Maternal Mortality: Statewide and National Efforts to Reduce Adverse Outcomes of Pregnancy and Childbirth

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Birth Outcomes Initiative Symposium
October 30, 2019
Judith.burgis@prismahealth.org
Disclosures

Chair of the SC Maternal Mortality and Morbidity Review Committee (MMMRC)

SC ACOG Section Chair

Thanks to Dave Goodman, CDC and to Amy Crockett, SC BOI Clinical Lead
Learning Objectives

*Understand* the definition of pregnancy-associated and pregnancy-related deaths

*Review* CDC and SC data on maternal mortality

*Describe* ways to decrease maternal mortality and improve racial equity in South Carolina
Key Definitions

A pregnancy-associated death is the death of a woman (during pregnancy or within one year of pregnancy) that is temporally related to pregnancy.

A pregnancy-related death is a subset of pregnancy-associated deaths that is related to or are aggravated by pregnancy.

The Maternal Mortality Rate\(^1\) is reported as

\[
\text{# of maternal deaths per 100,000 live births}
\]

The Pregnancy-Related Mortality Ratio\(^2\) is reported as

\[
\text{# of pregnancy-related deaths per 100,000 live births}
\]

\(^1\)Deaths occurring during pregnancy or within 42 days of delivery. Maternal deaths are identified by ICD-10 codes as listed on the death certificate.

\(^2\)Deaths occurring during pregnancy or within one year of pregnancy. Pregnancy-related deaths are identified by the pregnancy checkbox and/or death certificate linked to fetal deaths or birth certificate.
National Sources for Measuring Maternal Deaths: There are Two

1) National Center for Health Statistics (NCHS)

2) The Pregnancy Mortality Surveillance System (PMSS)
### Measuring Maternal Deaths: NCHS

<table>
<thead>
<tr>
<th>Data Source</th>
<th>Death Certificates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source of Classification</td>
<td>ICD-10 coding</td>
</tr>
</tbody>
</table>

**CDC – National Center for Health Statistics (NCHS)**

**In accordance with international standards:** “The death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and the site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes.”

<table>
<thead>
<tr>
<th>Excluded</th>
<th>Included: Maternal Mortality Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>• O96 (Late maternal deaths)</td>
<td>• A34 (obstetric tetanus)</td>
</tr>
<tr>
<td>• O97 (Sequelae of direct obstetric causes)</td>
<td>• 000–095</td>
</tr>
<tr>
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<td>• 098–099</td>
</tr>
</tbody>
</table>

# Measuring Maternal Deaths: NCHS

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<tbody>
<tr>
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<tr>
<td>Time Frame</td>
<td>During pregnancy; up to 42 days</td>
</tr>
<tr>
<td>Terms</td>
<td>Maternal Death</td>
</tr>
<tr>
<td>Measure</td>
<td>Maternal Mortality Rate: # of Maternal deaths per 100,000 live births</td>
</tr>
<tr>
<td>Purpose</td>
<td>Statistical: National trends &amp; international comparison</td>
</tr>
</tbody>
</table>
Measuring Maternal Deaths: NCHS
Measuring Maternal Deaths: NCHS

![Graph showing maternal mortality rate from 1999 to 2014. Key events include:
- ICD-10 cause of death coding implemented in 2013.
- NCHS implements revised death certificate in 2006.
- NCHS stops reporting official maternal mortality rate in 2012.

The graph indicates a rising trend in maternal mortality rate, starting from 9.8 deaths per 100,000 live births in 1999, peaking at 23 deaths per 100,000 live births in 2014.]

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11
Measuring Maternal Deaths: Pregnancy Mortality Surveillance System (PMSS)

CDC – ACOG working group (1986)

Clinical relevance instead of rule-based designation of cause of death
## Measuring Maternal Deaths: PMSS

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<thead>
<tr>
<th>Data Source</th>
<th>CDC – National Center for Health Statistics (NCHS)</th>
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<tr>
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<td>Death Certificates</td>
<td>Death certificates; Linked birth and fetal death certificates; other info sent by jurisdictions</td>
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</table>

**Linkage increases**
- Identification (40-50%)
- Information available to classify deaths
  - Timing
  - Pregnancy history
  - Health

News articles/obituaries increase information about context
# Measuring Maternal Deaths: PMSS

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</tr>
<tr>
<td>Source of Classification</td>
<td>ICD-10 coding</td>
<td>Clinical epidemiologists</td>
</tr>
<tr>
<td>Time Frame</td>
<td>During pregnancy; up to 42 days</td>
<td>During pregnancy; up to 1 year</td>
</tr>
<tr>
<td>Measure</td>
<td>Maternal Mortality Rate: # of Maternal deaths per 100,000 live births</td>
<td>Pregnancy-related Mortality Ratio: # of Pregnancy-related Deaths per 100,000 live births</td>
</tr>
<tr>
<td>Purpose</td>
<td>Statistical: National trends &amp; international comparison</td>
<td>Analyze clinical factors, publish information that may lead to prevention strategies</td>
</tr>
</tbody>
</table>
Measuring Maternal Deaths: NCHS & PMSS

IF FEMALE:

- Not pregnant within past year
- Pregnant at time of death
- Not pregnant, but pregnant within 42 days of death
- Not pregnant, but pregnant 43 days to 1 year before death
- Unknown if pregnant within the past year

PRMR: Pregnancy-related mortality ratio
MMR: Maternal mortality rate
http://www.cdc.gov/reproductivehealth/maternalinfanthealth/pmss.html
Measuring Maternal Deaths: PMSS

http://www.cdc.gov/reproductivehealth/maternalinfanthealth/pmss.html
PMSS: Causes of Pregnancy-related Death

PMSS: Causes of Pregnancy-related Death

PMSS: Percent >42 days

Racial/Ethnic Disparities in Pregnancy-Related Deaths —

Emily E. Petersen, MD1; Nicole L. Davis, PhD1; David Goodman, PhD1; Shanna Cox, MSPH1; Carla Syverson, MSN1,2; Kristi Seed1,2; Carrie Shapiro-Mendoza, PhD1; William M. Callaghan, MD1; Wanda Barfield, MD1

Approximately 700 women die in the United States each year as a result of pregnancy or its complications, and significant racial/ethnic disparities in pregnancy-related mortality exist (1). Data from CDC’s Pregnancy Mortality Surveillance System (PMSS) for 2007–2016 were analyzed. Pregnancy-related mortality ratios (PRMRs) (i.e., pregnancy-related deaths per 100,000 live births) were calculated for women by race/ethnicity, age, and state. PRMRs were analyzed by age group, highest level of education, and calendar year for women who were non-Hispanic white, black, AI/AN, Asian or Pacific Islander (A/PI), and...
PMSS: State Variation

Disparity implies inequality often where a greater equality might be reasonably expected
PMSS: Disparity Ratio by Tertile

Disparity Ratio in Pregnancy-related Mortality Ratio by Race-Ethnicity and Ratio Tertile, 2007-2016

- **Lowest PRMR**
- **Middle PRMR**
- **Highest PRMR**

- **Black: White**
- **Native: White**
- **Asian: White**
- **Hispanic: White**

PMSS: by Age Grouping

Pregnancy-related Mortality Ratio by Race-Ethnicity and Age, 2007-2016

PMSS: by Education Grouping

Pregnancy-related Mortality Ratio by Race-Ethnicity and Education, 2007-2016

Preventing Maternal Deaths: Maternal Mortality Review Committees (MMRCs)
Preventing Maternal Deaths: Maternal Mortality Review Committees (MMRCs)

MMRCs have 3 components that the other systems (NCHS and PMSS) don’t have:

1. Robust **DATA** system dedicated to maternal mortality with multi-level data from multiple sources (including non-traditional sources)

2. A multidisciplinary committee of **EXPERTS** to review each death, through clinical and non-clinical lens, with a focus on prevention (population level)

3. **PH STAFF** (usually a state department of public health team) to gather and manage the data, establish and guide the committee, communicate with stakeholders, and conduct and disseminate research and surveillance. (AKA, put it all together)
Preventing Maternal Deaths: Experts

Organizations
- Academic Institutions
- Behavioral Health Agencies
- Blood Banks
- Consumer Advocacy
- Federally Qualified Health Centers
- Fetal and Infant Mortality Review (FIMR) Programs
- Healthy Start Agencies
- Homeless Services
- Hospitals/Hospital Associations
- Private and Public Insurers
- Professional Assoc. State Chapters
- Rural Health Associations
- State Medical Society
- State Medicaid Agency
- State Title V Program
- Tribal Organizations
- Violence Prevention Agencies
- State Title X Program

Core Disciplines
- Anesthesiology
- Family Medicine
- Forensic Pathology
- Maternal Fetal Medicine
- Perinatology
- Nurse Midwifery
- Obstetrics and Gynecology
- Patient Safety
- Perinatal Nursing
- Psychiatry
- Public Health
- Social Work

Specialty Disciplines
- Clergy
- Community Leadership
- Critical Care Medicine
- Nutrition
- Emergency Response
- Epidemiology
- Genetics
- Home Nursing
- Law Enforcement
- Mental Health Provider
- Pharmacy
- Public Health Nursing
- Quality/Risk Management
- Substance Abuse Counseling

Expanded Data +
Multidisciplinary Committee =
Expanded Scope:
  Suicide
  Homicide
  Overdose
**COMMITTEE DETERMINATION OF CAUSE(S) OF DEATH**

<table>
<thead>
<tr>
<th>TYPE</th>
<th>CAUSE (DESCRIPTIVE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMMEDIATE</td>
<td></td>
</tr>
<tr>
<td>CONTRIBUTING</td>
<td></td>
</tr>
<tr>
<td>UNDERLYING</td>
<td></td>
</tr>
<tr>
<td>OTHER SIGNIFICANT</td>
<td></td>
</tr>
</tbody>
</table>

**IF PREGNANCY-RELATED, COMMITTEE DETERMINATION OF UNDERLYING CAUSE OF DEATH**

Refer to page 3 for PMSS-MM cause of death list, if more than one is selected, list in order of importance beginning with the most compelling (1-2; no more than 2 may be selected in the system).

- **DID OBESITY CONTRIBUTE TO THE DEATH?**
- **DID MENTAL HEALTH CONDITIONS CONTRIBUTE TO THE DEATH?**
- **DID SUBSTANCE USE DISORDER CONTRIBUTE TO THE DEATH?**
- **WAS THIS DEATH A SUICIDE?**
- **WAS THIS DEATH A HOMICIDE?**

<table>
<thead>
<tr>
<th></th>
<th>YES</th>
<th>PROBABLY</th>
<th>NO</th>
<th>UNKNOWN</th>
</tr>
</thead>
<tbody>
<tr>
<td>DID OBESITY CONTRIBUTE TO THE DEATH?</td>
<td>YES</td>
<td>PROBABLY</td>
<td>NO</td>
<td>UNKNOWN</td>
</tr>
<tr>
<td>DID MENTAL HEALTH CONDITIONS CONTRIBUTE TO THE DEATH?</td>
<td>YES</td>
<td>PROBABLY</td>
<td>NO</td>
<td>UNKNOWN</td>
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<tr>
<td>DID SUBSTANCE USE DISORDER CONTRIBUTE TO THE DEATH?</td>
<td>YES</td>
<td>PROBABLY</td>
<td>NO</td>
<td>UNKNOWN</td>
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<tr>
<td>WAS THIS DEATH A SUICIDE?</td>
<td>YES</td>
<td>PROBABLY</td>
<td>NO</td>
<td>UNKNOWN</td>
</tr>
<tr>
<td>WAS THIS DEATH A HOMICIDE?</td>
<td>YES</td>
<td>PROBABLY</td>
<td>NO</td>
<td>UNKNOWN</td>
</tr>
</tbody>
</table>

- **IF HOMICIDE, SUICIDE, OR ACCIDENTAL DEATH, LIST THE MEANS OF FATAL INJURY**
- **IF HOMICIDE, WHAT WAS THE RELATIONSHIP OF THE PERPETRATOR TO THE DECEDEENT?**

<table>
<thead>
<tr>
<th><strong>IF HOMICIDE, SUICIDE, OR ACCIDENTAL DEATH, LIST THE MEANS OF FATAL INJURY</strong></th>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>FIREARM</td>
<td>SHARP INSTRUMENT</td>
<td>BLUNT INSTRUMENT</td>
<td>POISONING/ OVERDOSE</td>
<td>HANGING/ STRANGULATION/ SUFFOCATION</td>
</tr>
<tr>
<td>FALL</td>
<td>PUNCHING/ KICKING/ BEATING</td>
<td>EXPLOSIVE</td>
<td>DROWNING</td>
<td>FIRE OR BURNS</td>
</tr>
<tr>
<td>MOTOR VEHICLE</td>
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<td></td>
<td></td>
<td></td>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>NO RELATIONSHIP</td>
<td>PARTNER</td>
<td>EX-PARTNER</td>
<td>OTHER RELATIVE</td>
<td>OTHER ACQUAINTANCE</td>
</tr>
<tr>
<td>OTHER</td>
<td>SPECIFY:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UNKNOWN</td>
<td>NOT APPLICABLE</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
COMMITTEE DETERMINATION OF 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, provider, facility, system and/or community factors.

CONTRIBUTING FACTORS WORKSHEET
What were the factors that contributed to this death? Multiple contributing factors may be present at each level.

RECOMMENDATIONS OF THE COMMITTEE
If there was at least some chance that the death could have been averted, what were the specific and feasible actions that, if implemented or altered, might have changed the course of events?

---

WAS THIS DEATH PREVENTABLE?
- □ YES
- □ NO

CHANCE TO ALTER OUTCOME?
- □ GOOD CHANCE
- □ SOME CHANCE
- □ NO CHANCE
- □ UNABLE TO DETERMINE

---

PATIENT/FAMILY

PROVIDER

FACILITY

SYSTEM

COMMUNITY

CONTRIBUTING FACTOR KEY (DESCRIPTIONS ON PAGE 4)
- Delay
- Adherence
- Knowledge
- Cultural/Religious
- Environmental
- Violence
- Mental Health conditions
- Substance use disorder - alcohol, illicit/prescription drugs
- Tobacco use
- Chronic disease
- Childhood abuse/trauma
- Access/Financial
- Unstable Housing
- Social Support/Isoation
- Equipment/technology
- Policies/procedures
- Communication
- Continuity of care/care coordination
- Clinical quality of care
- Outreach
- Enforcement
- Referral
- Assessment
- Legal
- Other

PREVENTION LEVEL
- PRIMARY: Prevents the contributing factor before it ever occurs
- SECONDARY: Reduces the impact of the contributing factor once it has occurred (i.e. treatment)
- TERTIARY: Reduces the impact or progression of an ongoing contributing factor once it has occurred (i.e. management of complications)

EXPECTED IMPACT LEVEL
- SMALL: Education/counseling (community- and/or provider-based health promotion and education activities)
- MEDIUM: Clinical intervention and coordination of care across continuum of care (e.g. obstetrics, protocols, prescriptions)
- LARGE: Large existing protective intervention (improve readiness, recognition and response to obstetric emergencies/LARC)
- EXTRA LARGE: Population health (promote environments that support healthy living/ensure available and accessible services)
- GIANT: Address social determinants of health (poverty, inequality, etc.)
MMRC Example: A Cardiomyopathy Death

• Prenatal care
• Intrapartum and postpartum care
• Any postpartum visits
• Informant (family interviews)
• Social determinants of health
• Demographics
MMRC Example: A Cardiomyopathy Death
MMRC Example: A Cardiomyopathy Death
MMRCs: Equity Framework

Understanding community contributing factors requires a shift in thinking

1. We can link MMRIA data to community context
2. Assigning contributing role of community in individual cases is challenging
3. Community factors may be more evident in aggregate data
4. Adaptation, implementation, and evaluation of a Health Equity Toolkit in process(!)

MMRCs Equity Framework
MMRCs: Equity Framework
MMRCs: Equity Framework

Health Care Service Environ

Social Environ

Pregnancy-related Mortality Ratio

Unmet drug Tx need

PCP per capita

Behavioral Hlth per capita

OB per capita

Rural

% Poverty

Income Inequality

% Uninsured
MMRCs: are NOT...

- A mechanism for assigning blame or responsibility for any death
- A research study
- Peer review
- An institutional review
- A substitute for existing mortality and morbidity inquiries
Experience a Maternal Mortality Review Committee In Action

www.reviewtoaction.org
MMRCs: Not New

SOUTH CAROLINA MATERNAL MORTALITY
REVIEW FOR 1970

JOHN G. EICHELBERGER, M.D. AND
E. J. DENNIS, III, M.D.

The purpose of this review of the maternal deaths in 1970 is to provide the physicians information which will aid in reduction of maternal deaths and ultimate benefit to the Committee to censur or reprimand the involved physician. When indicated, especially in a preventable death, the Committee will make recommendation to

MATERNAL DEATHS IN SOUTH CAROLINA 1961-1971

JOHN G. EICHELBERGER, M.D.*
E. J. DENNIS, III, M.D.**
(Re)Growth of MMRCs across the US

2011
<20
(Re)Growth of MMRCs across the US

- **2011**: <20
- **2019**: 43

- Systematic data collection and use
- Technical assistance and training
- Job aids
- Access to resources and learning

MMRIA User Meeting Agenda

*MMRIA*: Maternal Mortality Review Information App

*MMRDS*: Maternal Mortality Review Data System

*REVIEW to ACTION*: Maternal Mortality Review Information App

*ERASE MM*: Early Identification and Action to Reduce Maternal Mortality

*PRISMA HEALTH*
Maternal Mortality Review Information Application (MMRIA)

A common language for reviews to work together
MMRIA in the Southeast Region IV
**MMRIA: Distribution of Pregnancy-related Deaths by Timing**

<table>
<thead>
<tr>
<th>Region</th>
<th>14 MMRCs</th>
<th>Region IV</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>33%</td>
<td>43%</td>
</tr>
<tr>
<td></td>
<td>37%</td>
<td>43%</td>
</tr>
</tbody>
</table>

MMRIA: Leading Underlying Causes of Pregnancy-Related Deaths

MMRIA: 3 Leading Underlying Causes of Death

- Cardiovascular and Coronary Conditions
- Infection
- Cardiomyopathy
- Hemorrhage
MMRIA: Preventability

OVERALL

34% Not Preventable
63% Preventable
3% Unable to Determine

OVERALL

42% Not Preventable
56% Preventable
1% Unable to Determine

14 MMRCs
Region IV
Definition
A death is considered preventable if the committee determines there was at least some chance of the death being averted by one or more reasonable changes to patient, family, provider, facility, system and/or community factors.

Why
MMRCs determine preventability to prioritize interventions with the greatest opportunity for impact.
Every Death Reflects a Web of Missed Opportunities

Factors playing a part can include:
Access to care
Missed or delayed diagnoses
Not recognizing warning signs

Most deaths are preventable, no matter when they occur.

We can better identify and close gaps in access to quality care.

The Way Forward

Health Care providers can:

Help patients manage chronic conditions

Communicate with patients about early warning signs

Use tools to flag warning signs early so women can receive timely treatment

The Way Forward

Hospitals and Health Systems can

Standardize coordination of care and response to emergencies (Safety bundles)
Improve delivery of quality prenatal and postpartum care
Train non obstetric providers to consider recent pregnancy history

The Way Forward

States and Communities can:
Assess and coordinate delivery hospitals for risk appropriate care

Support review of the causes behind every maternal death

The Way Forward

Women and their Families can:
Know and communicate about symptoms of complications

Note pregnancy history any time medical care is received in the year after delivery

The South Carolina Maternal Mortality and Morbidity Review (MMMR) Committee, established by state law in 2016, investigates the death of mothers associated with pregnancy to determine which ones can be prevented. A pregnancy-related death occurs when a woman dies while pregnant or within 1 year after the pregnancy. The cause must be related to or made worse by her pregnancy or its management. This does not include accidental or incidental causes.¹

Committee established by statute – 2016
Meets quarterly
Voluntary reporting
Annual report to the legislature

https://www.scstatehouse.gov/reports/DHEC/MMMR%202019%20Legislative%20Brief%20-%20Revised%2003182019.pdf
SC Maternal Morbidity and Mortality Review Committee (MMMRC)

Multidisciplinary
Actively practicing
Based on ACOG and CDC recommendations
Three- to four-year terms
75% attendance requirements
Renewable once
SC Maternal Morbidity and Mortality Review Committee (MMMRC)

3 YEARS

• ACOG
• MRM/OB each Regional Perinatal Center (RPC)
• SC Perinatal Association
• Coroner
• SC Hospital Association
• SC Department of Health and Human Services (DHHS)
• OB MD FQHC
• OB MD Level II hospital

4 YEARS

• OB Anesthesia
• Cardiology
• Domestic Violence
• Midwife
• Law Enforcement
• Alcohol and Drug Abuse
• Regional Systems Developers (RSDs)
• Family Medicine
• Psychiatry/Behavioral Medicine
SC Maternal Morbidity and Mortality Review Committee (MMMRRC)

Goals of the South Carolina MMMR Committee

1. Determine the annual number of pregnancy-associated deaths that are pregnancy-related.
2. Identify trends and risk factors among preventable pregnancy-related deaths in South Carolina.
3. Develop actionable strategies for prevention and intervention.

https://www.scstatehouse.gov/reports/DHEC/MMMR%202019%20Legislative%20Brief%20-%20Revised%2003182019.pdf
South Carolina Pregnancy-Related Death by Race, 2013-2017

Rate per 100,000 live births

- South Carolina: 24.7
- White: 13.7
- Black and Other: 46.3
- Healthy People 2020 Goal: 11.4

https://www.scstatehouse.gov/reports/DHEC/MMMR%202019%20Legislative%20Brief%20-%20Revised%2003182019.pdf
SC Maternal Morbidity and Mortality Review Committee (MMMRC)

**Scope of Case Review**

- Pregnancy-associated deaths
- Pregnancy-related deaths

**MMMR Committee Findings**

During the 2016-2018 review period, 13 of the 15 maternal deaths reviewed in South Carolina were determined to be pregnancy-related. One death was determined to be pregnancy-associated but not related to pregnancy, and the other could not be determined. Among the 13 pregnancy-related deaths, 54% were determined to be preventable.

54%

As reported nationally, the findings from South Carolina’s MMMR Committee show that the common causes of maternal death include cardiovascular and coronary conditions, hemorrhage, infection, and embolism.

https://www.scstatehouse.gov/reports/DHEC/MMMR%202019%20Legislative%20Brief%20%20Revised%2003182019.pdf
A death is *considered preventable* if the committee determines that there was some chance of the death being averted by one or more reasonable changes to patient, community, provider, health facility, and/or system factors.

Most common *preventable* causes of death include:
- Cardiovascular and cardiac conditions
- Hemorrhage
- Infection
- Embolism

SC Maternal Morbidity and Mortality Review Committee (MMRRC)

SC MMRRC ACCOMPLISHMENTS

SC uses the MMRIA reporting format

CDC-developed
Makes our data more powerful
Assist with identifying social determinants
Includes community factors
SC Maternal Morbidity and Mortality Review Committee (MMMRC)

Voluntary reporting  mmmr@dhec.sc.gov

Matching maternal death certificates with fetal live birth/death certificates (new in 2019)
SC MMMRC ACCOMPLISHMENTS

South Carolina contributed aggregate state data to national surveillance efforts and CDC publications

Emily E. Prenatt, MS1,1,2,3, Nancy L. Davis, MD,1,4, David Goodman, MD,1,5, Sharon Cox, MPH,1,5, Nikki Marks, DrPH,1,5, Sheila Johnson, MPH1,5, Carla Strother, MSW,1 Kristin Scott,1,4, Carrie B. Harper-Manley, PhD,1 William M. Callaghan, MD,4, Wendy Ballard, MD1

On May 7, 2019, this report was posted as an MMWR Early Release on the MMWR website (https://www.cdc.gov/mmwr/index.html).

Abstract

Background: Approximately 700 women die from pregnancy-related complications in the United States every year. Methods: Data from CDC’s national Pregnancy Mortality Surveillance System (PMSS) for 2011–2015 were analyzed. Pregnancy-related mortality ratios (pregnancy-related deaths per 100,000 live births; PRMRs) were calculated overall and by sociodemographic characteristics. The distribution of pregnancy-related deaths by timing relative to the end of pregnancy and leading causes of death were calculated. Detailed data on pregnancy-related deaths during 2013–2017 from 13 state maternal mortality review committees (MMRCs) were analyzed for preventability; factors that contributed to pregnancy-related deaths, and MMRC-identified prevention strategies to address contributing factors.

Results: For 2011–2015, the national PRMR was 17.2 per 100,000 live births. Non-Hispanic black women and American Indian/Alaska Native women had the highest PRMRs (42.8 and 32.3, respectively), whereas non-Hispanic white women had the lowest PRMR (18.0). Timing of death was known for 87.7% (2,990) of pregnancy-related deaths. Among these deaths, 31.3% occurred during pregnancy, 16.3% on the day of delivery, 16.0% 1–7 days postpartum, 21.4% 7–42 days postpartum, and 11.7% 43–365 days postpartum. Leading causes of death included cardiovascular conditions, infection, and hemorrhage, and varied by timing. Approximately 55% of pregnancy-related deaths from these causes were determined to be preventable and did not differ significantly by race/ethnicity or timing of death. MMRC data indicated that multiple factors contributed to pregnancy-related deaths. Contributing factors and prevention strategies can be categorized at the community, health facility, patient, provider, and system levels and include improving access to, and coordination and delivery of, quality care.

Conclusions: Pregnancy-related deaths occurred during pregnancy, around the time of delivery, and up to 1 year postpartum; leading causes varied by timing of death. Approximately three in five pregnancy-related deaths were preventable.

Implications for Public Health Practice: Strategies to address contributing factors to pregnancy-related deaths can be integrated at the community, health facility, patient, provider, and system levels to prevent future deaths. This report describes the timing and characteristics of pregnancy-related deaths in the United States using 2011–2015 national CDC Pregnancy Mortality Surveillance System (PMSS) data. Data from 13 state maternal mortality review committees (MMRCs) during 2013–2017 were used to determine the percentage of pregnancy-related deaths that were preventable and factors that contributed to the deaths. MMRC-identified strategies for prevention are reported.

Methods: PMSS was established in 1986 by CDC and the American College of Obstetricians and Gynecologists (ACOG) to evaluate the causes of death and risk factors associated with pregnancy-related deaths. PMSS methodology has been described previously. (1) CDC’s Division of Reproductive Health requests that all states, the District of Columbia, and New York City send death certificates, linked live birth or fetal death certificates, and additional data when available, on deaths that occurred during pregnancy.
SC Maternal Morbidity and Mortality Review Committee (SC MMMRC)

SC MMMRC ACCOMPLISHMENTS

Annual Report to the South Carolina Birth Outcomes Initiative (SC BOI) each Spring

Annual Report to the SC General Assembly
https://www.scstatehouse.gov/reports/DHEC/MMMR%202019%20Legislative%20Brief%20-%20Revised%202003182019.pdf
SC Maternal Morbidity and Mortality Review Committee (MMMRC)

RECOMMENDATIONS

Information to state cardiologists ??
One question on intake forms?

Are you planning a pregnancy in the next year? – with referral information readily available
SC Maternal Morbidity and Mortality Review Committee (MMMRC)

RECOMMENDATIONS

Support for Maternal levels of care
Women at high risk for complications receive care in facilities prepared to provide the required level of specialized care can improve outcomes

SC is becoming an AIM state

Adopt hemorrhage and hypertension protocols at every birthing facility in the state

Continued support for SimCoach
SC Maternal Morbidity and Mortality Review Committee (MMMRC)

NEXT STEPS

Removed barriers to accessing data (recent passing of bill!)

Identify funding (still a work in progress)

Family or informant interviews

Improve reporting of maternal deaths

- Increase reporting through mmmr@dhec.sc.gov
- Make reporting a requirement
- Linkage of maternal death/live birth, fetal death certificates
Eliminate preventable maternal deaths

Reduce maternal morbidity

Improve population health of women
Thanks and Questions!

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