Maternal Mortality: Trends, Causes, & Approaches to Reversing the Trend

Carol J. Rowland Hogue, PhD, MPH
Terry Professor of MCH & Professor of Epidemiology
Rollins School of Public Health
Emory University
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Maternal Mortality Rate
United States per 100,000 live births
*Note: Number of pregnancy-related deaths per 100,000 live births per year.*
Maternal Mortality During 1990-2013


https://www.acog.org/About-ACOG/ACOG-Departments/LOMC accessed 09/04/18
“Judge Glenda Hatchett spends an afternoon with her son Charles and grandsons Langston, 1, and Charles Johnson the fifth, 3, at Chastain Park in Atlanta. Hatchett is helping her son raise awareness about maternal deaths after losing her daughter in law, Kira Dixon Johnson, after she gave birth to Hatchett’s second grandson.”

Deidre Johnson *Photo by James Chance*

*From the article By Dwyer Gunn 9/4/18, “Why is so risky to be a black mother?”*

[https://www.coloradotrust.org/content/story/why-it-so-risky-be-black-mother](https://www.coloradotrust.org/content/story/why-it-so-risky-be-black-mother) Accessed 9/21/18
Serena Williams – from the documentary, “Being Serena,” by HBO

https://www.youtube.com/watch?v=xXGj1A90X94

TABLE 2. Crude and adjusted odds ratios for the Black-White gap in maternal mortality, stratified by birth weight and livebirth order, United States, 1979–1986

<table>
<thead>
<tr>
<th>Group</th>
<th>Whites</th>
<th>Blacks</th>
<th>Crude odds ratio</th>
<th>Adjusted odds ratio (95% confidence interval)*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. of cases</td>
<td>No. of controls</td>
<td>No. of cases</td>
<td>No. of controls</td>
</tr>
<tr>
<td>Group 1: normal birth weight ≥2,500 g, livebirth order 1–3</td>
<td>415</td>
<td>4,643</td>
<td>214</td>
<td>762</td>
</tr>
<tr>
<td>Group 2: normal birth weight ≥2,500 g, livebirth order ≥4</td>
<td>99</td>
<td>464</td>
<td>63</td>
<td>134</td>
</tr>
<tr>
<td>Group 3: low birth weight &lt;2,500 g, livebirth order 1–3</td>
<td>158</td>
<td>284</td>
<td>93</td>
<td>116</td>
</tr>
<tr>
<td>Group 4: low birth weight &lt;2,500 g, livebirth order ≥4</td>
<td>29</td>
<td>23</td>
<td>22</td>
<td>25</td>
</tr>
</tbody>
</table>

* Adjusted for maternal age (<20, 20–24, 25–29, 30–34, 35–39, ≥40 years), education (<12, 12, 13–15, ≥16 years), Kotelchuck index (6) (no, inadequate, intermediate, adequate, adequate plus care), gestational age (<37, 37–41, ≥42 weeks), year of death (1979–1986), marital status (married, not married), low birth weight (yes, no), livebirth order (1–3, ≥4), region (Northeast, South, Midwest, West), metropolitan area resident (yes, no), livebirth order x low birth weight.
Maternal age

Maternal BMI

Chronic Hypertension

Type 2 Diabetes

• Postpartum Hemorrhage via uterine atony
• Cardiovascular disease
Fig. 2 Changes in maternal mortality rates by state – United States, 1997–2012. Rates are presented as maternal deaths per 100,000 live births. Change values were calculated by the authors based on 5-year moving averages for the years 1997 and 2012, based on data from the years 1995–2014.
Approaches to Reversing the Trend

• Take action to expand evidence-based programs
  • Group prenatal care
  • AIM
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- **Monitor prenatal care & delivery for quality**
  - Low-dose aspirin
  - Maternal immunization
  - Timing delivery
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• **Listen and learn from the women and their families**
  • Legislation
  • Community involvement
“Kira Johnson tragically lost her life after a routine c-section at Cedars Sinai. Kira was allowed to bleed internally for more than 10 hours before the medical staff at Cedars Sinai took action. We fight to make sure this never happens to another mother. More women die in the United states each year than in any other civilized country in the world.”

“4Kira4Moms is currently calling on Congress to pass H.R.1318” which mandates state-based maternal mortality review.  [http://4kira4moms.com/](http://4kira4moms.com/) Accessed 9/21/18

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• Listen and learn from the women and their families
  • Legislation
  • Community involvement
• Assess evidence for new initiatives
  • Levels of Maternal Care (LoMC)
  • Bundling
  • WIC participation enhancements
Thank you!
Figure 1 Maternal mortality rates (MMR), 1991-2007; pregnancy-related mortality rates (PRMR), 1991-2005, United States.

William M. Callaghan

Overview of Maternal Mortality in the United States

Seminars in Perinatology, Volume 36, Issue 1, 2012, 2 - 6

http://dx.doi.org/10.1053/j.semperi.2011.09.002
FIG. 4. Trends in severe maternal morbidity during delivery hospitalizations in the United States, 1998–2011. "The number of delivery hospitalizations with at least one severe maternal morbidity indicator per 10,000 delivery hospitalizations. Data from Centers for Disease Control and Prevention."
Trends for all diabetes (○), GDM (▲), type 1 diabetes (■), and type 2 diabetes (●) among delivery hospitalizations in the U.S., 1994–2004.

Diabetes Trends Among Delivery Hospitalizations in the U.S., 1994-2004
Figure 1. Prevalence\(^1\) of hypertension\(^2\) by body mass index (BMI) and for reproductive aged women, 20–44, United States, National Health and Nutrition Examination Survey, 1999–2008. 1. Weighted estimates calculated using the examination weight and 95% confidence intervals. 2. Hypertension was defined as an average systolic blood pressure ≥140 mmHg, average diastolic blood pressure ≥90 mmHg, or self-reported currently taking antihypertensives. doi:10.1371/journal.pone.0036171.g001
Figure 3. Birth rates, by selected age of mother:
United States, final 1990-2012 and preliminary 2013

NOTE - Due to software limitation, this graph could not be plotted on a log scale. The published version of this graph will be plotted on a log scale.

NOTES: Rates are plotted on a logarithmic scale.
Figure 2. Percentage of first births, by age of mother: United States, 1970–2006


Delayed Childbearing: More Women Are Having Their First Child Later in Life

T.J. Mathews, M.S., and Brady E. Hamilton, Ph.D.
<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Hypertension % (95% CI)</th>
<th>Unadjusted OR OR (95% CI)</th>
<th>p-value</th>
<th>Adjusted OR Adjusted OR (95% CI)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20–34</td>
<td>2.7 (2.1–3.4)</td>
<td>Referent</td>
<td></td>
<td>Referent</td>
<td></td>
</tr>
<tr>
<td>35–39</td>
<td>10.0 (8.1–12.2)</td>
<td>4.0 (3.1–5.3)</td>
<td>&lt;0.01</td>
<td>3.3 (2.1–5.2)</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>40–44</td>
<td>18.4 (15.6–21.5)</td>
<td>8.2 (5.9–11.5)</td>
<td>&lt;0.01</td>
<td>8.2 (5.0–13.3)</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>

Table 2. Prevalence of hypertension\(^1\) and unadjusted and adjusted odds ratios (OR) for risk of hypertension by characteristics of reproductive aged women, 20–44, United States, National Health and Nutrition Examination Survey, 1999–2008.