ALABAMA PUBLIC HEALTH

ALABAMA MMR
MATERNAL MORTALITY REVIEW

REVIEW OF 2016 MATERNAL MORTALITY

Principal Author: Taishayla Mckitt, MPH

ACKNOWLEDGEMENTS

The Alabama Department of Public Health and the Alabama Maternal Mortality Review Committee would like to jointly acknowledge the Alabama women who lost their lives in 2016 while pregnant or within a year of pregnancy. We also extend condolences to the children and families of these women. It is our sincere hope that findings from these reviews will allow us to better understand the events leading up to death and prevent other women from suffering the same fate.

Alabama Department of Public Health, Maternal Mortality Review Program Staff

Grace H.A. Thomas, MD, FACOG, Medical Officer

Janice M. Smiley, MSN, RN, Director of the Perinatal Health Division

Lindsay Harris, BSN, RNC-LRN, Maternal Mortality Review Coordinator

Taishayla Mckitt, MPH, Maternal Mortality Review Epidemiologist

Tammie Yeldell, MPH, Director of the Maternal and Child Health Epidemiology Branch

Alabama Maternal Mortality Review Committee Leadership

Rachel Sinkey, MD, FACOG, Committee Chair

Susan Baker, MD, FACOG, Committee Vice-Chair

Evelyn Coronado-Guillaumet, MPH, National Liaison

Alabama Maternal Mortality Review Committee, Members

Paul V. Benson, MD

Richard E. Beverly, MD, FACEP

Elizabeth H. Blair, MD, FACOG

Jeana E. Blalock, MD

Margaret Borders, MT (ASCP), CPXP

Thomas Wayne Butler, MD

Cheryl Cardwell, BSN, RN

Lisa Carter, MSN, RN

Britta E. Cedergren, MPH, MPA

Dianne K. Chandler, LMSW

Marc G. Cribbs, MD, FACC

Rosemary Cummings, MSN, RN

Shirley Daniel, RN, CLC

Amy E. Davis, DNP, RNC-MNN

Maria Descartes, MD

Allen R. Dupre, MD, FACOG

Carla Emmons, MSW

Shereda Finch, MEd, MPA

Joyce Foreman

Rickey G. Green, MSCN, LBSW, CGPM, CGRS

Laurie Gregory, MA, BSN, RN, CHES

Blair Danielle Hedges, MSN, CRNP, MA

Katherine Dixon Hert, BS

Nancy K. Dowdle, PharmD

Brittany P. Hollingsworth, PharmD

Hamad Husainy, DO, FACEP

Henry G. Johnson, MD, FACOG

Tommy Johnson, DMD

Kristen Johnston, DNP, FNP-BC, COI

Connie L. Jones, CRNP, RN

Jennifer Kendall, MD

Pete Lane, DO

Leon W. Lewis, MD, FACOG

Lauren Linken, MD

Carrie Martin, BSN, RN, CHCO

Natasha Marvin, MS

Tiffani Maycock, DO

Angela McCormick, MS, RDN

Carolyn Miller, LICSW, PIP

Megan Mileski, MSN, RN

Cathy Nichols, RN

Kathy Pounds, BSN, RN

Mark Powell, MD

Jon Purdue

Indranee Rajapreyar, MD

Lindsay Speros Robbins, MD, MPH

Trendle Samuel, BSN, RN, CLC

Amy Trammell Sanford, BSN, RN

Jennifer Satterfield, RN

Sherry Seibenhener, DNP, FNP-C, WHNP-BC

Darlene A. Showalter, DNP, RN, CNS

Catherine Skinner, MD, FAAFP

Michelle Tubinis, MD

We also extend our gratitude to our sponsors and supporters at the March of Dimes, the American College of Obstetricians and Gynecologists, Alabama Chapter, and the Medical Association of the State of Alabama.

EXECUTIVE SUMMARY

The Alabama Department of Public Health (ADPH) is committed to improving the well-being and health of mothers across the state. Launched in 2018, the Alabama Maternal Mortality Review Committee (AL-MMRC) was convened to determine the scope of maternal mortality and put forth actionable recommendations that may positively affect maternal outcomes.

The AL-MMRC is comprised of professionals from various organizations, disciplines, and backgrounds, which provides a diverse lens with which to assess the circumstances leading up to maternal mortality. The AL-MMRC completed the first year's review of 2016 maternal mortality cases. This report outlines key findings from the review of the deaths, with a purpose to provide a broad overview and contextual information during the time period. In subsequent years of review, data will be combined to complete in-depth analyses to further improve understanding surrounding these deaths in Alabama.

Key Findings of Pregnancy-Associated and Pregnancy-Related Deaths

- The pregnancy-associated mortality ratio (PAMR)[1] and pregnancy-related mortality ratio (PRMR)[2] for 2016 was 38.9 and 22.0 deaths per 100,000 live births, respectively.
- Nearly 70% of pregnancy-associated and pregnancy-related cases were determined to be preventable.
- Mental health and substance use disorders were identified as key contributors in almost half of pregnancy-associated and pregnancy-related deaths.
- Patient/family-, system-, and provider-related factors were among the most frequently identified factors involved in pregnancy-associated and pregnancy-related deaths.
- Cardiovascular-related conditions were found as the leading underlying causes in pregnancy-related deaths.

Summary of Key Recommendations:

- Expansion of Medicaid was an underlying, yet significant factor which permeated throughout the case reviews. Research has shown that in states where Medicaid expansion was adopted, there were reduced maternal mortality rates and positive maternal health outcomes.[3] Based on the findings of the committee's review, Medicaid program expansion will allow women to receive needed healthcare before, during, and after pregnancies.
- Lack of receipt and coordinated care before, during, and after pregnancy can be addressed through Medicaid expansion.
- Autopsies are a necessity in determining the underlying causes of death in maternal cases and therefore should be performed routinely on all maternal cases, with appropriate resource allocation.
- Increased resources and services are imperative for women who suffer from mental health and substance use disorders.
- Patient education, which should adhere to health literacy communication strategies such as plain language usage, should include important topics such as appropriate healthcare during the preconception, interconception, and postpartum periods, and tobacco cessation during pregnancy, among others.
- Existing national standards regarding levels of maternal care are critical and the committee strongly encourages adoption, particularly for patients who may require specialized care coordination.
- Providing adequate and quality healthcare in the postpartum period is a significant factor that will aid in combatting maternal mortality.

1. Pregnancy-associated mortality ratio: ratio of deaths among women who died within one year of the end of pregnancy, from a cause that is not related to pregnancy, to the number of live births in the designated geographic area and time period (per 100,000 live births). 2. Pregnancy-related mortality ratio: ratio of deaths among women who died within one year of the end of pregnancy, from a cause related to or aggravated by pregnancy, to the number of live births in the designated geographic area and time period (per 100,000 live births). 3. Searing, A. & Ross, D.C. (2019). Medicaid Expansion Fills Gaps in Maternal Health Coverage Leading to Healthier Mothers and Babies. Retrieved August 07, 2020, from https://ccf.georgetown.edu/wp-content/uploads/2019/05/Maternal-Health-3a.pdf

INTRODUCTION

Maternal mortality is a national crisis with sobering statistics, and is associated with complex and multilayered factors, such as barriers to healthcare access, racial and ethnic disparities, and social determinants of health. Throughout the years, the U.S. has seen pregnancy-related mortality rates steadily increase since 1987.[4] Additionally, more than 700 deaths are estimated to occur in the U.S. each year, with significant gaps in rates between race and ethnicity groups. Disproportionate rates are realized among African American women, who are three to four times more likely to die from pregnancy-related causes when compared to white women.[5] Trends in maternal mortality have led to strategies for prevention and increased resources, including funding and legislative rulings, to better understand the events surrounding deaths that occur during pregnancy and in the year after pregnancy.

In the wake of increasing maternal mortality in the U.S., national and state attention have turned to actions to remediate the growing issue. The Preventing Maternal Deaths Act of 2018 authorized the Centers for Disease Control and Prevention (CDC) to commit resources to support state and tribal Maternal Mortality Review Committees (MMRCs).[6] One such product of the CDC's continued efforts is the Enhancing Reviews and Surveillance to Eliminate Maternal Mortality (ERASE MM) program, which helps to fund and support state MMRCs, by increasing state capacity for surveillance and facilitating standardization of pertinent data. These efforts, along with many others, aid in a nationwide effort to combat maternal mortality.

In Alabama, the ADPH Bureau of Family Health Services took the initiative to advance the mission of maternal mortality prevention at the state level. The Bureau formed a program, informed by ERASE MM, to establish the framework of the committee and goals. Experts in their respective fields, representing many different specialties and focus areas, were called upon from across the state to join the committee. Since its inception, the committee has worked diligently to review cases and determine mitigation and preventative strategies.

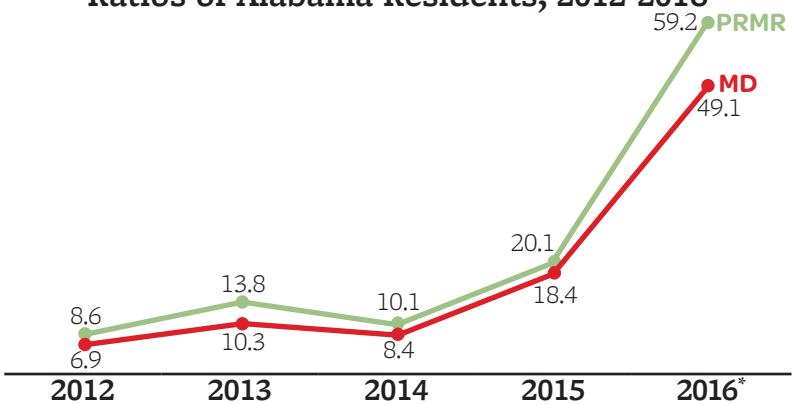
Scope of Maternal Mortality in Alabama

Data provided by the ADPH Center for Health Statistics (CHS) reveal that both maternal deaths and pregnancy-related deaths (see *Key Definitions*) trended upward between 2012 and 2016. Between 2012 and 2015, ratios increased steadily; however, in 2016 there was a marked leap in both ratios. This upsurge may be partially explained by improved surveillance, which includes changes in death certificate collection and methodology. Regardless of the factors attributable to the increase, the ratios were already elevated enough to initiate an in-depth review of the issue which so deeply affected the state throughout the years. Differences in rates calculated by the CHS and MMRC are explained by the extra layer of committee review undergone for each case in comparison to the use of solely checkboxes, data coding, and linkages at face value for determining pregnancy status and cause of death. This further illustrates the importance of the role MMRCs play in understanding maternal mortality.

	MATERNAL DEATH[7]	PRMR
2012	6.9	8.6
2013	10.3	13.8
2014	8.4	10.1
2015	18.4	20.1
2016*	49.1	59.2

This maternal death and pregnancy-related death ratio data is from the ADPH, Center for Health Statistics. Per 100,000 live births.

Maternal Death and Pregnancy-Related Mortality Ratios of Alabama Residents, 2012-2016



4. Pregnancy Mortality Surveillance System. (2020, February 4). Retrieved from https://www.cdc.gov/reproductivehealth/maternalmortality/pregnancy-mortality-surveillance-system.htm 5. Pregnancy-Related Deaths. (2019, February 26). Retrieved June 24, 2020, from https://www.cdc.gov/reproductivehealth/maternalinfanthealth/pregnancy-relatedmortality.htm 6. Herrera Beutler, J. (2018, December 21). H.R.1318 - 115th Congress (2017-2018): Preventing Maternal Deaths Act of 2018. Retrieved July 06, 2020, from https://www.congress.gov/bill/115th-congress/house-bill/1318. *Death file layout and options in pregnancy checkbox changed during this year. 7. Maternal mortality ratio (per 100 000 live births). (2014, March 11). Retrieved June 24, 2020, from https://www.who.int/healthinfo/statistics/indmaternalmortality/en/

CASE IDENTIFICATION, DATA SOURCES, AND METHODOLOGY

CHS staff helped to initially identify women ages 15 to 55 years who died in 2016, within one year of the end of pregnancy (N=86). Maternal mortality program staff reviewed all records to determine which cases would be eligible for further committee review. These included those with obstetric causes of death, as assigned with International Classification of Diseases, 10th Revision (ICD-10) codes, those for whom pregnancy status was verified (through linkage with birth and fetal death records), and a pregnancy checkbox indicator. Thirty women were excluded who were either not pregnant or pregnancy status could not be confirmed. Additional exclusions (N=20) included women who were non-Alabama residents and those who died as a result of a homicide or motor vehicle accident (total excluded = 50). For the cases deemed eligible (N=36), pertinent documents, including medical records, autopsy reports, and other evidence, were gathered and summarized into individual, de-identified case narratives. These were submitted to the AL-MMRC for further deliberation.

For each case, the committee used the CDC's Maternal Mortality Review Information Application (MMRIA) Committee Decisions form to capture important information, including causes of death, contributing factors, and preventability. Through these retrospective, comprehensive reviews, recommendations were developed with the confidence that if implemented, the landscape of maternal mortality in Alabama would change for the betterment of maternal health and related outcomes.

In accordance with HIPAA and ADPH data reporting guidelines on small numbers, some reporting was suppressed. As such, most data represented in this report include all cases, regardless of pregnancy relatedness. In some instances, data may be disaggregated by a select category to provide greater insight.

Key Definitions

In order to provide a consistent, objective method of reviewing maternal mortality cases, the AL-MMRC used the below definitions during case reviews.

TERM	DEFINITION	SOURCE
Maternal Death	Death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes.[7] *Note: This definition is not inclusive of deaths that occur after 42 days of the end of a pregnancy.*	World Health Organization
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.	

2016 CASE REVIEW FINDINGS FOR PREGNANCY-ASSOCIATED AND PREGNANCY-RELATED CASES

Of the 36 cases submitted to the AL-MMRC for further review, 17 (47%) cases were determined to be pregnancy-associated not related, and 13 (36%) were pregnancy-related, though relatedness was unable to be determined for six (17%) decedents. The PAMR was 38.9 deaths, while the PRMR was 22.0 deaths, both per 100,000 live births. Table 1 outlines basic demographic information for all cases and residential live birth data. A majority of the cases were non-Hispanic, white females between the ages of 25 and 34 years. The highest level of educational attainment was high school or less for approximately 61% of cases. Based on the recorded last place of residence, most cases lived in metropolitan areas. Many of the cases were Medicaid recipients (67%), received prenatal care beginning in the first trimester (47%), and had documented preexisting medical conditions (67%). Case data mostly aligned with live births data relative to the frequency and proportion within each variable category.

Timing of Death and Critical Factors

The timing of death and critical factors varied among both pregnancy-associated and pregnancy-related cases. Collectively, two-thirds of pregnancy-associated and pregnancy-related deaths occurred 43 days to one year after the end of pregnancy. Figure 1 shows timing of death disaggregated by pregnancy-related status. The committee reviewed factors, some of which at least probably or certainly contributed to deaths, including obesity, mental health, and substance use disorder. Mental health (42%) and substance use (47%) disorders were found to be key contributors in pregnancy-associated and pregnancy-related deaths. Additionally, among pregnancy-associated cases, it was determined that five deaths were the result of suicide. On the contrary, obesity was found to be a contributor in only 17 percent of cases.

Table 1. Basic Demographics of Pregnancy-Associated and Pregnancy-Related Alabama Cases, 2016

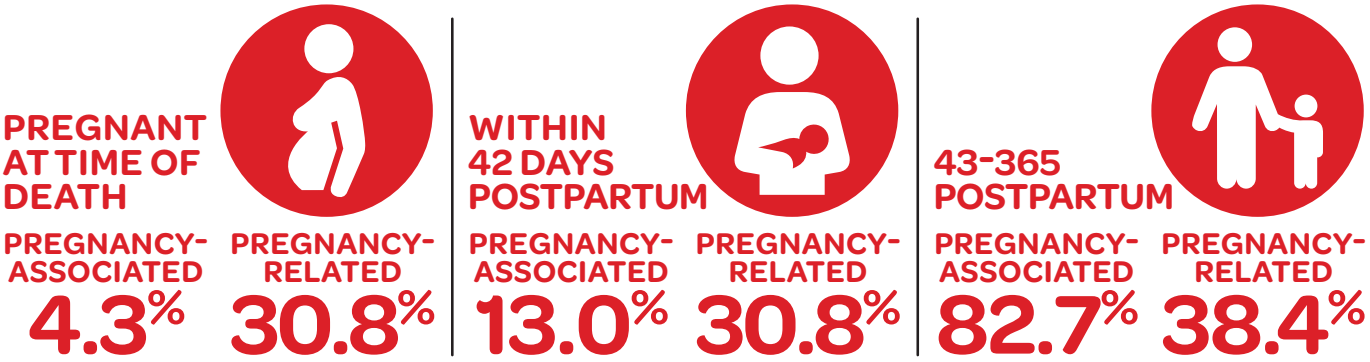
	No. (%) (N=36)	No. (%) AL Live Births¥ (N=59,090)
Age Group (Years)		
15 – 24	11 (30.6)	20,531 (34.7)
25 – 34	18 (50.0)	32,050 (54.2)
35 – 44	7 (19.4)	6,419 (10.9)
Race/Ethnicity		
Non-Hispanic, White	23 (63.9)	35,296 (59.7)
Non-Hispanic, Black	8 (22.2)	17,960 (30.4)
Hispanic	3 (8.3)	4,578 (7.7)
Unable to Determine	2 (5.6)	--
Maternal Educational Attainment		
High School or less	22 (61.1)	27,379 (46.3)
Some college	5 (13.9)	17,629 (29.8)
Associate or Bachelor Degree	7 (19.4)	13,961 (23.6)
Unknown	2 (5.6)	121 (0.3)
Urban Status*		
Metropolitan	29 (80.6)	34,665 (58.7)
Micropolitan	4 (11.1)	--
Rural	3 (8.3)	24,425 (41.3)
Primary Insurance for Prenatal Care		
		(For Births)
Medicaid	24 (66.7)	29,845 (50.5)
Private	9 (25.0)	25,611 (43.4)
Other	2 (5.6)	2,314 (3.9)
Self-Pay	1 (2.8)	1,287 (2.2)
Trimester of First Prenatal Care Visit		
First	17 (47.2)	39,122 (66.2)
Second	12 (33.3)	14,970 (25.3)
Third	2 (5.6)	3,485 (5.9)
None	3 (8.3)	1,218 (2.1)
Unknown	2 (5.6)	295 (0.5)
Documented Preexisting Medical Condition(s)		
Yes	24 (66.7)	--
No	10 (27.8)	--
Not Specified	2 (5.6)	--

¥Source: 2016 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 collection and methodology between data sources.

*Urban status categories: Metropolitan Division: >=2,500,000 | Metropolitan: 50,000 – 2,499,999 | Micropolitan: 10,000 – 49,999 | Rural: < 10,000

For cases classified as pregnancy-related, underlying causes of deaths were stratified by a range of conditions; however, cardiovascular-related conditions (e.g., cardiomyopathy and cardiovascular/coronary conditions) were leading causes of pregnancy-related deaths. Other causes of deaths included hemorrhage, amniotic fluid embolism, blood disorders, cerebrovascular accidents, infection, mental health conditions, and preeclampsia/eclampsia. Autopsies are instrumental in the reviews, as they provide greater clinical insight that may be used to provide a determination on a cause of death. It was found that only half of all pregnancy-associated and pregnancy-related deaths had an autopsy report. The absence of autopsies impacted the ability of the MMRC to determine if deaths were indirectly or directly caused by the pregnancy and whether the deaths were preventable, leading to the classification of "unable to determine pregnancy-relatedness" for some cases.

Figure 1. Pregnancy-Associated and Pregnancy-Related Cases by Timing of Death



Note: Pregnancy-Associated category is inclusive of cases designated as pregnancy-associated not related and pregnancy-associated, unable to determine relatedness.

Preventability

Preventability of deaths is a key component to maternal mortality reviews, as it is indicative of events that may have been avoided if reasonable changes could be made to the contributing factor(s). It was found that nearly 70% of pregnancy-associated and pregnancy-related deaths were preventable [Figure 2]. The chance of altering the outcome when preventable is illustrated in Figure 3. In most cases, there was at least some chance to alter the course of events.

Figures 2-3. Preventability Of 2016 Alabama Pregnancy-Associated And Pregnancy-Related Cases And Chance To Alter Outcomes For Deaths Found To Be Preventable

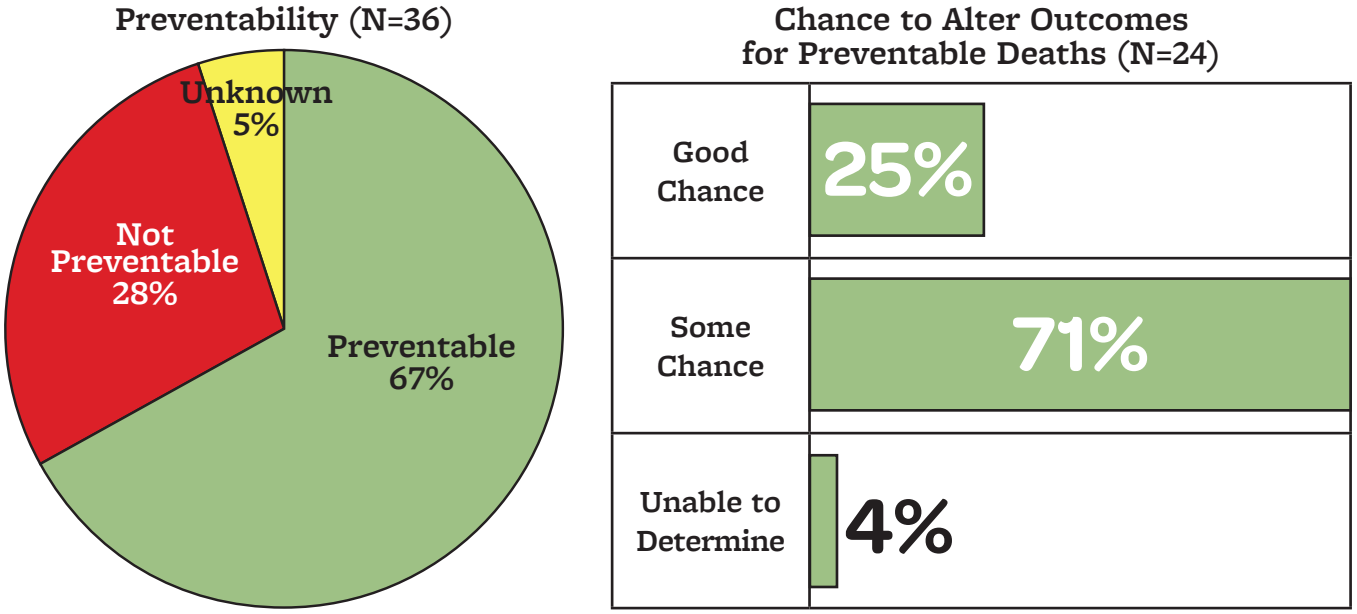
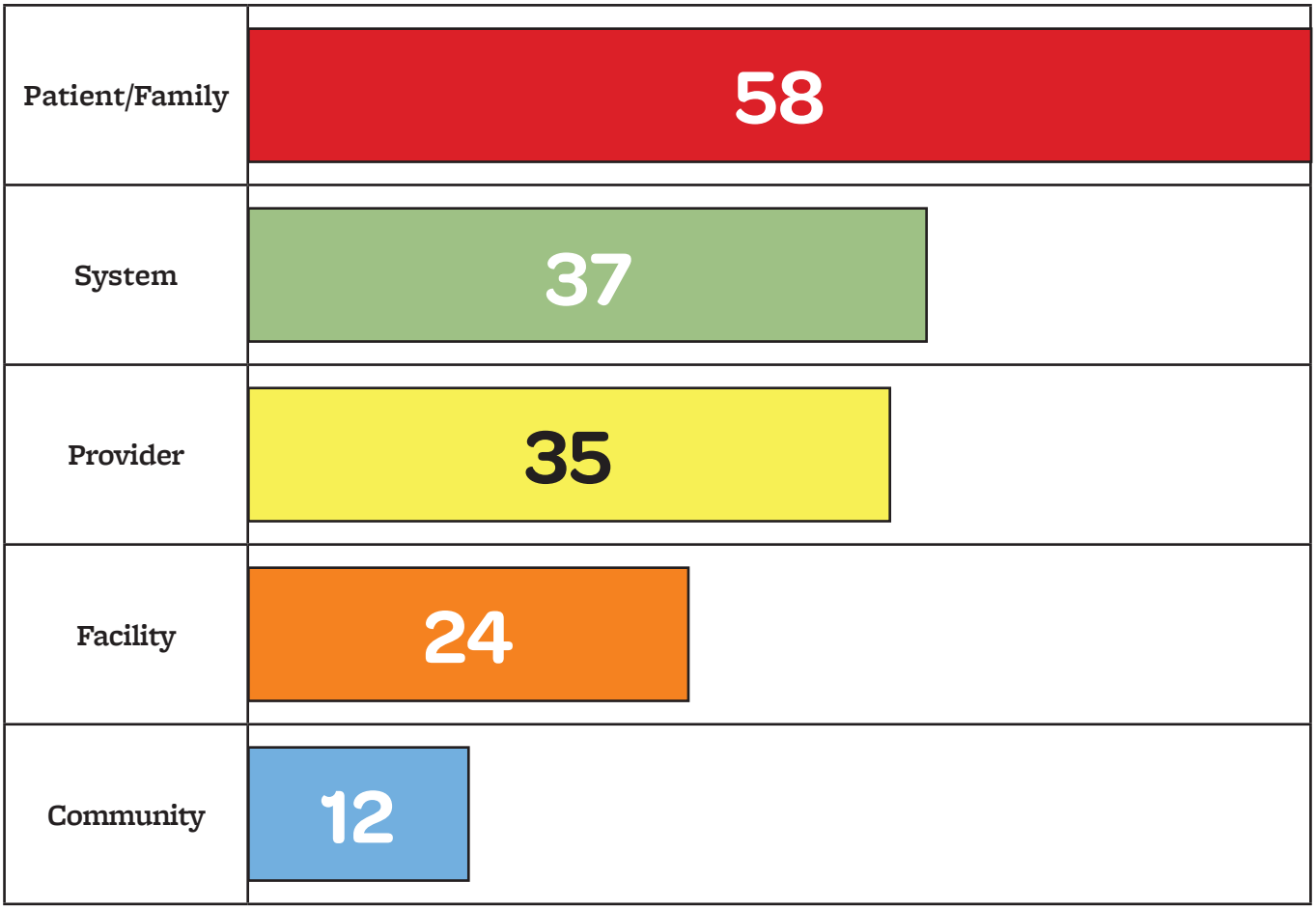


Figure 4. Contributing Factor Levels Identified by the AL-MMRC for 2016 Alabama Pregnancy-Associated And Pregnancy-Related Cases



Contributing Factors

Contributing factors were classified into one of five categories: patient/family, provider, facility, system, and community. Each case could have any combination or number of contributing factors. The committee identified 166 contributing factors across all categories for both pregnancy-associated and pregnancy-related cases, most of which were either patient/family-, system-, or provider-related (Figure 4). Categories were further disaggregated by contributing factor class. Table 2 shows the top three classes within each of the top contributing factor categories. It is important to note that while patient/family factors were the most frequently identified, implementation of prevention strategies are most often at system, facility, provider, and community levels.

Table 2. Top Contributing Factors (CF) and Classes Identified by the AL-MMRC for 2016 Pregnancy-Associated and Pregnancy-Related Cases

CF Class	No.
Patient/Family	
Substance Use Disorder, Alcohol/Drugs	9
Adherence	8
Delay*	7
System	
Continuity of Care/Care Coordination	10
Access/Financial	7
Policies/Procedures	5
Provider	
Clinical Skill/Quality of Care	6
Assessment	6
Delay*	6

*The provider or patient was delayed in referring or accessing care, treatment, or follow-up care/action.

COMMITTEE RECOMMENDATIONS

Over the course of the 2016 case reviews, more than 100 recommendations were recorded. Key recommendations are outlined below with detailed descriptions. If implemented, these are believed to have the potential to change the course of events that ultimately led to the demise of the women. Moving forward, organizations and stakeholders that have the resources to implement programs and activities may use these recommendations in their considerations to improve maternal health.

HEALTHCARE COVERAGE AND POSTPARTUM CARE

Healthcare coverage remains a significant issue in addressing maternal mortality. Medicaid expansion up to one year postpartum and improved reimbursement for providers could improve the healthcare women receive, as a majority of the deaths reviewed occurred 43 to 365 days after the end of pregnancy. To honor the reproductive rights of all women, it is recommended that the Medicaid waiting period for women requesting a postpartum bilateral tubal ligation be waived.

AUTOPSIES FOR MATERNAL DEATHS

In order 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 health care providers, and can help give closure to family members. Only 18 of the 36 deaths reviewed had an autopsy performed. Funding for autopsies through the Maternal Health Act will aid in this matter by increasing access to autopsy services by reducing or eliminating significant financial barriers for underserved communities. 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 maternal autopsy services is essential. Effectively promulgating such a pathway to stakeholders is of paramount importance. Providers, coroners, district attorneys, and other stakeholders need education and direction regarding the importance of and availability of autopsies through ADPH. Making autopsy report review routine and expected for all cases referred to the AL-MMRC would provide deeper understanding of modifiable and non-modifiable lethal factors and help guide the committee in issuing future recommendations.

SUBSTANCE USE AND 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, in order 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 getting appropriate care, which leads to missed opportunities for treatment of both the mother and baby.

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. The following topics should be included in patient educational materials:

- Specific medical conditions: including hypertension and cardiovascular disease, and the importance of follow-up visits with providers
- Preconception and interconception counseling and education for women of child-bearing age, including healthy birth spacing intervals
- Access to contraception in the postpartum period
- Smoking cessation

PROVIDER EDUCATION

Similarly, providers who work directly with maternal patients, including those outside of the obstetric specialty, should be equally educated on important topics which impact maternal health. The following are potential subjects to be included in educational materials for providers:

- Condition-specific: cardiomyopathy, postpartum hemorrhage (and early recognition), postpartum danger signs and symptoms of pregnancy-associated hypertension, and massive transfusion protocols
- Efforts should be taken to increase awareness of ancillary providers outside of obstetrics on the occurrence of postpartum hypertension
- Patient care: thorough assessments which do not relate patients' complaints to changes associated with pregnancy
- Management and coordination of patient care needs: timely screening and referral for perinatal depression; referrals to Maternal Fetal Medicine, cardiology, and social work for high-risk patients; and inclusion of family counseling in obstetric plans of care
- Perimortem cesarean delivery should occur at the site of the arrest, as transport compromises cardiopulmonary resuscitation and leads to further time delays
- Adoption of evidence-based patient safety practices/protocols at all delivering hospitals

LEVELS OF MATERNAL 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 transferral of patients to higher levels of care.

ACCESS TO CARE

In 2016, approximately eight percent of the maternal mortality cases lived in rural areas in the state. Efforts to keep rural hospitals open allow patients who live in those areas access to healthcare. 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. Safe abortion services and access to contraceptives are also imperative to women's health. 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 also be addressed. Although care coordination should take place for all admissions, specialized care coordination should occur for cardiovascular patients to optimize outcomes.

FROM DATA TO ACTION: OPPORTUNITIES MOVING FORWARD

The descriptive epidemiology in this report provides state-specific context to a significant issue in maternal health and may act as a foundation from which to initiate actions. The aforementioned recommendations also aid as a starting point from which to address maternal mortality prevention. Initiatives throughout the state may leverage recommendations with existing and new programs to begin the work that must be done towards elimination of maternal mortality. Opportunities for action and next steps are included below.

- Legislative funding provides an opportunity to grow the existing maternal mortality program. In 2019, various partners, including the Medical Association of the State of Alabama and Alabama March of Dimes Chapter, requested funding be allocated to the growth and sustainment of the AL-MMRC. These funds would aid in onboarding additional staff, autopsy reviews, and other equipment and supplies as necessary. As more cases are reviewed, annual data will be compiled and allow for detailed analyses, recommendations will become more current, and allow the potential to also begin looking at maternal morbidities 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.
- 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 periods. For instance, mental health and substance use disorders were found as key contributing factors in nearly half of the deaths reviewed and, subsequently, were a key topic in the recommendations. Entities, such as the Alabama Department of Mental Health, would 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. Similarly, the Alabama Perinatal Quality Collaborative focuses on initiatives that improve the quality of health for women and infants across the state. Provision of data and recommendations to such an organization may influence future initiatives and programs that will complement the work of the AL-MMRC. In general, data and information sharing with partners across the state will support concerted efforts to eliminate maternal 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 is a service which provides screenings and evaluations for women of childbearing age for chronic illnesses and clinical necessities, such as hypertension and access to long-acting reversible contraceptives. Interventions are developed for patients in order to ensure improvement in healthy lifestyles. 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. These issues were highlighted during review of cases and continued program services, though initiated for the purpose of infant mortality reduction, will have an added benefit for maternal mortality prevention.

CONCLUSION

In summary, the first year of reviews provided a wealth of information that may be used as a basis to strengthen communities, systems, and health care for Alabama mothers. Awareness is the first step towards action, which was achieved by reviews of the 2016 cases. The AL-MMRC remains committed to continuance of these reviews to further gain knowledge on why and how these deaths occur and to determine strategies which may circumvent future deaths. All efforts must be employed to mobilize our collective expertise and technological advances to save the mothers of Alabama. They are most deserving of the best that medical, social, and technological sciences and community support have to offer.