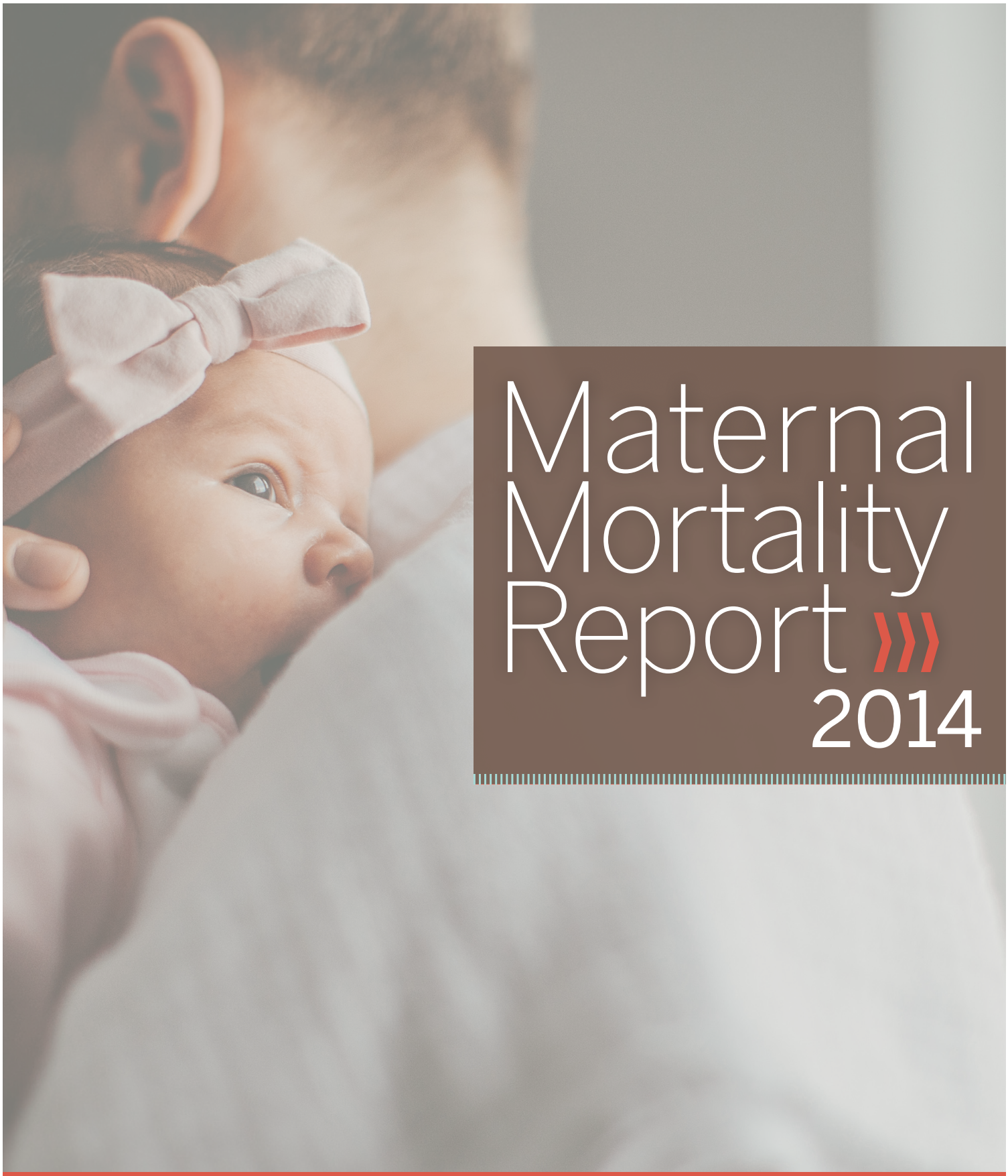


Maternal Mortality Report 2014

Learn more about maternal mortality at: dph.georgia.gov/maternal-mortality

GEORGIA DEPARTMENT OF PUBLIC HEALTH

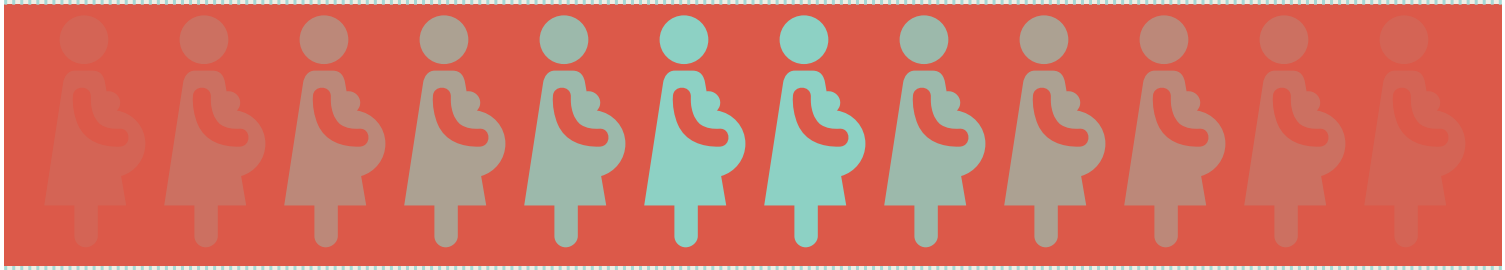
Maternal Mortality Report 2014

MATERNAL MORTALITY REVIEW COMMITEE | Report

2012-2014 EXECUTIVE SUMMARY

THE MATERNAL MORTALITY REVIEW COMMITTEE (MMRC) reviews maternal deaths that occur during pregnancy or within a year of the end of a pregnancy. Each death is reviewed to determine cause, contributing factors, and to recommend interventions to reduce future maternal deaths. These reviews provide the most detailed depiction of maternal deaths in Georgia.

THE MATERNAL MORTALITY REPORT includes information about maternal deaths that occurred in 2014 and aggregate **data for 2012 through 2014**. The MMRC reviewed **250** maternal deaths in 2012-2014.



There were **64** maternal deaths for every 100,000 live births

››› Of the **250** maternal deaths reviewed, **101** were determined to be pregnancy-related deaths ››› **60%** of the pregnancy-related deaths were preventable ››› There were **26** pregnancy-related deaths for every 100,000 births.

MATERNAL INITIATIVES | Impacting Outcomes

INITIATIVES UNDERWAY TO IMPACT MATERNAL OUTCOMES

THE GEORGIA PERINATAL QUALITY COLLABORATIVE (GaPQC) led by the **Georgia Department of Public Health** (DPH) launched the **Alliance for Innovation on Maternal Healthcare** (AIM) hemorrhage bundle initiative in April 2018. Over half of the state's birthing hospitals are participating in the initiative to increase readiness, recognition and response to one of the leading causes of pregnancy related deaths: hemorrhage. In 2019 the initiative will be expanded to include rollout of the AIM hypertension bundle.

IN 2018 THE GEORGIA GENERAL ASSEMBLY provided **$2,000,000** to implement quality improvement projects in rural birthing hospitals. **Sixteen hospitals** receive funding and are among the birthing hospitals working to implement the **AIM hemorrhage bundle initiative**.

PERINATAL LEVELS OF CARE LEGISLATION became effective **July 1, 2018** (O.C.G.A. 31-2A-50 through 31-2A-57) to create a mechanism for level of care designation and ongoing site verification of Georgia birthing hospitals. Beginning July 2019, hospitals can request **level of care designation** for maternal and/or neonatal. Maternal and neonatal level of care designation will increase consistent application of national recommendations for levels of care and facilities recognition of their risk level capacity.

Maternal Mortality Review Process »»

FOR 2014, **186** POTENTIAL MATERNAL DEATHS WERE IDENTIFIED BY THE FOLLOWING METHODS:

1 | NOTIFIABLE CONDITION REPORTS

2 | THE PREGNANCY CHECKBOX ON DEATH CERTIFICATES

3 | ICD-10 O CODES

4 | DEATH CERTIFICATES LINKED TO BIRTH OR FETAL DEATH CERTIFICATES

5 | SEARCH OF OBITUARIES AND NEWS OUTLETS

REVIEW PROCESS | Maternal Mortality Case Review

SIX KEY QUESTIONS CONSIDERED FOR EACH CASE REVIEWED

1. Was the death pregnancy-related?
2. What was the cause of death?
3. Was the death preventable?
4. What were the factors that contributed to this death?
5. What are the recommendations and actions that address these contributing factors?
6. What is the anticipated impact of these actions if implemented?

QUESTION 1 | Was the death pregnancy-related?

BACKGROUND

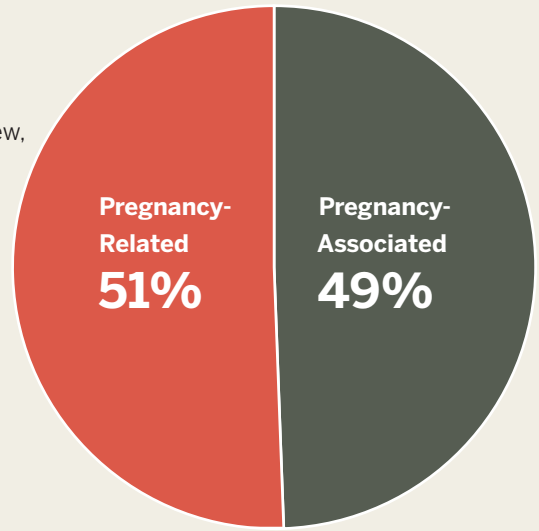
Individual case information is abstracted by trained case abstractors and summarized for review by the MMRC. The MMRC reviews case information and determines whether the death was pregnancy-related. A maternal death is classified into one of three categories:

- Pregnancy-related: The death of a woman while pregnant or within one year of the end of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by pregnancy or its management
- Pregnancy-associated: The death of a woman while pregnant or within one year of the end of pregnancy, due to a cause unrelated to pregnancy
- Pregnancy-associated but unable to determine pregnancy-relatedness.

RESULTS

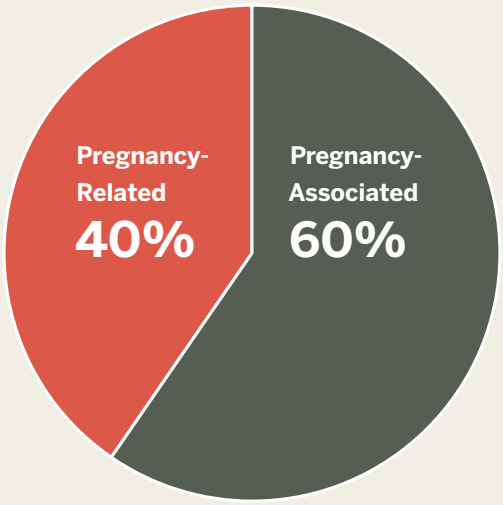
In **2014**, among **85** maternal deaths, **43** (51%) were determined by the Georgia MMRC to be related to or aggravated by pregnancy or its management (pregnancy-related death) and **42** (49%) were determined to be due to a cause unrelated to pregnancy and having only a temporal relationship to pregnancy (pregnancy-associated).

FIGURE 1 | Maternal Mortality Case Review, Georgia, 2014 (N= 85)



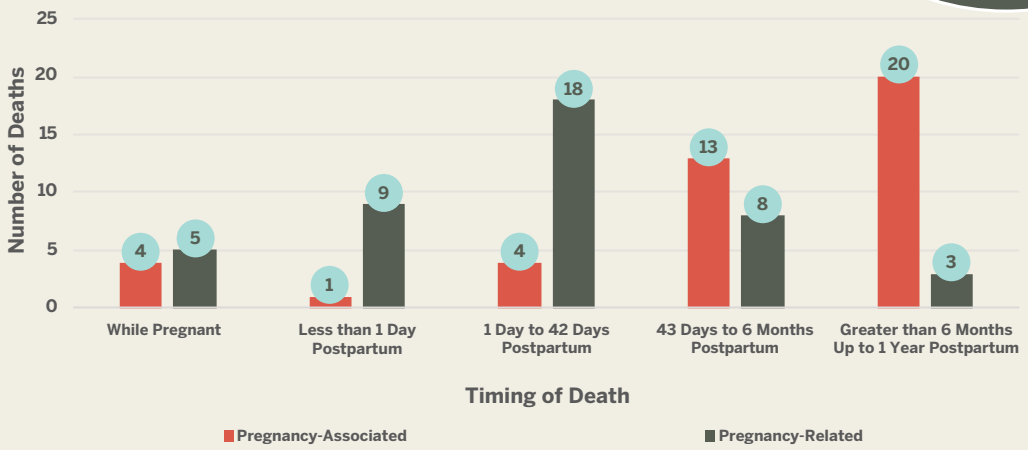
QUESTION 1 | Was the Death Pregnancy-Related?

FIGURE 2 | Maternal Mortality Case Review, Georgia, 2012-2014 (N= 250)



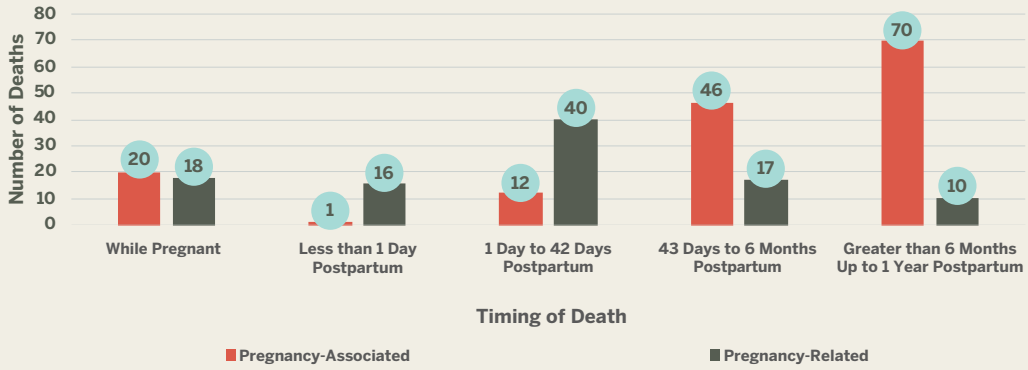
Between **2012 and 2014**, the Georgia MMRC has reviewed 250 total maternal deaths. Of the maternal deaths reviewed, 101 (**40%**) were related to or aggravated by pregnancy or its management (pregnancy-related death) and 149 (**60%**) were due to a cause unrelated to pregnancy (pregnancy-associated death).

FIGURE 3 | Number of Maternal Deaths by Timing of Death in Relation to Pregnancy, Georgia, 2014 (N= 85)



In **2014**, **32** of the pregnancy-related deaths (**74%**) occurred within 42 days after the end of pregnancy. Conversely, **33** of pregnancy-associated deaths (**79%**) occurred 43 days and up to one year after the end of pregnancy.

FIGURE 4 | Number of Maternal Deaths by Timing of Death in Relation to Pregnancy, Georgia, 2012-2014 (N= 250)



A similar trend is evident in the aggregate maternal deaths from **2012 and 2014**. Of the **250** maternal deaths reviewed, **74** pregnancy-related deaths (**73%**) occurred within 42 days of the end of pregnancy. **116** pregnancy-associated maternal deaths (**78%**) occurred 43 days and up to one year after the end of pregnancy.

QUESTION 1 | Was the Death Pregnancy-Related?

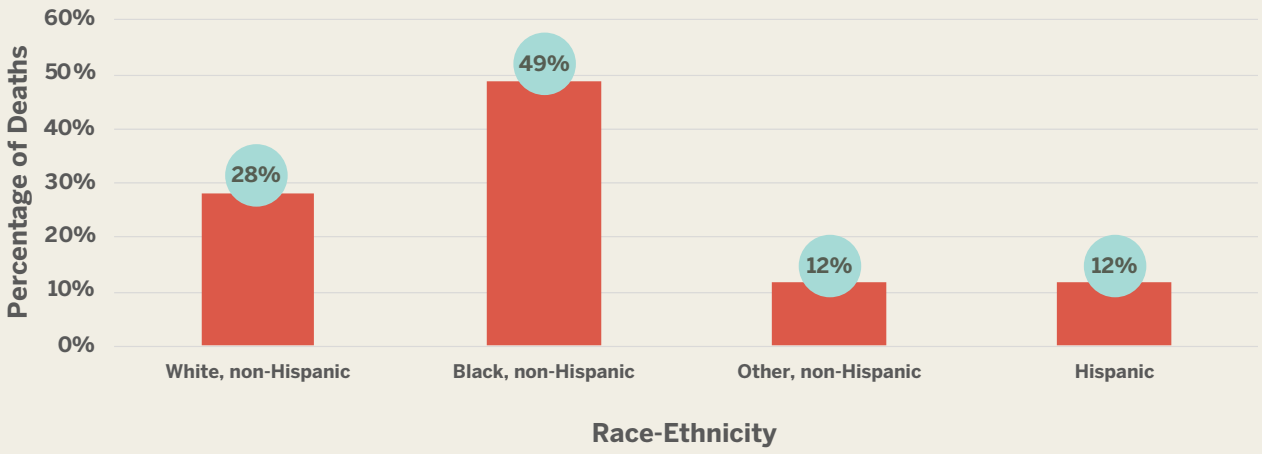
THE DISTRIBUTION OF PREGNANCY-RELATED DEATHS BY TIMING OF DEATH IN RELATION TO PREGNANCY, GEORGIA, 2012-2014

18%
WHILE PREGNANT

55%
55% WITHIN 42 DAYS POSTPARTUM

27%
43 DAYS TO 1 YEAR POSTPARTUM

FIGURE 5 | Distribution of Pregnancy-Related Deaths by Race-Ethnicity, Georgia, 2014 (N= 43)



There is a stark racial-ethnic disparity in pregnancy-related maternal deaths. In **2014**, of the **43** pregnancy-related deaths, a majority, **21** (**49%**) were Black, non-Hispanic. The second highest racial-ethnic group, White, non-Hispanic, accounted for **12** (**28%**) pregnancy-related deaths.

QUESTION 1 | Was the Death Pregnancy-Related?

PREGNANCY-RELATED MATERNAL MORTALITY RATIO BY RACE (PER 100,000 LIVE BIRTHS), GEORGIA, 2012-2014

White, Non-Hispanic: **14.3** deaths
PER 100,000 LIVE BIRTHS

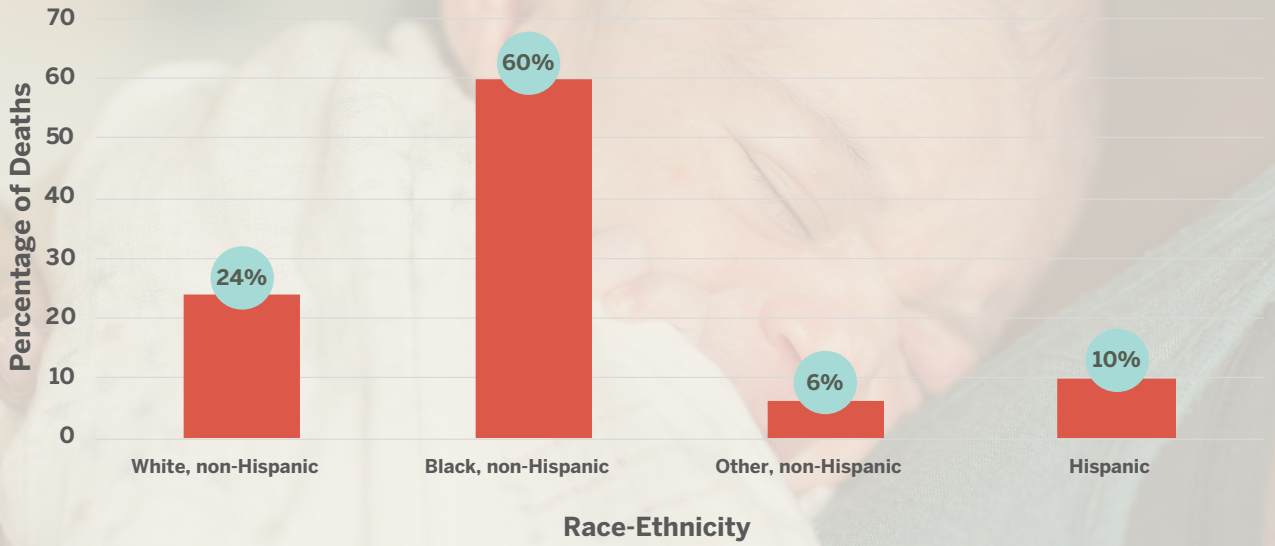
Black, Non-Hispanic: **47.0** deaths
PER 100,000 LIVE BIRTHS

MATERNAL MORTALITY RATIO BY RACE FORMULA:

Maternal deaths for specific race (2012-2014) *100,000 = Maternal Mortality Ratio by Race (per 100,000 births), Georgia, 2012-2014, Live births for specific race (2012-2014)

Between 2012-2014, Black non-Hispanic women were about **3.3 times more likely** to die due to pregnancy-related complications than White, non-Hispanic women.

FIGURE 6 | Percentage of Pregnancy-Related Deaths by Race-Ethnicity, Georgia, 2012-2014 (N= 100*)

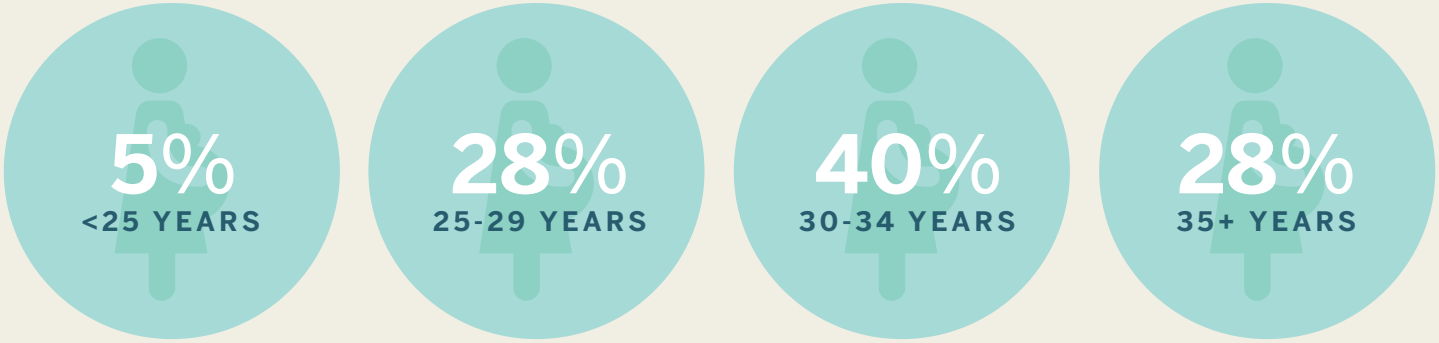


*Race-ethnicity was unknown for one (1%) maternal death in 2012.

Between **2012-2014**, over half (**60%**) of the pregnancy-related deaths in Georgia occured among Black, non-Hispanic women, while nearly one-quarter (**24%**) of pregnancy-related deaths occurred among White, non-Hispanic women.

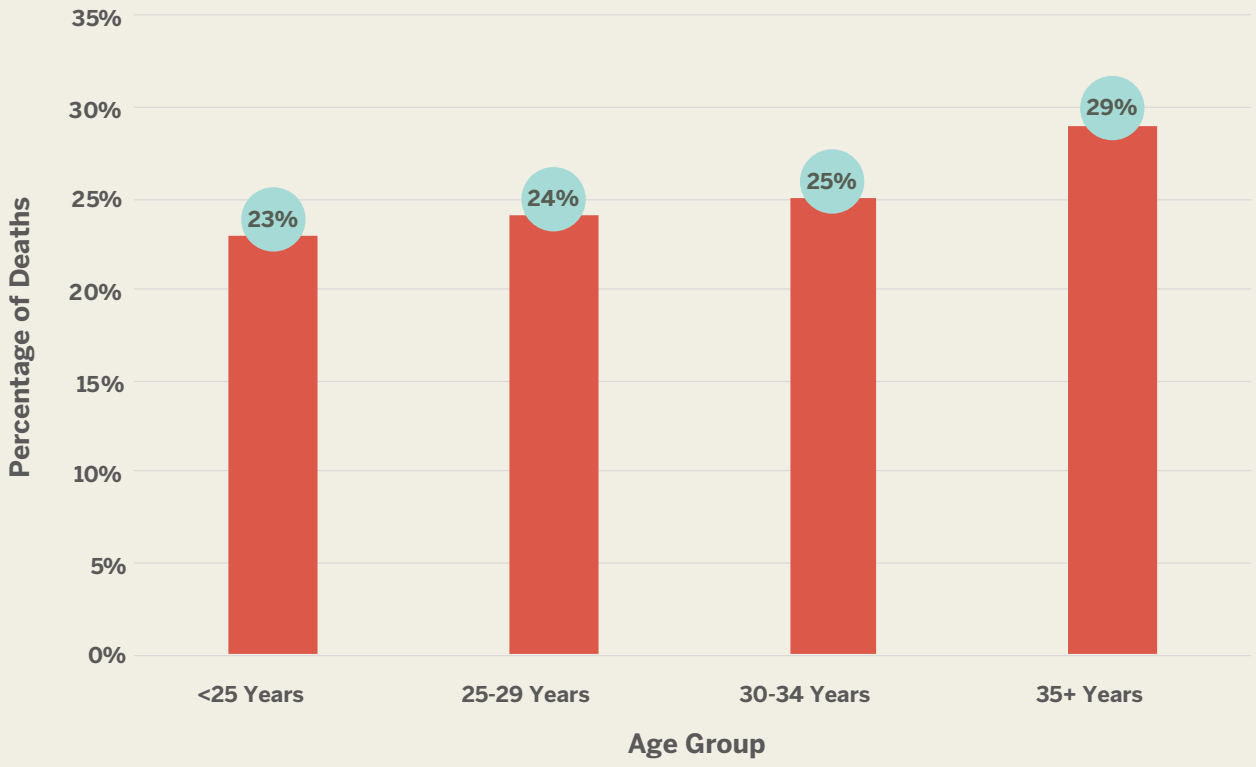
QUESTION 1 | Was the Death Pregnancy-Related?

FIGURE 7 | Percentage of Pregnancy-Related Deaths by Age Group, Georgia, 2014 (N= 43)



In **2014**, of the **43** pregnancy-related deaths, **17** (**40%**) occurred among women between 30 and 34 years of age.

FIGURE 8 | Percentage of Pregnancy-Related Deaths by Age Group, Georgia, 2012-2014 (N= 101)



Of the **101** pregnancy-related deaths reviewed for **2012 to 2014**, there was little variation found between age groups. There were **72** (**29%**) pregnancy-related deaths among women less than 35 years.

PREGNANCY-RELATED

Maternal Mortality Ratio by Age Group

DEATHS PER 100,000 LIVE BIRTHS 2012-2014

under 25 years of age
17.5

25-29 years of age
22.0

30-34 years of age
26.7

35+ years of age
52.2

MOVING FORWARD:

- Continue to enter all abstracted case information into Maternal Mortality Review Information Application (MMRIA).
- Consistently utilize Maternal Mortality Review Committee Decisions Form (Appendix A).

QUESTION 2 | What was the cause of death?

BACKGROUND

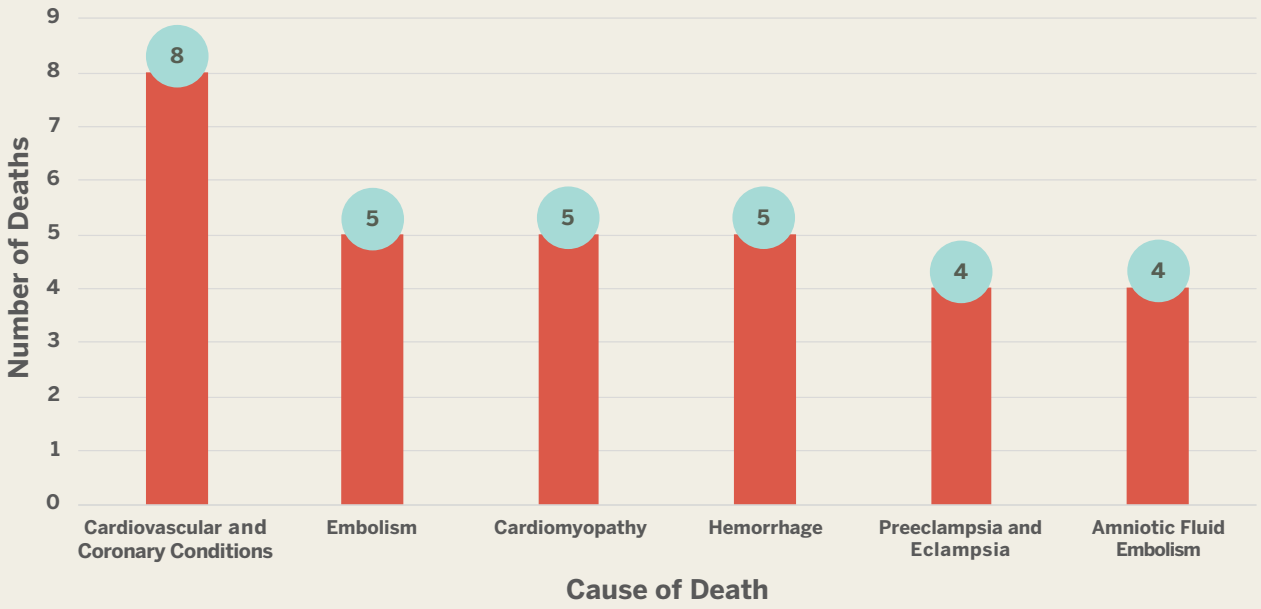
For pregnancy-related deaths, Pregnancy Mortality Surveillance System (PMSS-MM) codes were assigned to standardize the cause of death. The PMSS-MM codes were developed by the Centers for Disease Control and Prevention (CDC) and American College of Obstetricians and Gynecologist (ACOG). For this report, PMSS-MM codes were further classified in accordance with the guidance of CDC presented in the Report from Nine Maternal Mortality Review Committees.

Between 2012 and 2014 in Georgia, 99 of the 101 pregnancy-related deaths had information regarding autopsy status. Approximately half of the pregnancy-related deaths (53%) had autopsies performed. Autopsies often provide the MMRC with information that is critical to answering the key questions about the cause of maternal deaths.

RESULTS

In **2014**, six leading causes of pregnancy-related death represent **31** (72%) of the **43** deaths. The leading causes were cardiovascular and coronary conditions, embolism,

FIGURE 9 | Leading Causes of Death Among Pregnancy-Related Deaths, Georgia, 2014

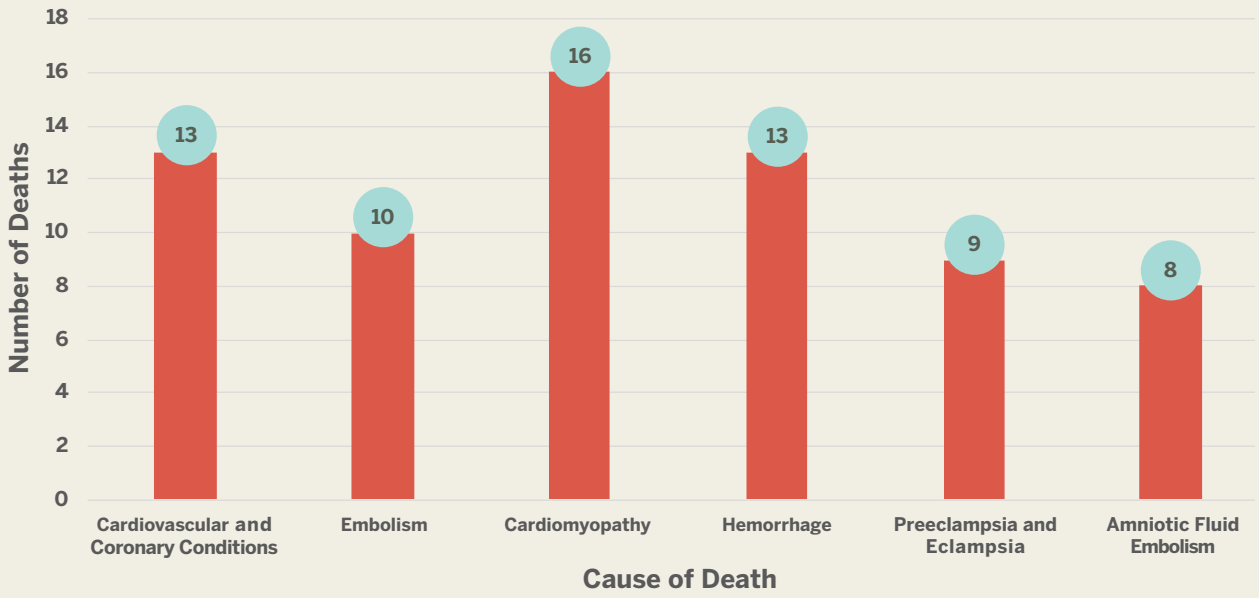


cardiomyopathy, hemorrhage, preeclampsia and eclampsia and amniotic fluid embolism. The remaining **12** (28%) pregnancy-related deaths in 2014 were attributed to: autoimmune disorder, blood disorders, cerebrovascular accident, homicide, infection, malignancy, pulmonary condition and unintentional injury.

Between **2012-2014**, the six leading causes of death were cardiomyopathy, hemorrhage, cardiovascular and coronary conditions, embolism, preeclampsia and eclampsia, and amniotic fluid embolism. The six leading causes comprise **68%** of all (101) pregnancy-related deaths. The leading cause of death was cardiomyopathy which accounted for **16** deaths (16%). The other leading causes of death were cardiovascular and coronary conditions and hemorrhage, each accounting for **13** deaths (13%), embolism 10 deaths (10%), preeclampsia and eclampsia **9** deaths (9%), and amniotic fluid embolism **8** deaths (8%).

***The remaining causes of pregnancy-related deaths** included: anesthesia complications, autoimmune disease, blood disorders, cerebrovascular accidents, conditions unique to pregnancy, homicide, infection, liver/gastrointestinal conditions, malignancies, mental health conditions, metabolic/endocrine conditions, pulmonary conditions, seizure disorder, and unintentional injury.*

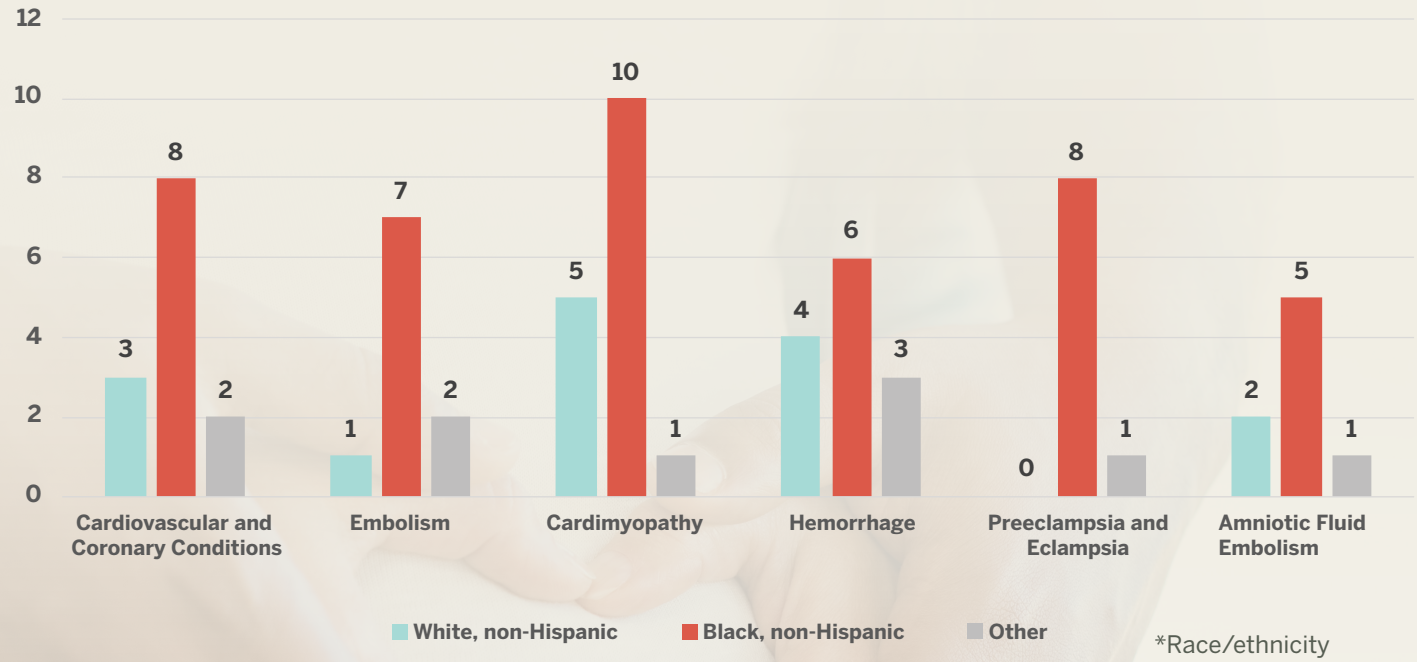
FIGURE 10 | Leading Causes of Death Among Pregnancy-Related Cases, Georgia, 2012-2014



QUESTION 2 | What was the Cause of Death?

CAUSES OF MATERNAL DEATH BY RACE

FIGURE 11 | Leading Causes of Death Among Pregnancy-Related Cases by Race, Georgia, 2012-2014



*Race/ethnicity is unknown for one pregnancy-related death.

Other races include: Bi-Racial, Asian Indian, Asian, Vietnamese Filipino, and American Indian

QUESTION 2 | What was the Cause of Death?

CAUSES OF MATERNAL DEATH BY RACE/ETHNICITY

Between 2012 and 2014, cardiomyopathy was the leading cause of death among White, non-Hispanics (**21%**) and Black, non-Hispanics (**17%**). The leading causes of pregnancy-related death varied by racial-ethnic group. Compared to the overall leading causes of death, mental health conditions (**13%**) and homicide (**8%**) were among the top five leading causes of death for White, non-Hispanics but embolism and preeclampsia and eclampsia were not.

TABLE 1 Leading Causes of Pregnancy-Related Deaths Among White, Non-Hispanic women, Georgia, 2012-2014 (N=24)

Cause of Death	Number	Percentage
Cardiomyopathy	5	21%
Hemorrhage	4	17%
Mental Health Conditions	3	13%
Cardiovascular and Coronary Conditions	3	13%
Homicide	2	8%
Amniotic Fluid Embolism	2	8%

TABLE 2 Leading Causes of Pregnancy-Related Deaths Among Black, Non-Hispanic women, Georgia, 2012-2014 (N=60)

Cause of Death	Number	Percentage
Cardiomyopathy	10	17%
Cardiovascular and Coronary Conditions	8	13%
Preeclampsia and Eclampsia	8	13%
Embolism	7	12%
Hemorrhage	6	10%

Between 2012 and 2014, cardiomyopathy was the leading cause of death among White, non-Hispanics (**21%**) and Black, non-Hispanics (**17%**).

QUESTION 2 | What was the Cause of Death?

AGE GROUP

Between 2012 and 2014 in Georgia, the leading causes of pregnancy-related death varied by age group. Cardiomyopathy (**17%**) was the leading cause of death for decedents less than 34 years old and preeclampsia and eclampsia (**21%**) was the leading cause of death for decedents 35 years or older. Mental health conditions (**13%**) and pulmonary conditions (**9%**) were among the top five leading causes of death for decedents less than 25 years old. The five leading causes of death for those less than 25 years old accounted for **57%** of the pregnancy-related deaths in the age group, suggesting a broader distribution of pregnancy-related causes of death in this age group.

TABLE 3 Leading Causes of Pregnancy-Related Deaths Among Those Less than 25 Years Old, Georgia, 2012-2014 (N=23)

Cause of Death	Number	Percentage
Cardiomyopathy	4	17%
Mental Health Conditions	3	13%
Hemorrhage	2	9%
Preeclampsia and Eclampsia	2	9%
Pulmonary Conditions	2	9%

TABLE 4 Leading Causes of Pregnancy-Related Deaths Among Those 25 to 29 Years Old, Georgia, 2012-2014 (N=24)

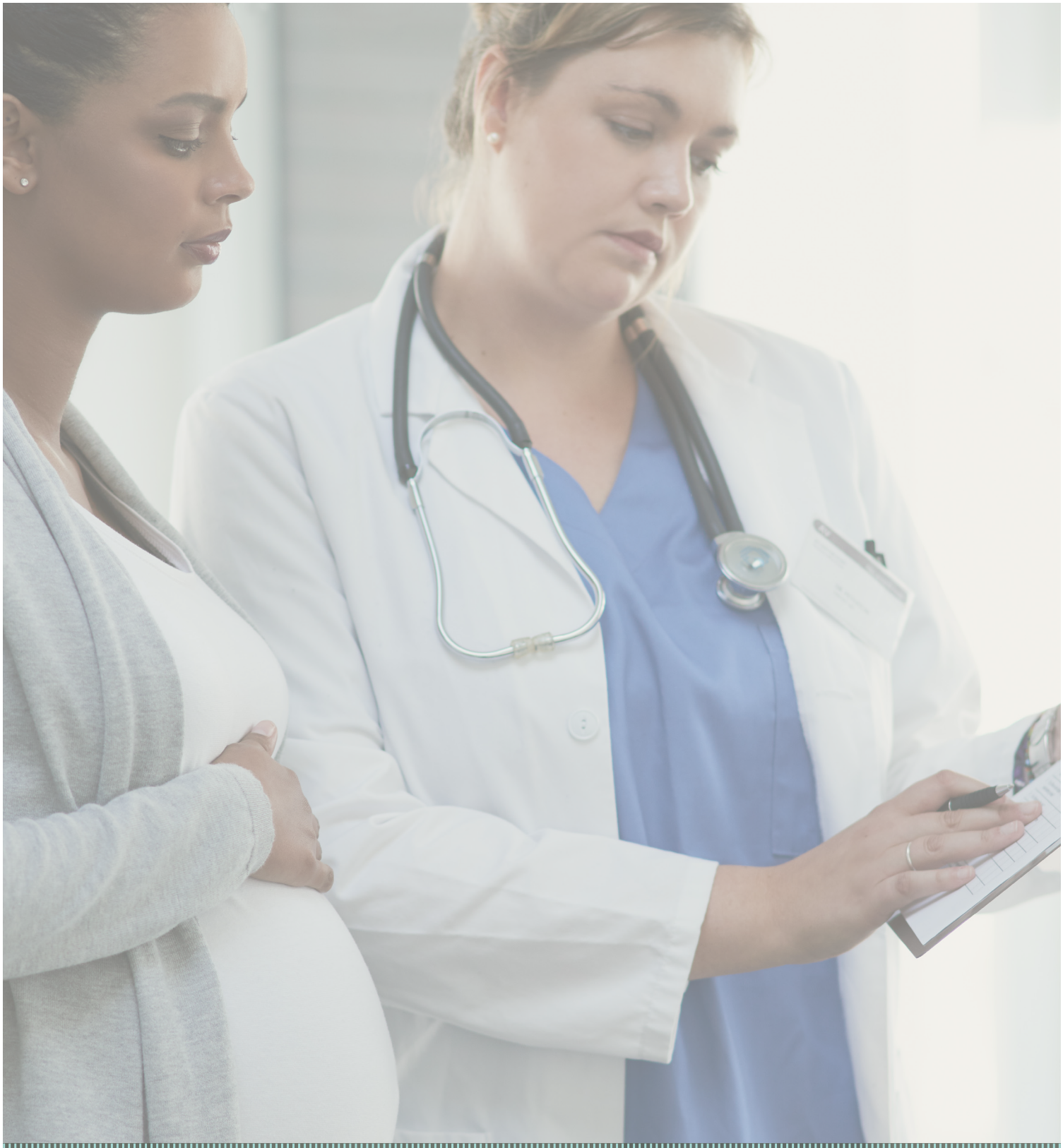
Cause of Death	Number	Percentage
Cardiomyopathy	4	17%
Cardiovascular and Coronary Conditions	4	17%
Embolism	4	17%
Hemorrhage	4	17%
Metabolic/Endocrine	2	8%
Seizure Disorder	2	8%

TABLE 5 Leading Causes of Pregnancy-Related Deaths Among Those 30 to 34 Years Old, Georgia, 2012-2014 (N=24)

Cause of Death	Number	Percentage
Cardiomyopathy	4	16%
Cardiovascular and Coronary Conditions	4	16%
Amniotic Fluid Embolism	3	12%
Embolism	3	12%
Cerebrovascular Accident	3	12%

TABLE 6 Leading Causes of Pregnancy-Related Deaths Among Those 35 Years Old and Older, Georgia, 2012-2014 (N=29)

Cause of Death	Number	Percentage
Cause of Death	Number	Percentage
Preeclampsia and Eclampsia	6	21%
Hemorrhage	5	17%
Cardiomyopathy	4	14%
Cardiovascular and Coronary Conditions	4	14%
Amniotic Fluid Embolism	3	10%
Embolism	3	10%



MOVING FORWARD:

- Increase specificity of recommendations for each cause of death.
- Consistently capture contributing factors.

QUESTION 3 | Was the Death Preventable?

BACKGROUND

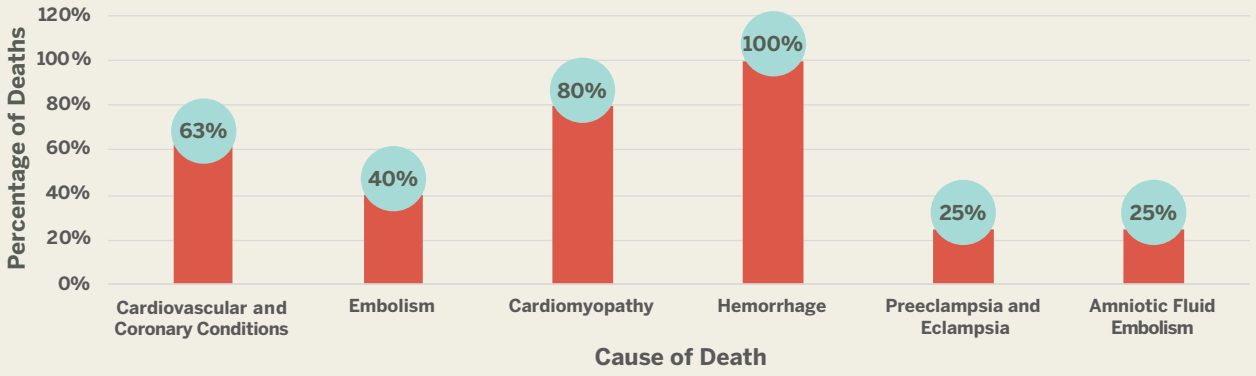
The MMRC makes a determination about preventability for each pregnancy-related death. To determine preventability the MMRC answers the following questions:

1. Was the death preventable?
2. Was there a chance to alter the outcome?

RESULTS

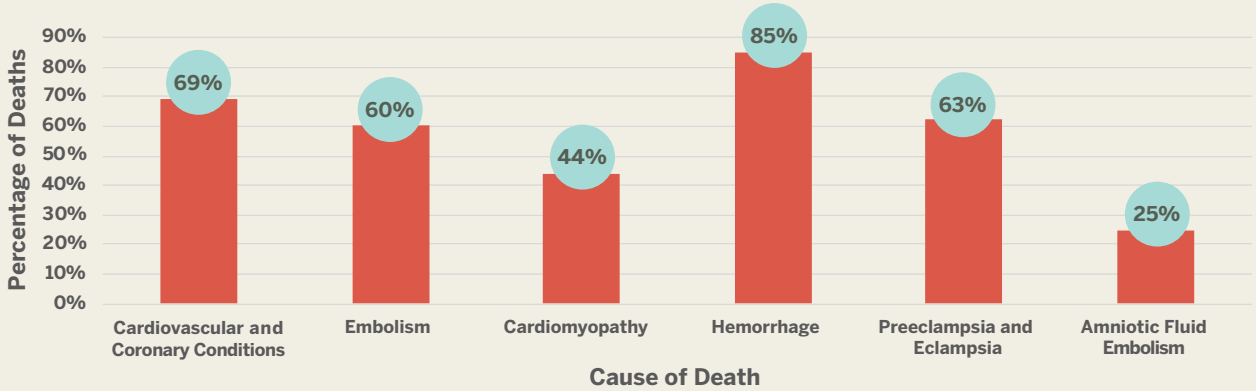
In **2014**, **58%** of pregnancy-related deaths were determined to be preventable. Between **2012-2014**, **61%** of pregnancy-related deaths were determined to be preventable.

FIGURE 12 | Percentage of Pregnancy-Related Deaths Determined to be Preventable by Leading Cause of Death, Georgia, 2014 (N=31)



Between 2012 and 2014, over two-thirds of the pregnancy-related deaths due to hemorrhage (**11**; **85%**) and cardiovascular and coronary conditions (**9**; **69%**) were determined to be preventable.

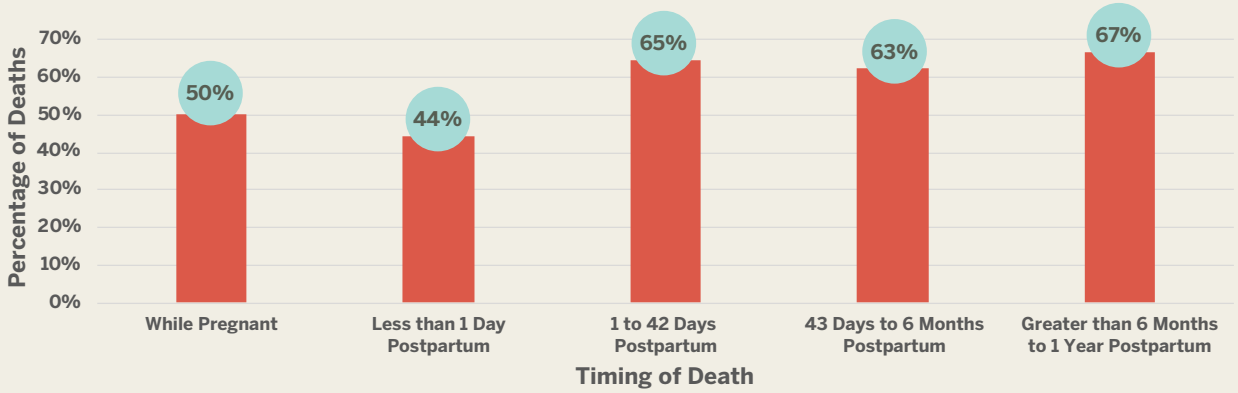
FIGURE 13 | Percentage of Pregnancy-Related Deaths Determined to be Preventable by Leading Cause of Death, Georgia, 2012-2014 (N=68)



QUESTION 3 | Was the Death Preventable?

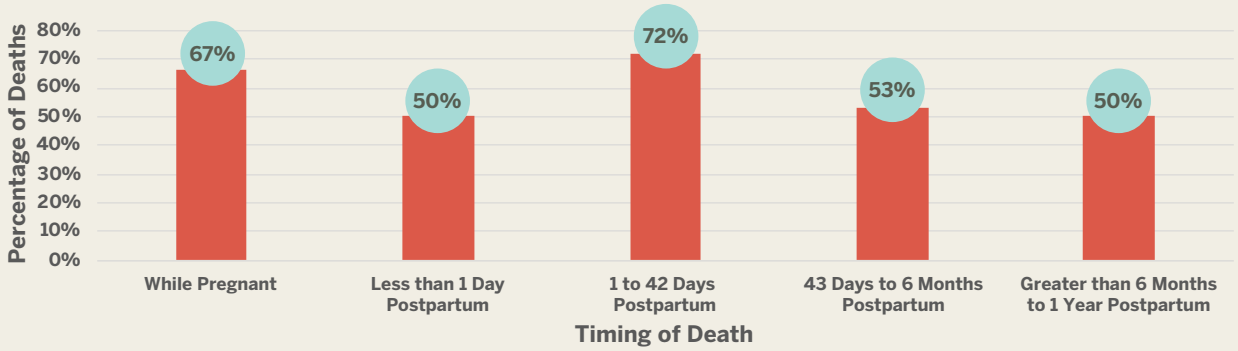
In **2014,** more than half of the pregnancy-related deaths occurring while pregnant or within 42 days postpartum were determined to be preventable. Approximately **65%** of the pregnancy-related maternal deaths occurring 43 days up to one year postpartum were determined to be preventable.

FIGURE 14 Percentage of Pregnancy-Related Deaths Determined to be Preventable by Timing of Death, Georgia, 2014 (N=43)



Between 2012 and 2014, 66% of pregnancy-related deaths occurring while pregnant or within 42 days postpartum were determined to be preventable. Approximately **52%** of the pregnancy-related maternal deaths occurring 43 days up to one year postpartum were determined to be preventable.

FIGURE 15 Percentage of Pregnancy-Related Deaths Determined to be Preventable by Timing of Death, Georgia, 2012-2014 (N=100*)



*One pregnancy-related maternal death did not have preventability information indicated.

MOVING FORWARD:

- Consistently apply the definition of preventability.
- Establish Action Committee to look at preventability from a public health standpoint including contributing factors and social determinants.

QUESTION 4 | What Were the Factors that Contributed to this Death?

BACKGROUND

After the MMRC determines that a death is pregnancy-related, identifies the underlying cause of death and determines preventability, the factors that contributed to the death are identified.

EACH FACTOR IS CATEGORIZED INTO ONE OF FIVE LEVELS:

1. Patient/Family
2. Provider
3. Facility
4. Systems of Care
5. Community

KEY CONTRIBUTING FACTORS		
Delay	Tobacco use	Continuity of care/ care coordination
Adherence	Chronic disease	Quality of care
Knowledge	Childhood abuse/trauma	Outreach
Cultural/religious	Access – financial	Enforcement
Environmental	Unstable housing	Referral
Violence	Social support/isolation	Assessment
Mental health conditions	Technology	Legal
Substance use disorder (alcohol, illicit/prescription drugs)	Policies/procedures Communication	Other

PREGNANCY-RELATED DEATH | Contributing Factors

RESULTS

In 2014, the majority (**70%**) of the pregnancy-related deaths had a contributing factor identified. A total of **54** contributing factors were identified for the pregnancy-related maternal deaths; some deaths have multiple contributing factors associated with them. Over half (**56%**) of the contributing factors identified by the MMRC were patient and/or family related.

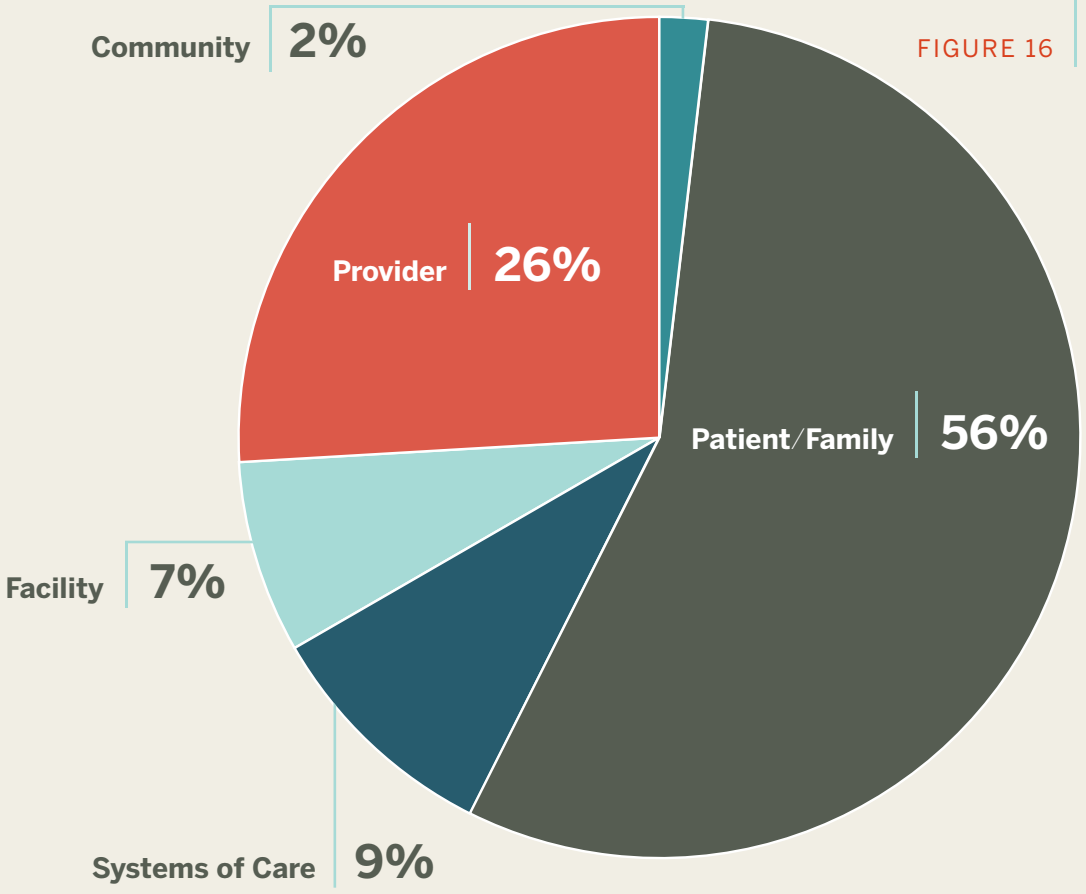


FIGURE 16 Distribution of Contributing Factors to Pregnancy-Related Deaths, Georgia, 2014 (N=54)

MOVING FORWARD:

- **Identify** at least one contributing factor for each pregnancy-related death.
- **Identify** themes within contributing factors to better inform the MMRC recommendations.
- **Improve** the MMRC's ability to recognize and document contributing factors.
- **Establish** an Action Committee to expand evaluation of contributing factors.
- **Consider** use of geospatial data in future analyses to identify social determinants associated with maternal deaths.

QUESTION 5 | What Are the Recommendations and Actions That Address These Contributing Factors?

BACKGROUND

The Committee develops recommendations to prevent future deaths based on the contributing factors identified. The MMRC considers the following key questions to determine recommendations for prevention:

- *Was there at least some chance that the death could have been prevented?*
- *What were the specific and feasible actions, if implemented or altered, that might have changed the course of events?*

RESULTS

86% of the 2014 pregnancy-related deaths included at least one recommendation. These recommendations are included in the comprehensive list for 2012-2014 that follows. For all pregnancy-related deaths in **2012-2014**, the Georgia MMRC identified recommendations that were coded into themes and listed by contributing factor. The most common themes among pregnancy-related deaths include the following:

PATIENT/FAMILY:

- **Educate** patient and families about early warning signs and symptoms during pregnancy and after delivery
- **Provide** education on the importance of early prenatal care, keeping all appointments, adherence to medication when indicated, and postpartum follow-up

PROVIDERS:

- **Recognize** early warning signs and symptoms during pregnancy and after delivery
- **Initiate** preventive medications during pregnancy when indicated
- **Refer** to Maternal Fetal Medicine (MFM) provider when first indicated
- **Transport** high-risk maternal patients while stable to risk-appropriate facility
- **Refer** morbidly obese pregnant patients for cardiology consult

PREGNANCY-RELATED DEATH | Recommendations

FACILITY:

- **Implement** hemorrhage and hypertension patient safety bundles
- **Increase** availability and access to postpartum LARCs
- **Transport** high-risk maternal patients while stable to risk-appropriate facility

SYSTEMS OF CARE:

- **Mandate** autopsy for every maternal death
- **Expand** Medicaid coverage to one year postpartum
- **Provide** case management for morbidly obese pregnant patients
- **Implement** case management and follow-up after delivery

COMMUNITY:

- **Promote** healthy eating and maintaining healthy weight prior to pregnancy
- **Promote** pregnancy spacing
- **Promote** smoking cessation
- **Provide** resources for prenatal care and postpartum follow-up
- **Manage** chronic conditions prior to pregnancy
- **Ensure** resources for long-acting reversible contraceptives and other contraceptive methods are available when pregnancy is not desired or not advised

MOVING FORWARD:

- **Establish** an Action Committee that will use case recommendations from the MMRC to develop an action plan to impact leading causes of pregnancy-related deaths.
- Continuous quality improvement of data collection and documentation of case review findings.
- **Expand** dissemination of report findings and recommendations to medical providers serving reproductive aged females.
- **Ensure** each pregnancy-related death reviewed includes recommendations for prevention.

QUESTION 6 | What Is the Anticipated Impact of These Actions If Implemented?

BACKGROUND

The MMRC assigns a primary, secondary or tertiary level of prevention to each recommendation.

- Primary prevention is intervening before a health effect occurs (smoking cessation)
- Secondary prevention includes early identification of health conditions (screening)
- Tertiary prevention is to prevent progression of condition once it occurs (treatment)

RESULTS

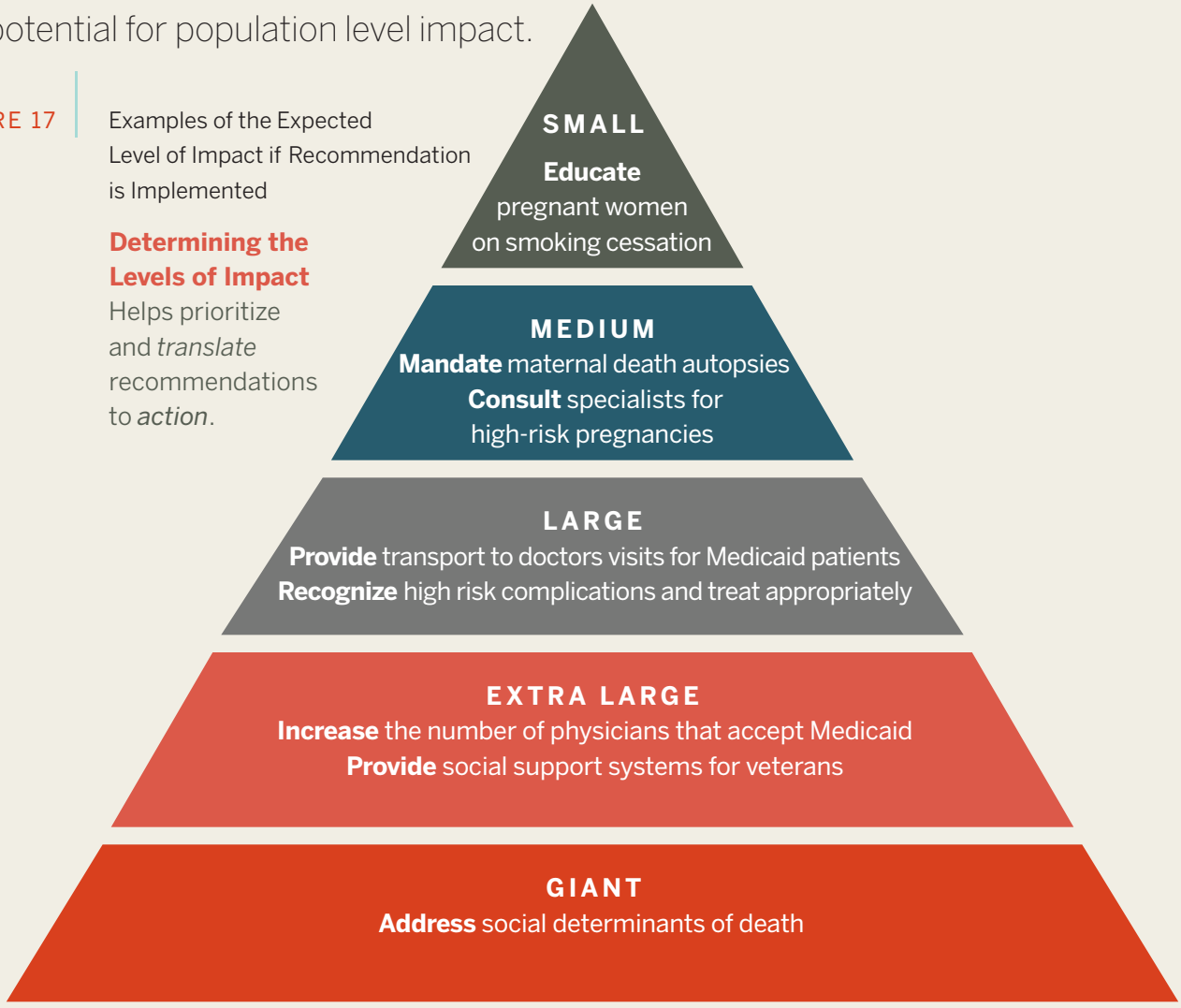
In **2014**, there were **56** prevention recommendations for **37** of the **43** pregnancy-related maternal deaths. There were **46** recommendations that had levels of prevention noted. More than three-quarters (**76%**) of the recommendations were assigned a secondary level of prevention; followed by a tertiary level of prevention (**13%**) and primary level of prevention (**11%**).

The MMRC also assigns an expected level of impact for each recommendation. The impact levels range from small, individual level actions, to giant which have the potential for population level impact.

FIGURE 17

Examples of the Expected Level of Impact if Recommendation is Implemented

Determining the Levels of Impact
Helps prioritize and *translate* recommendations to *action*.



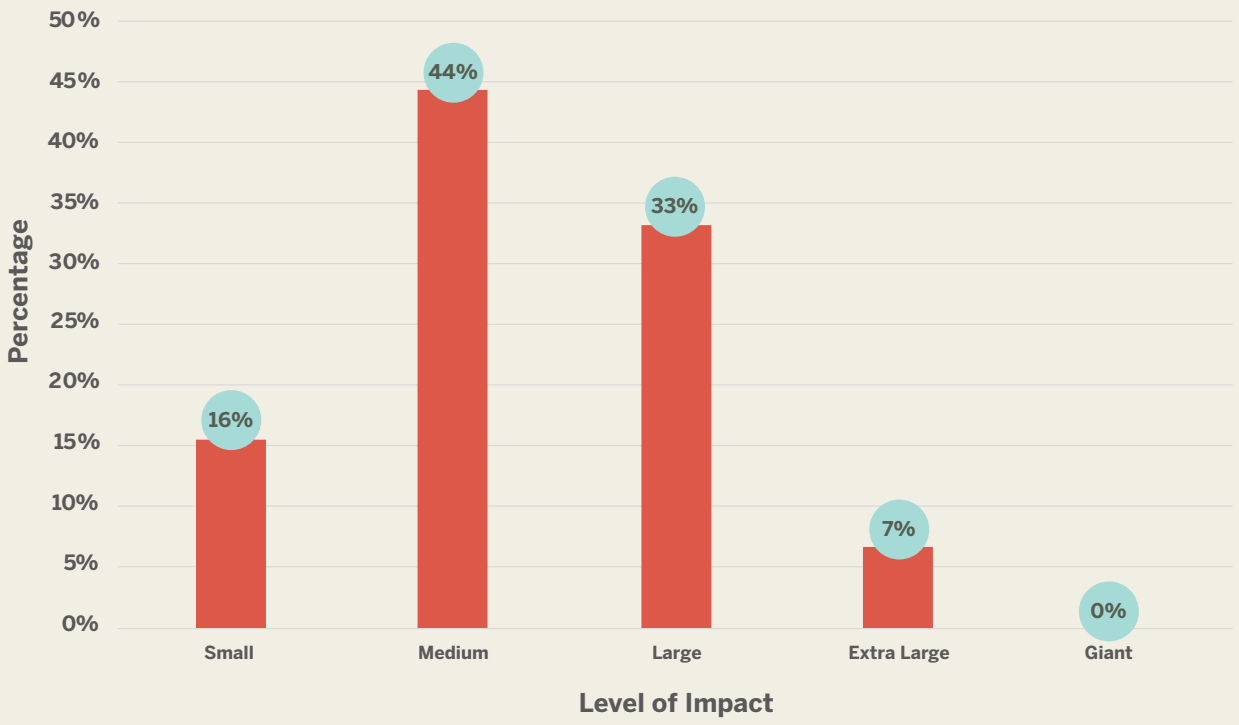
SOURCE:

Building U.S. Capacity to Review and Prevent Maternal Deaths. (2018). Report from nine maternal mortality review committees. Retrieved from http://reviewtoaction.org/Report_from_Nine_MMRCs.

A comprehensive strategy to reduce maternal deaths incorporates multiple levels

In **2014**, over **three-quarters** (**78%**) of the prevention recommendations had an anticipated medium or large impact. None of the identified recommendations had an anticipated giant impact.

FIGURE 18 | Anticipated Level of MMRC Impact of Recommendations if Implemented, Georgia, 2014 (N=45)



MOVING FORWARD:

Establish an action committee to prioritize recommendations and develop an action plan to address all levels of impact and promote health equity.

APPENDIX A | Calculations

MATERNAL MORTALITY RATIO FORMULA: (DEATHS PER 100,000 LIVE BIRTHS)

Number of maternal deaths / Number of live births *100,000

PREGNANCY-RELATED MATERNAL MORTALITY RATIO FORMULA: (DEATHS PER 100,000 LIVE BIRTHS)

Number of pregnancy-related maternal deaths / Number of live births *100,000

Regrouping	Specified Causes Included in Regrouping
Accidental Overdose	
Anesthesia Complications	
Autoimmune Disease	Systemic lupus erythematosus, Other collagen vascular disease/ not otherwise specified
Amniotic Embolism	
Blood Disorders	Sickle cell anemia, other hematologic conditions including thrombophilias/thrombotic thrombocytopenic purpura/hemolytic uremic syndrome/not otherwise specified
Cardiomyopathy	Postpartum/peripartum cardiomyopathy. Hypertrophic cardiomyopathy, other cardiomyopathy/not otherwise specified
Cardiovascular and Coronary Conditions	Coronary artery disease/myocardial infarction/atherosclerotic cardiovascular disease, pulmonary hypertension, valvular heart disease, vascular aneurysm/dissection, hypertensive cardiovascular disease, Marfan's syndrome, conduction defects/arrhythmias, vascular malformations outside the head and coronary arteries, other cardiovascular disease, including congestive heart failure, cardiomegaly, cardiac hypertrophy, cardiac fibrosis, and non-acute myocarditis/not otherwise specified
Cerebrovascular Accidents	Hemorrhage/thrombosis/aneurysm/ malformation, but not secondary to hypertensive disease
Conditions Unique to Pregnancy	Gestational diabetes, hyperemesis, liver disease of pregnancy
Embolism	Thrombotic (non-cerebral), other embolism/not otherwise specified

Regrouping	Specified Causes Included in Regrouping
Hemorrhage	Rupture/laceration/intra-abdominal bleeding; placental abruption, placenta previa, ruptured ectopic pregnancy, uterine atony/ postpartum hemorrhage, placenta accreta/increta/percreta, due to retained placenta, due to primary disseminated intravascular coagulation, other hemorrhage/not otherwise specified
Homicide	Intentional injury
Infection	Postpartum genital tract (e.g., of the uterus/pelvis/perineum/ necrotizing fasciitis), sepsis/septic shock, chorioamnionitis/antepartum infection, non-pelvic infections (e.g., pneumonia, H1N1, meningitis, HIV), urinary tract infection, other infections/not otherwise specified
Liver and Gastrointestinal Conditions	Crohn's disease/ulcerative colitis, liver disease/failure/transplant, other gastrointestinal diseases/not otherwise specified
Malignancies	Gestational trophoblastic disease, malignant melanoma, other malignancies/not otherwise specified
Mental Health Conditions	Depression, other psychiatric conditions, suicide
Metabolic / Endocrine Conditions	Obesity, diabetes mellitus, other metabolic/endocrine disorders/ not otherwise specified
Preeclampsia and Eclampsia	
Pulmonary Conditions (Excluding Adult Respiratory Distress Syndrome)	Chronic lung disease, cystic fibrosis, asthma, other pulmonary disease/not otherwise specified
Renal Disease	
Seizure Disorders	Epilepsy/seizure disorder, other neurologic diseases/not otherwise specified
Unintentional Injury	Motor vehicle accidents, accidental overdose, smoke inhalation, drowning

REFERENCES

- The Centers for Disease Control and Prevention. Pregnancy Mortality Surveillance System. *Retrieved on September 21, 2018 from:* https://www.cdc.gov/reproductivehealth/maternalinfanthealth/pregnancy-mortality-surveillance-system.htm
- Building US Capacity to Review and Prevent Maternal Deaths. (2018) *Report from nine maternal mortality review committees. Retrieved from* http://reviewtoaction.org/Report_from_Nine_MMRCs

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