Safety Action Series

Maternal Mortality: What Do The Numbers Mean?

Monday, April 3 2017
1:30 p.m. Eastern
Dial In: 888.863.0985
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Speakers

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Mortality Statistics Branch  
National Center for Health Statistics  
Center for Disease Control and Prevention

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Maryland Population Research Center,  
University of Maryland, College Park
Disclosures

- Donna Hoyert, PhD has no real or perceived conflicts of interest.

- Marian MacDorman, PhD has no real or perceived conflicts of interest.
Objectives

- Discuss the importance of accurate maternal mortality reporting and share suggestions for properly completing the maternal death certificate.

- Describe trends and differentials in vital statistics maternal mortality data by socio-demographic characteristics and cause of death.

- Evaluate data quality of vital statistics maternal mortality data.
Importance of Maternal Mortality

- Continues to be a significant public health issue
- Included in national and domestic targets:
  - US Healthy People Objectives for health improvement priorities
  - UN Millennium Development Goals,
  - UN Sustainable Development Goals for countries to end poverty, protect the planet, and ensure prosperity for all
Death Certificate Purposes

- Permanent record of fact of death
- Fraud prevention
- Settlement of estate
- Statistics
  - Measure health status
  - Set public health goals
  - Determine medical research funding levels
Life Expectancy in U.S. Declines Slowly in Decades, Report Says

By KATIE ROGERS  DEC. 8, 2016

Table 1: Reported Funding for Categories in NIH's Research, Condition, and Disease Categorization System (RCDC) Corresponding to Leading Causes of Death and Chronic Conditions, Fiscal Year 2012

<table>
<thead>
<tr>
<th>NIH RCDC category corresponding to a leading cause of death or chronic condition</th>
<th>Fiscal year 2012 funding reported in RCDC ($ millions)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alzheimer's disease</td>
<td>$503</td>
</tr>
<tr>
<td>Arthritis</td>
<td>259</td>
</tr>
<tr>
<td>Asthma</td>
<td>229</td>
</tr>
<tr>
<td>Breast cancer</td>
<td>800</td>
</tr>
<tr>
<td>Cancer</td>
<td>5,621</td>
</tr>
<tr>
<td>Cardiovascular</td>
<td>2,040</td>
</tr>
</tbody>
</table>

Source: GAO analysis of NIH data.

Sections of Death Certificate

- Legal or demographic:
  - Name
  - Address
  - Date of birth
  - Age
  - Sex
  - Race
  - Education
Sections of Death Certificate

- Medical certification:
  - Date of death
  - Autopsy information
  - Injury description
  - Certification statement
  - Cause of death
## Cause of Death example

<table>
<thead>
<tr>
<th>Instructions and examples)</th>
<th>Approximate Onset to death</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interval:</td>
<td></td>
</tr>
<tr>
<td>diseases, injuries, or complications—NOT enter terminal events such as cardiac fibrillation without showing the additional lines if necessary.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Rupture of left ventricle</td>
<td>Minutes</td>
</tr>
<tr>
<td>Due to (or as a consequence of):</td>
<td></td>
</tr>
<tr>
<td>b. Myocardial infarction</td>
<td>2 Days</td>
</tr>
<tr>
<td>Due to (or as a consequence of):</td>
<td></td>
</tr>
<tr>
<td>c. Coronary atherosclerosis</td>
<td>2 Years</td>
</tr>
<tr>
<td>Due to (or as a consequence of):</td>
<td></td>
</tr>
<tr>
<td>d. ________________________________</td>
<td>__________________________</td>
</tr>
<tr>
<td>other significant conditions contributing to death but not resulting in the underlying cause given in PART I diabetes mellitus, Cigarette smoking, Hypertension, Hypercholesterolemia, Coronary bypass surgery</td>
<td></td>
</tr>
</tbody>
</table>
Separate question added to death certificate to increase identification of maternal deaths

  - 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

NVSS-National Vital Statistics System
ICD- International Classification of Diseases

Slide 11
Why adopt separate recent pregnancy question?

• Reasons for adding the question:
  – To improve measurement of this public health issue
  – To replicate experience of selected states
  – To increase standardization
  – To support new concepts and categories in ICD-10
  – To accept recommendations from the American College of Obstetrics and Gynecology, CDC/Division of Reproductive Health, and ICD-10
**Cause of death example**

Female, 28 years old

<table>
<thead>
<tr>
<th>CAUSE OF DEATH (See instructions and examples)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PART I.</strong> Enter the chain of events—diseases, injuries, or complications—that directly caused the death. DO NOT enter terminal events such as cardiac arrest, respiratory arrest, or ventricular fibrillation without showing the etiology. DO NOT ABBREVIATE. Enter only one cause on a line. Add additional lines if necessary.</td>
</tr>
<tr>
<td>IMMEDIATE CAUSE (Final disease or condition → resulting in death)</td>
</tr>
<tr>
<td>a. Cerebrovascular accident 3 months postpartum</td>
</tr>
<tr>
<td>b. Hypertension</td>
</tr>
<tr>
<td>c. Pregnancy</td>
</tr>
<tr>
<td>d.</td>
</tr>
<tr>
<td><strong>PART II.</strong> Enter other significant conditions contributing to death but not resulting in the underlying cause given in PART I</td>
</tr>
<tr>
<td>33. WAS AN AUTOPSY PERFORMED?</td>
</tr>
<tr>
<td>34. WERE AUTOPSY FINDINGS AVAILABLE TO COMPLETE THE CAUSE OF DEATH?</td>
</tr>
<tr>
<td>35. DID TOBACCO USE CONTRIBUTE TO DEATH?</td>
</tr>
<tr>
<td>□ Yes ☐ Probably</td>
</tr>
<tr>
<td>□ No ☐ Unknown</td>
</tr>
<tr>
<td>36. IF FEMALE:</td>
</tr>
<tr>
<td>□ Not pregnant within past year</td>
</tr>
<tr>
<td>□ Pregnant at time of death</td>
</tr>
<tr>
<td>□ Not pregnant, but pregnant within 42 days of death</td>
</tr>
<tr>
<td>☐ Not pregnant, but pregnant 43 days to 1 year before death</td>
</tr>
<tr>
<td>□ Unknown if pregnant within the past year</td>
</tr>
</tbody>
</table>

**MANNER OF DEATH**

- Natural ☐ Homicide ☐
- Accident ☐ Pending Investigation ☐
- Suicide ☐ Could not be determined ☐
Summary of medical certification step

• Provide well-thought out medical opinion on a sequence of conditions resulting in death
  – Gives family closure
  – Performs service for the larger community

• Explains the circumstances and conditions surrounding death

• Statistics derived from the death certificates depend on what’s reported on the certificate
From certification to statistics

• Mortality data is compiled in accordance with World Health Organization regulation in the International Classification of Diseases (ICD)
• Mortality data in the US has used ICD-10 codes (not ICD-10-CM codes) since 1999
• Statistics cover a wide range of issues—maternal mortality is one of them
Terms and Definitions Provided for Maternal Mortality in ICD

• Terms:
  – Maternal mortality
  – Late maternal mortality
  – Pregnancy-related mortality, now Death occurring during pregnancy, childbirth and puerperium
  – Rates

• Definitions:
Maternal Mortality

Maternal deaths are defined by the World Health Organization as “the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and the site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes.”

ICD-10-, vol 2, section 5.8.1
Late Maternal Mortality

Late maternal deaths are defined by the World Health Organization as “the death of a woman from direct or indirect obstetric causes more than 42 days but less than one year after termination of pregnancy.”

ICD-10-, vol 2, section 5.8.1
Identification of maternal mortality from death certificates

• Generally, same process as in any other cause of death

• Consistently identified maternal deaths as those records with specific ICD codes (A34, O00-O95, O98-O99)

• Depends upon (standard) death certificate and ICD instructions

• New question has role
How question used to identify a maternal death

- Ideal processing situation:
  - Cause-of-death statement would include information about role of pregnancy and timing between pregnancy and death, so separate question would not be used in coding
  - Separate pregnancy question would allow calculation of deaths of pregnant or recently pregnant women and assist surveillance programs

- Processing reality:
  - Pregnancy question is used in tandem with cause-of-death statement
  - Same general guidelines used for separate questions as before: Information in question taken into consideration when coding
  - Vital statistics liberal in making connection between pregnancy and potentially indirect causes
Example 1: Female, 28 years old

Question not needed to assign appropriate code since text is clear about when pregnancy ended. **Tentative** underlying cause is O96 (“Death from any obstetric cause occurring more than 42 days but less than one year after delivery”) by general principle. No further modification is applicable so O96 remains the underlying cause.
**Example 2: Female, 28 years old**

<table>
<thead>
<tr>
<th><strong>CAUSE OF DEATH (See instructions and examples)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>32. PART I.</strong> Enter the chain of events—diseases, injuries, or complications—that directly caused the death. DO NOT enter terminal events such as cardiac arrest, respiratory arrest, or ventricular fibrillation without showing the etiology. DO NOT ABBREViate. Enter only one cause on a line. Add additional lines if necessary.</td>
</tr>
<tr>
<td><strong>IMMEDIATE CAUSE (Final disease or condition resulting in death)</strong></td>
</tr>
<tr>
<td>a. Cerebrovascular accident (O96)</td>
</tr>
<tr>
<td>b. Hypertension (O96)</td>
</tr>
<tr>
<td>c. Pregnancy</td>
</tr>
<tr>
<td>d.</td>
</tr>
</tbody>
</table>

**PART II.** Enter other significant conditions contributing to death but not resulting in the underlying cause given in PART I.

<table>
<thead>
<tr>
<th><strong>33. WAS AN AUTOPSY PERFORMED?</strong></th>
<th><strong>34. WERE AUTOPSY FINDINGS AVAILABLE TO COMPLETE THE CAUSE OF DEATH?</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>□ Yes   □ No</td>
<td>□ Yes   □ No</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>36. DID TOBACCO USE CONTRIBUTE TO DEATH?</strong></th>
<th><strong>36. IF FEMALE:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>□ Yes   □ Probably</td>
<td>□ Not pregnant within past year</td>
</tr>
<tr>
<td>□ No   □ Unknown</td>
<td>□ Pregnant at time of death</td>
</tr>
<tr>
<td></td>
<td>□ Not pregnant, but pregnant within 42 days of death</td>
</tr>
<tr>
<td></td>
<td>□ Not pregnant, but pregnant 43 days to 1 year before death</td>
</tr>
<tr>
<td></td>
<td>□ Unknown if pregnant within the past year</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>37. MANNER OF DEATH</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>□ Natural</td>
</tr>
<tr>
<td>□ Homicide</td>
</tr>
<tr>
<td>□ Accident</td>
</tr>
<tr>
<td>□ Pending Investigation</td>
</tr>
<tr>
<td>□ Suicide</td>
</tr>
<tr>
<td>□ Could not be determined</td>
</tr>
</tbody>
</table>

Need question to determine appropriate codes. **Tentative** underlying cause is O96 ("Death from any obstetric cause occurring more than 42 days but less than one year after delivery") by general principle. No further modification is applicable so O96 remains the underlying cause.
Example 3: Female, 28 years old

Need question to determine appropriate codes. **Tentative** underlying cause is O16 ("Unspecified maternal hypertension") by general principle. No further modification is applicable so O16 remains the underlying cause.
Example 4: Female, 28 years old

<table>
<thead>
<tr>
<th>Immediate Cause</th>
<th>Tentative Underlying Cause</th>
<th>Approximate Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cerebrovascular accident (I64)</td>
<td>Hypertension (I10)</td>
<td>Onset to death</td>
</tr>
</tbody>
</table>

Question consistent with reported text. **Tentative** underlying cause is I10 by general principle. However, a modification is applicable that prefers the I64 (“Stroke, not specified as hemorrhage or infarction”) be selected as the underlying cause.
Transition in question availability among states

According to contracts, all should be using 2003 certificate by 2014
Age distribution of decedents reported with recent pregnancies, areas with question 2003 - 2017

- 10-54 years: 83%
- <10 years or 55 years and over: 17%
Age distribution of those reported as recently pregnant by type of person reporting the information

Percent of all decedents reported to have been pregnant recently

![Chart showing age distribution of those reported as recently pregnant by type of person reporting the information. The chart compares percentage distributions between physicians and medical examiners or coroners, with age groups 10-54 years of age and <10 years or 55 years or more.](chart.png)
Reporting of recent pregnancies for women <10 or over 55 years of age

• Not uncommon, but mainly 55 years and over

• Implications of false positives for measures:
  – No or minimal impact on maternal deaths
  – No or minimal impact on late maternal deaths
Implications of false positives among women between ages 10-54 years of age on measures

- Maternal and late maternal deaths
  - Using the question increases overall rate. False positive responses would be overinflating the rate.
  - Impact of using the question is greater with increasing age and some suggestion that more reporting problems with age. False positives may likely be overinflating the gradient by age.
  - Impact of using question greater for some cause of death codes than others. False positives would have minimal or no effect for some and inflate others.
Resources on completing cause of death

https://www.cdc.gov/nchs/data/misc/hb_cod.pdf


From: https://www.cdc.gov/nchs/nvss/writing_cod_statements.htm
Conclusion

• Very important to carefully complete the checkbox about a pregnancy occurring within 1 year of the woman dying

• Report the sequence and causal relationship between conditions causing death in the death certificate

• When reporting the conditions in parts I and II of the medical certification statement, note if the pregnancy or did or did not contribute to death
Original Research

Recent Increases in the U.S. Maternal Mortality Rate

Disentangling Trends From Measurement Issues

Marian F. MacDorman, PhD, Eugene Declercq, PhD, Howard Cabral, PhD, and Christine Morton, PhD

OBJECTIVE: To develop methods for trend analysis of vital statistics maternal mortality data, taking into account changes in pregnancy question formats over time and between states, and to provide an overview of U.S. maternal mortality trends from 2000 to 2014.

METHODS: This observational study analyzed vital statistics data for 48 states and Washington, DC, increased from 2000 to 2014; the international trend was in the opposite direction. There is a need to redouble efforts to prevent maternal deaths and improve maternity care for the 4 million U.S. women giving birth each year.

(Obstet Gynecol 2016;128:447-55)

Published in Sept. 2016 issue of Obstetrics and Gynecology.
Background

• The National Vital Statistics System is the source of official US maternal mortality statistics.
• Studies from the 1980s and 1990s identified significant underreporting of maternal deaths.
• To improve reporting, a pregnancy question was added to the U.S. standard death certificate revision in 2003.
• Delays in states adopting the new question, plus some states used non-comparable or no pregnancy questions.
• This created a “data mess” where it was very difficult to identify the real trends in maternal mortality.
Methods

• We developed methods to adjust for the differences in question formats, to allow for trend analysis.

• We analyzed data separately for 48 states and DC, California and Texas.

• Maternal mortality rates computed per 100,000 live births. Live births approximate the population of pregnant women at risk of maternal death.

• MMR = maternal mortality rate.
Results
Estimated MMRs, 48 states* and DC
2000-2014

Rate per 100,000 live births

27% increase 2000-2014

*Excludes California and Texas
Adjusted MMRs, Texas, 2000-2014

Texas revised to the U.S. standard pregnancy question in 2006. The unrevised question asked about pregnancies within the past 12 months. Analysis group 2 correction factor was used to adjust unrevised data.
Unadjusted combined maternal and late maternal mortality rates, California, 2000-2014

Includes deaths within 1 year of pregnancy. California revised their death cert. in 2003 to a non-standard question that asks about deaths within 1 year of pregnancy. Before 2003, California did not have a pregnancy question on their death certificate.
Discussion

• Due to data incompatibilities, the United States has not published an “official” maternal mortality rate since 2007.

• This created an information deficit when greater world-wide attention was focused on maternal mortality.

• UN MDG: reduce maternal mortality. Global maternal mortality decreased 44% from 1990-2015.

• In contrast, the maternal mortality rate increased 27% from 2000-2014 for 48 states and DC. Clearly, the US is moving in the wrong direction!

• The lack of reliable maternal mortality data in the US hampered US participation in UN MDG efforts.
Discussion (cont.)

• The addition of the pregnancy question improved reporting of US maternal deaths.

• Chronic underfunding of state and national vital statistics systems, led to delays in state adoption of the revised pregnancy question.

• Accurate measurement of maternal mortality is an essential first step:
  – To identify at-risk populations
  – To measure the progress of prevention programs.
Trends in Maternal Mortality by Sociodemographic Characteristics and Cause of Death in 27 States and the District of Columbia

Marian F. MacDorman, PhD, Eugene Declercq, PhD, and Marie E. Thoma, PhD

OBJECTIVE: To analyze recent trends in maternal mortality by sociodemographic characteristics and cause of death and to evaluate data quality.

METHODS: This observational study compared data from 2008–2009 with 2013–2014 for 27 states and the District of Columbia that had comparable reporting of maternal mortality throughout the period. Maternal mortality rates were computed per 100,000 live births. Statistical significance of trends and differentials was evaluated using a two-proportion z-test.

RESULTS: The study population included 1,687 maternal deaths.

CONCLUSION: Despite the United Nations Millennium Development Goal and a 44% decline in maternal mortality worldwide from 1990 to 2015, maternal mortality has not improved in the United States and appears to be increasing. Maternal mortality rates for women 40 years or older and for nonspecific causes of death were implausibly high and increased rapidly, suggesting possible overreporting of maternal deaths, which may be increasing over time. Efforts to improve reporting for the pregnancy checkbox and to modify coding procedures to place less reliance on the checkbox are essential to improving vital statistics maternal mortality data, the
Background: Maternal mortality coding issues

- In the face of ever-increasing rates, some researchers have begun to wonder about possible over-reporting of maternal deaths with the pregnancy checkbox.
- In the US, coding of a death as maternal or non-maternal relies almost entirely on the pregnancy checkbox.
- If the checkbox is checked, the death is coded as maternal, except for external causes of injury (accidents, homicide, suicide).
- Yet, until recently the data quality of the pregnancy checkbox has never been reviewed or validated.
- Potential problem of using a checkbox format to report on rare events.
Recent CDC Report on Maternal Mortality Review Committees

• Detailed investigation of maternal deaths in 4 states (CO, DE, GA, OH).

• Results: Of 650 reported maternal deaths, 97 were confirmed to not be pregnant or post-partum (within 1 year) at the time of death.

• Errors were predominantly due to errors in the pregnancy checkbox.

• This is a 15% false positive rate.
Methods

• We analyzed maternal mortality trends for the most recent 5-year period (2008-9 to 2013-14) for 27 states and DC that used the U.S. standard pregnancy question

• Data were analyzed by maternal age, race/ethnicity, and for detailed causes of death.

• Purpose: To identify trends and at-risk populations to assist in targeting prevention efforts, and to begin to evaluate data quality.
Definitions

- **Direct obstetric deaths**: Deaths resulting from obstetric complications of the pregnant state (pregnancy, labor and puerperium), from interventions, omissions, incorrect treatment, or from a chain of events resulting from these.

- **Indirect obstetric deaths**: Deaths resulting from previous existing disease, or disease that developed during pregnancy, which was not due to direct obstetric causes, but which was aggravated by the physiological effects of pregnancy.
Results
Maternal Mortality Rates by Race/Ethnicity, 27 States* and DC, 2008-9 and 2013-14

NH = non-Hispanic. n.s. = no significant change.

Maternal Mortality Rates by Age, 27 States* and DC, 2008-9 and 2013-14


Rate per 100,000 live births

- Total: 20.6 (2008-9) to 25.4 (2013-4), +23%
- 30-34: 29.8 (2008-9) to 32.0 (2013-4)
- 35-39: 269.9 (2013-4) +90%
- 40+: 141.9 (2013-4)
MMRs for Direct Obstetric Causes, 27 States and DC 2008-9 and 2013-14

- Ectopic pregnancy O00
- Hypertension O10-O16
- Obstetric hemorrhage
- Infection
- Diabetes O24
- Liver disorders O26.6
- Obstetric embolism O88
- Cardiomyopathy O90.3
- Other pregnancy-related O26.8

Rate per 100,000 live births

- 2013-4
- 2008-9

- +73%
- +80%
MMRs for Indirect Obstetric and Unspecified Causes, 27 States and DC 2008-9 and 2013-14

- Mental and nervous system O99.3
- Circulatory system O99.4
- Respiratory system O99.5
- Other specified diseases and conditions O99.8
- Unspecified cause O95

Rate per 100,000 live births

2013-4:
- Mental and nervous system: -63%
- Circulatory system: +76%
- Respiratory system: -63%
- Other specified diseases and conditions: +76%
- Unspecified cause: -63%

2008-9:
- Mental and nervous system: -63%
- Circulatory system: +76%
- Respiratory system: -63%
- Other specified diseases and conditions: +76%
- Unspecified cause: -63%
Non-Specific vs Specific Causes of Death

• Purpose: To examine differences in trends for non-specific vs. specific causes.

• Created a grouping of non-specific causes:
  – O26.8 Other pregnancy-related conditions
  – O95 Unspecified cause
  – O99.8 Other specified diseases and conditions

• Specific causes were all others (not O26.8, O95, or O99.8)
Percentage of Maternal Deaths from Non-Specific Causes by Age: 27 States and DC, 2008-9 and 2013-14

<table>
<thead>
<tr>
<th>Year</th>
<th>Percent</th>
<th>O26.8</th>
<th>O95</th>
<th>O99.8</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008-9</td>
<td>34.0</td>
<td>16.7</td>
<td>6.6</td>
<td>10.7</td>
</tr>
<tr>
<td>2013-4</td>
<td>41.0</td>
<td>23.4</td>
<td>6.7</td>
<td>11.0</td>
</tr>
<tr>
<td>2008-9</td>
<td>30.5</td>
<td>15.2</td>
<td>8.6</td>
<td>6.3</td>
</tr>
<tr>
<td>2013-4</td>
<td>36.8</td>
<td>21.9</td>
<td>12.3</td>
<td>2.6</td>
</tr>
<tr>
<td>2008-9</td>
<td>49.3</td>
<td>23.3</td>
<td>6.2</td>
<td>19.9</td>
</tr>
<tr>
<td>2013-4</td>
<td>50.0</td>
<td>26.7</td>
<td>0.7</td>
<td>22.6</td>
</tr>
</tbody>
</table>
MMRs for Specific and Non-Specific Causes, 27 States and DC 2008-9 and 2013-14

<table>
<thead>
<tr>
<th>Cause</th>
<th>2008-9</th>
<th>2013-14</th>
<th>2013-14</th>
<th>2013-14</th>
</tr>
</thead>
<tbody>
<tr>
<td>All causes</td>
<td>20.6</td>
<td>25.4</td>
<td>+23%</td>
<td></td>
</tr>
<tr>
<td>Non-specific causes</td>
<td>7.0</td>
<td>10.4</td>
<td>+48%</td>
<td></td>
</tr>
<tr>
<td>Specific causes</td>
<td>13.5</td>
<td>15.0</td>
<td></td>
<td>Not sig.</td>
</tr>
</tbody>
</table>

Rate per 100,000 live births
Maternal mortality rates by age for specific and non-specific causes, 27 States and DC, 2008-9 and 2013-14

- **Non-specific cause codes**
  - <40: 5.3 (2008-2009), 6.6 (2013-2014), +25% increase
  - 40+: 66.2 (2008-2009), 132.6 (2013-2014), +100% increase

- **Specific cause codes**
  - 40+: 75.7 (2008-2009), 137.3 (2013-2014), +81% increase
# Sensitivity Analysis

<table>
<thead>
<tr>
<th>Maternal age</th>
<th>Number of female deaths from natural causes (excludes maternal deaths)</th>
<th>Reported Maternal deaths</th>
<th>% increase in MMR with 1% false positive rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>82,572</td>
<td>907</td>
<td>91%</td>
</tr>
<tr>
<td>15-19</td>
<td>929</td>
<td>26</td>
<td>36%</td>
</tr>
<tr>
<td>20-24</td>
<td>1,619</td>
<td>119</td>
<td>14%</td>
</tr>
<tr>
<td>25-29</td>
<td>2,568</td>
<td>152</td>
<td>17%</td>
</tr>
<tr>
<td>30-34</td>
<td>4,092</td>
<td>177</td>
<td>23%</td>
</tr>
<tr>
<td>35-39</td>
<td>6,345</td>
<td>144</td>
<td>44%</td>
</tr>
<tr>
<td>40-54</td>
<td>67,019</td>
<td>289</td>
<td>232%</td>
</tr>
</tbody>
</table>
Discussion

• The maternal mortality rate for 27 states and DC increased by 23% from 2008-9 to 2013-14.
• However, most of the increase was for women aged 40+ and among non-specific causes of death; rates for women <40 and among specific causes of death did not increase significantly.
• In 2013-4, 1/3 of reported maternal deaths were to women aged 40+, compared to only 3% of births.
• In 2013-14, MMRs for women aged 40+ were 18 times higher than for women aged 25-29; this differential is implausible by international standards.
Discussion (cont.)

• Maternal deaths coded to non-specific “other” causes increased from 34% in 2008-9 to 41% in 2013-4.
• For women 40+ one-half of deaths were coded to non-specific causes.
• Deaths from non-specific causes increased by 48% from 2008-9 to 2013-14, and accounted for 83% of the total increase in maternal mortality.
• Maternal mortality rates for women 40+ and for non-specific causes of death were implausibly high and increased rapidly, suggesting over-reporting of maternal deaths which may be increasing over time.
Overall Discussion

• Despite data problems, there is still much to be concerned about with US maternal mortality.
• Even if you limit the analysis to women <40 or to specific causes of death US MMRs were 3-4 times higher than in Europe.
• Maternal deaths have a high impact on society. These are largely preventable deaths of young women in the prime of life, often with families and other small children needing care.
• Accurate measurement of maternal mortality is an essential first step in prevention efforts.
Recommendations

• Need quality improvement efforts in every state to improve data quality for the pregnancy checkbox item.

• Need to query back to the certifier a random sample of maternal deaths to confirm the fact of pregnancy.

• All maternal deaths for women aged 40+ and for non-specific causes should be queried.

• More training for persons who complete death certificates.
Recommendations (cont.)

- Develop further data quality checks within the vital statistics data system – so that the checkbox is not the sole method of identifying maternal deaths.
- Identify and exclude “incidental causes” (WHO definition).
- Encourage the expansion of state maternal mortality review committees. Use data from committees to update vital statistics data on maternal death.
Q&A Session

Press *1 to ask a question

You will enter the question queue
Your line will be unmuted by the operator for your turn

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POSTPARTUM CARE BASICS FOR MATERNAL SAFETY
FROM BIRTH TO THE COMPREHENSIVE POSTPARTUM VISIT

April 18, 2017
3:00 p.m. Eastern

Alison Stuebe, MD, MSc, FACOG
Associate Professor, Maternal Fetal Medicine
University of North Carolina

Sue Kendig, MSN, JD, WHNP-BC, FAANP
Director of Policy, National Association of Nurse Practitioners in Women's Health;

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