the knowledge base of maternal mortality in the state. Creating a widely recognized, adequately funded, well publicized, easily navigated pathway for coroners, providers, district attorneys, and families to request maternal autopsy services is essential. Effectively promulgating such a pathway to stakeholders is of paramount importance.

MAKING AUTOPSY REPORT REVIEW ROUTINE and expected for all cases reviewed by the AL-MMRC would provide deeper understanding of modifiable and non-modifiable lethal factors and help guide the committee in issuing future recommendations.

Specifically, the committee recommends:

1. **ENCOURAGE AN AUTOPSY BE PERFORMED** for every case of maternal death.
2. **INCREASE STATE FUNDS FOR AUTOPSIES** and direct funding through the Maternal Health Act to aid in increasing access to autopsy services by reducing or eliminating significant financial barriers for underserved communities.
3. **ENSURE THAT FACILITIES** have the capability to perform autopsies or refer to other facilities for autopsies.
4. **REQUIRE THAT EVERY FACILITY HAVE A TRACKING SYSTEM** implemented for toxicology reports for maternal deaths.

Access to Care

Over the past two years, it has become evident that new and innovative delivery models need to be developed to ensure that patients throughout Alabama have access to quality healthcare. Increasing the utilization of telehealth and other more accessible options to provision of care can create pathways that decrease barriers for all women. In the same way, additional obstetricians and gynecologists, family practice physicians who provide obstetrical care, nurse practitioners, and certified nurse midwives are needed in Alabama to adequately cover the medical demands of mothers. Furthermore, the increasing number of women who present to hospitals without prenatal care must be addressed. Better medical care and an understanding of the system of care for pregnant women, in addition to barriers, need to be addressed. Although care coordination should happen for all admissions, specialized care coordination should occur for high risk patients to optimize outcomes.

Specifically, the committee recommends:

1. **PROVIDE CASE MANAGEMENT TO ALL PATIENTS** at the initiation of prenatal care and throughout pregnancy and the postpartum period to ensure that women maintain contact with the healthcare system.
2. **ENSURE THAT PROVIDERS AND FACILITIES ARE UTILIZING EVIDENCE-BASED** policies and protocols to increase access to services and provide quality care to all patients.
3. **ENCOURAGE WOMEN TO ENROLL IN PRENATAL CARE** early and maintain follow-up visits as instructed.

DATA TO ACTION: OPPORTUNITIES MOVING FORWARD

In response to this public health crisis, there have been several initiatives that directly and indirectly address maternal health issues and more specifically, maternal mortality. We recognize that there is additional work that influences these outcomes and hope to continue to build a more comprehensive way to identify and evaluate these activities.

Legislative Funding

LEGISLATIVE FUNDING PROVIDES AN OPPORTUNITY TO GROW the existing maternal mortality program. There was no funding for the AL-MMRC at its inception in 2018. In 2020, various partners, including the Medical Association of the State of Alabama and the Alabama March of Dimes Chapter, requested funding be allocated to support the growth and sustainment of the AL-MMRC. Funding for the program was received in 2020 when the state's budget included specific line-item funding for the ADPH to properly oversee and staff the program. These funds would aid in onboarding additional staff, paying for autopsies to be performed on maternal deaths, and providing other equipment and supplies as necessary. The ADPH has onboarded additional staff within the Maternal Mortality Review Program and has been able to provide equipment and supplies as intended. In addition, development of the Maternal Autopsy Program continues to progress. As more cases are reviewed, annual data will be compiled and allow for detailed analyses, recommendations will become more current, and maternal morbidities can be examined in conjunction with deaths. Additionally, including family interviews in the case review process will provide more information on contributing factors not otherwise captured in patient records. Funding provides a wealth of opportunities to advance program-related efforts.

Mental Health Resources

ENGAGEMENT WITH PARTNERS WHO HAVE THE CAPACITY TO CARRY FORWARD ACTIVITIES geared towards addressing the key findings and recommendations will likely have an impact on maternal mortality in the short-term and long-term. For instance, mental health and substance use disorders were identified as key contributing factors and topics in the recommendations. Organizations, such as the Alabama Department of Mental Health, will be able to use this information in identifying, implementing, and/or improving upon programs that may benefit maternal and postpartum clients suffering from these illnesses. The AL-MMRC formed a substance use disorder sub-committee and has collaborated with key stakeholders to identify resources available for substance use disorder and distributed those resources to providers and health care facilities throughout the state.

Initiative to Reduce Infant Mortality

THE GOVERNOR'S INITIATIVE TO REDUCE INFANT MORTALITY, launched in 2018 with member agencies, is a multifaceted approach to reducing infant mortality in three pilot counties over a course of five years. Two of the seven strategies focus exclusively on the physical and mental health of mothers – 1) preconception and interconception health and 2) screening, brief intervention, and referral to treatment (SBIRT). The preconception/interconception health program (Well Woman) is a service which provides screenings and evaluations for women of childbearing age to assess for chronic illnesses, such as hypertension and access to long-acting reversible contraceptives. The Well Woman program has continued to enroll patients this year. Through education on healthy lifestyles and healthy choices, the enrollees have made improvements in their health. The SBIRT program provides a tool to providers to identify and make appropriate referrals for women who may suffer from substance abuse, domestic violence, and/or postpartum depression. Well Woman and Title X staff have been trained to incorporate this screening tool into their practice. Online training for Obstetrician/Gynecologists (OB/GYNs) is in the final stages of review and approval.

CONCLUSIONS

AS THE AL-MMRC CONTINUES TO GAIN KNOWLEDGE regarding the underlying causes of the maternal deaths in Alabama, strategies are being developed to save lives and reduce the rate of maternal mortality in our state. Moving forward into our third year, the following recommendations and plans have been made:

- **ENGAGE STATE AND REGIONAL PARTNERS**, such as the Alabama Hospital Association, March of Dimes, regional hospitals, and medical providers, to strengthen regionalization of care ensuring women deliver their infants at the most appropriate level of care for mother and baby.
- **RECOMMEND INCREASING POSTPARTUM COVERAGE** from 60 days after delivery to one year. The AL-MMRC record reviews have shown that complications leading to death can occur several months after delivery.
- **INCREASE FAMILY ENGAGEMENT** to develop a deeper understanding of the underlying causes of death and complete the story of women who have died by establishing a staff position to interview their family members.
- **CONDUCT REAL TIME REVIEWS** of all maternal deaths related to COVID-19 to increase knowledge of the impact of the virus on pregnant women and develop recommendations for medical providers currently providing care to pregnant women who have tested positive for COVID-19.
- **THE AL-MMRC WOULD NOT BE POSSIBLE** without the funding received from the American College of Obstetricians and Gynecologists, Alabama Chapter in 2018-2019, and then with Alabama legislators in 2020. Continued legislative funding will provide necessary resources to accomplish the AL-MMRC's mission.



CONCLUSIONS

Nationally, the number of maternal deaths continues to increase. In 2019, **754 mothers died in the U.S.** because of pregnancy or a pregnancy-related complication, compared to 658 in 2018. The U.S. maternal mortality rate in 2019 was **20.1 deaths per 100,000** live births, which was significantly higher than the rate for 2018 (17.14 per 100,000 live births).⁵

We anticipate the future years of data from Alabama's review will reflect national trends and disparities. The **AL-MMRC remains committed** in its purpose of determining the causes of maternal mortality in Alabama and developing strategies to prevent the deaths of mothers and subsequently the major loss experienced by their children and family members.



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