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Children's Center

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

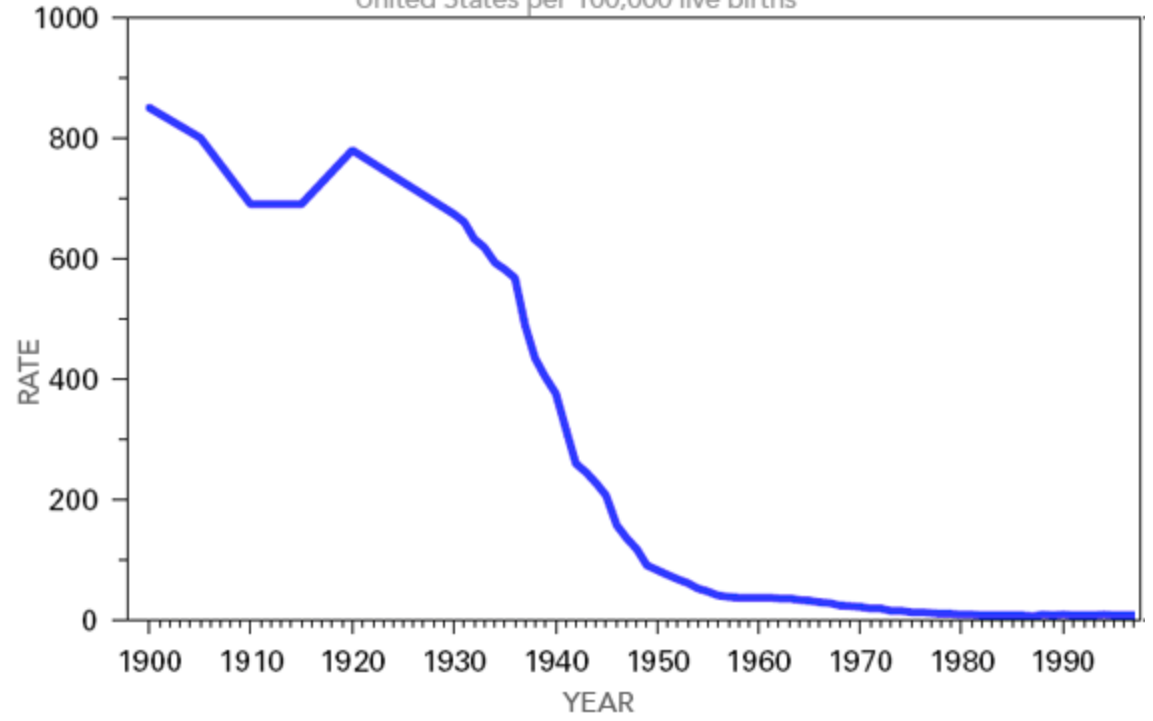
September 24, 2018

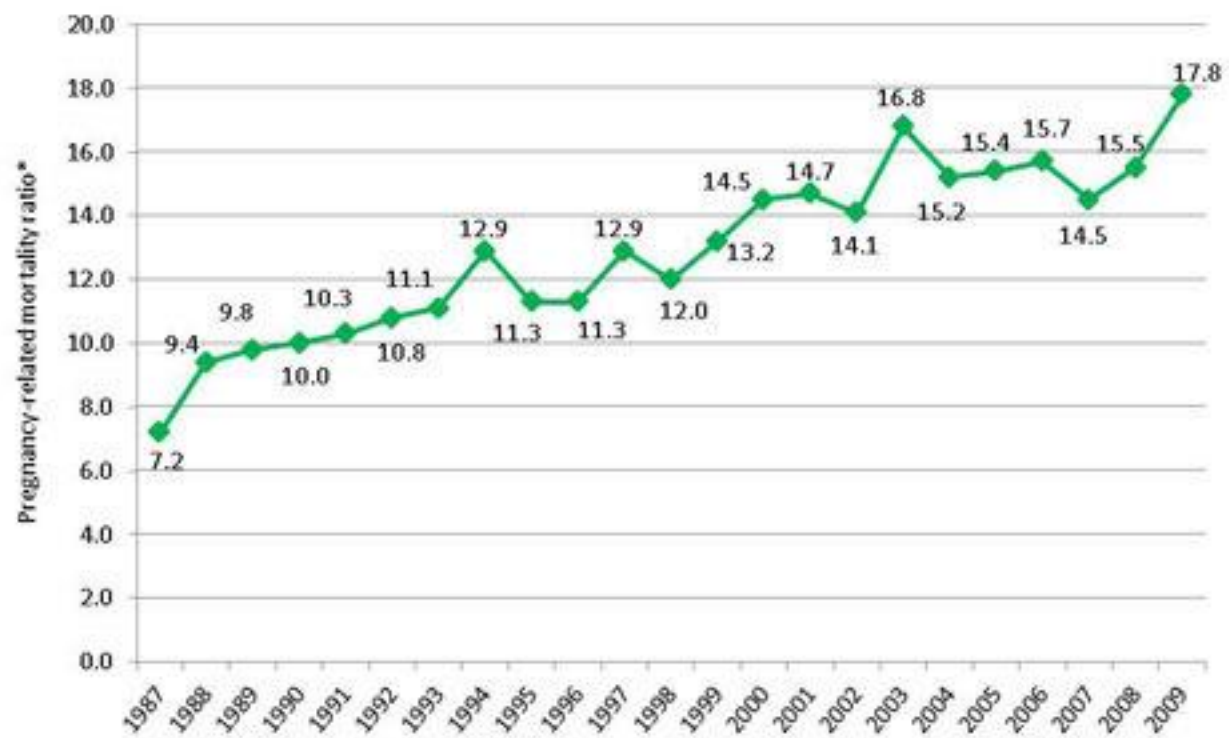


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Maternal Mortality Rate

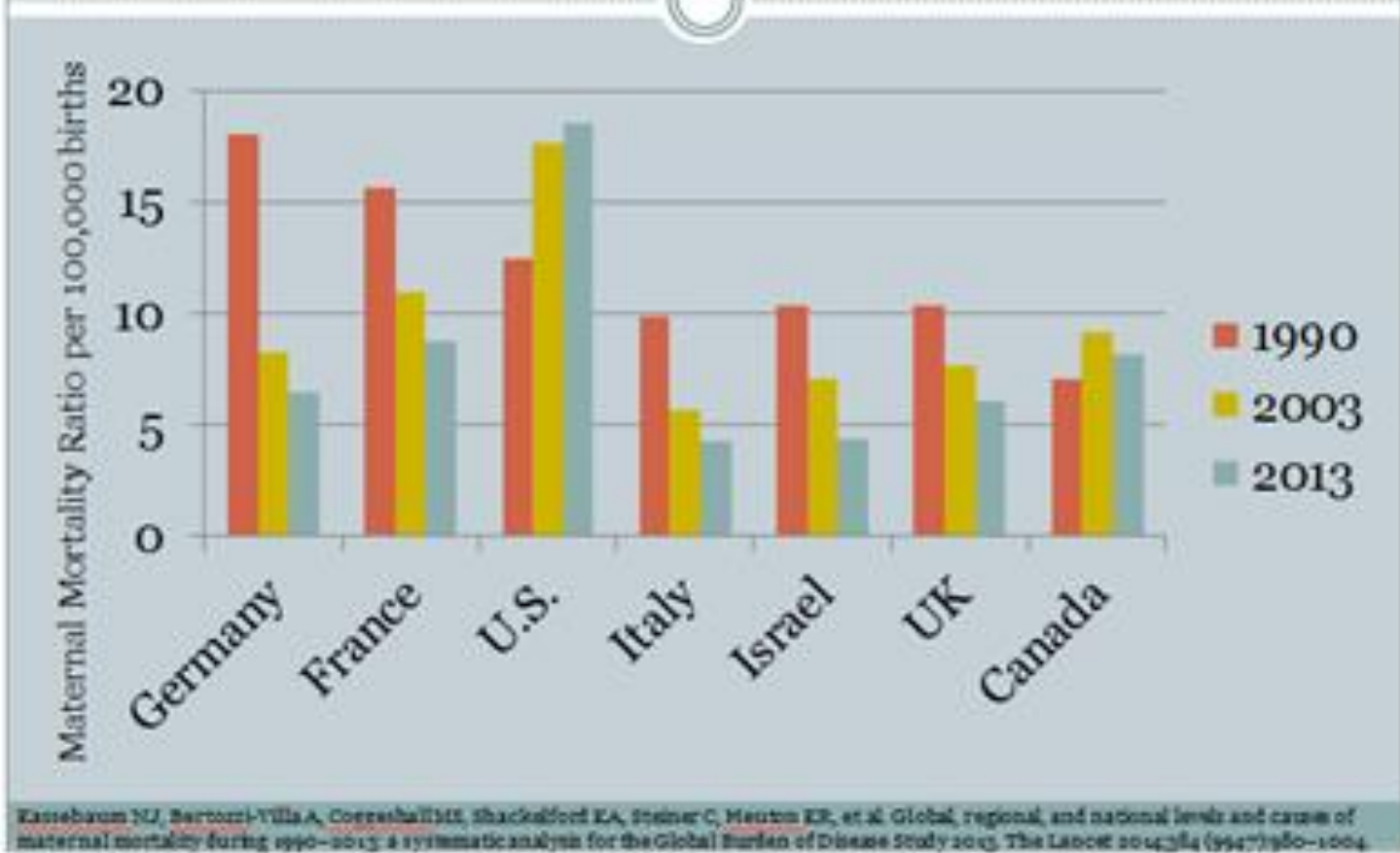
United States per 100,000 live births





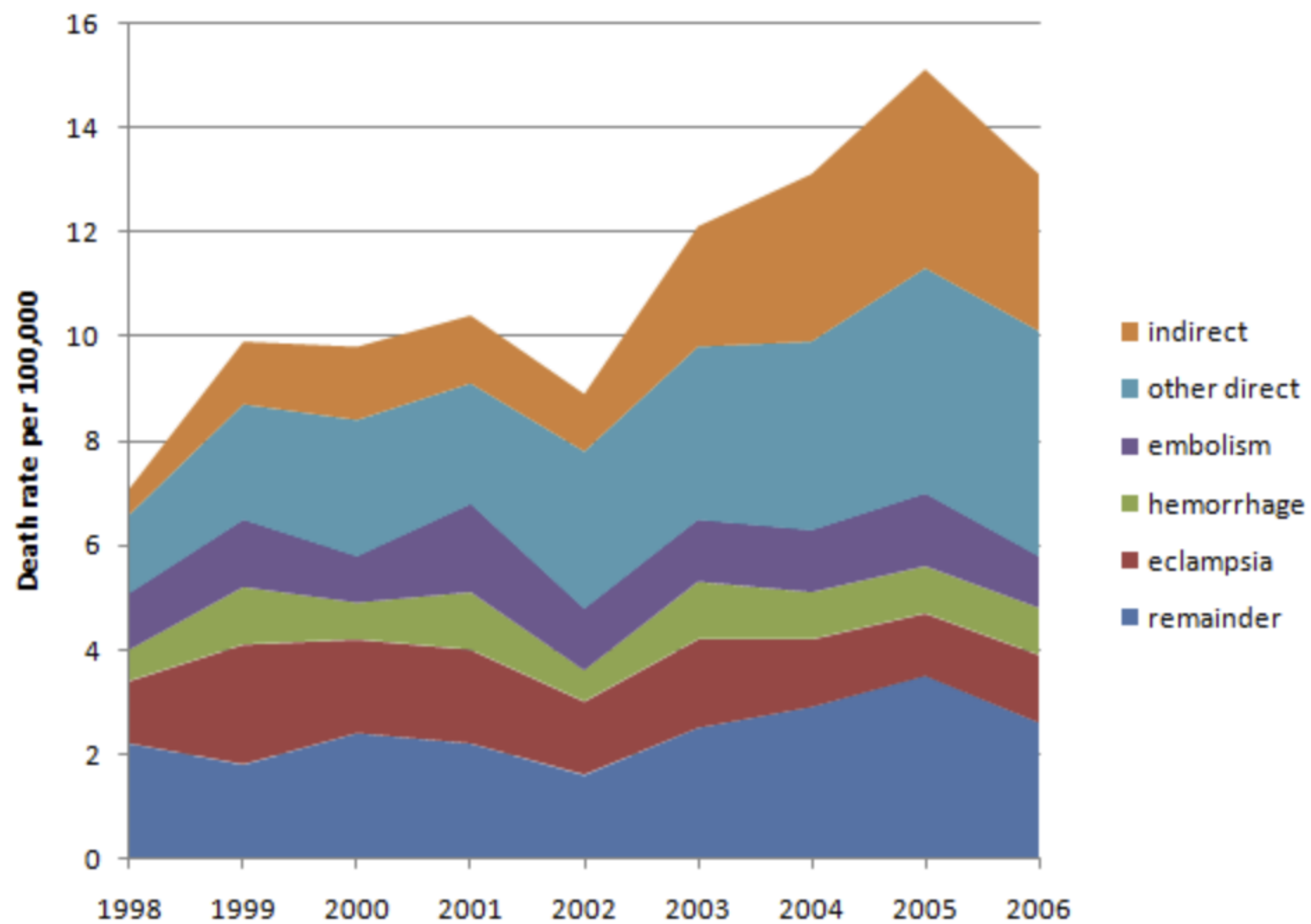
*Note: Number of pregnancy-related deaths per 100,000 live births per year.

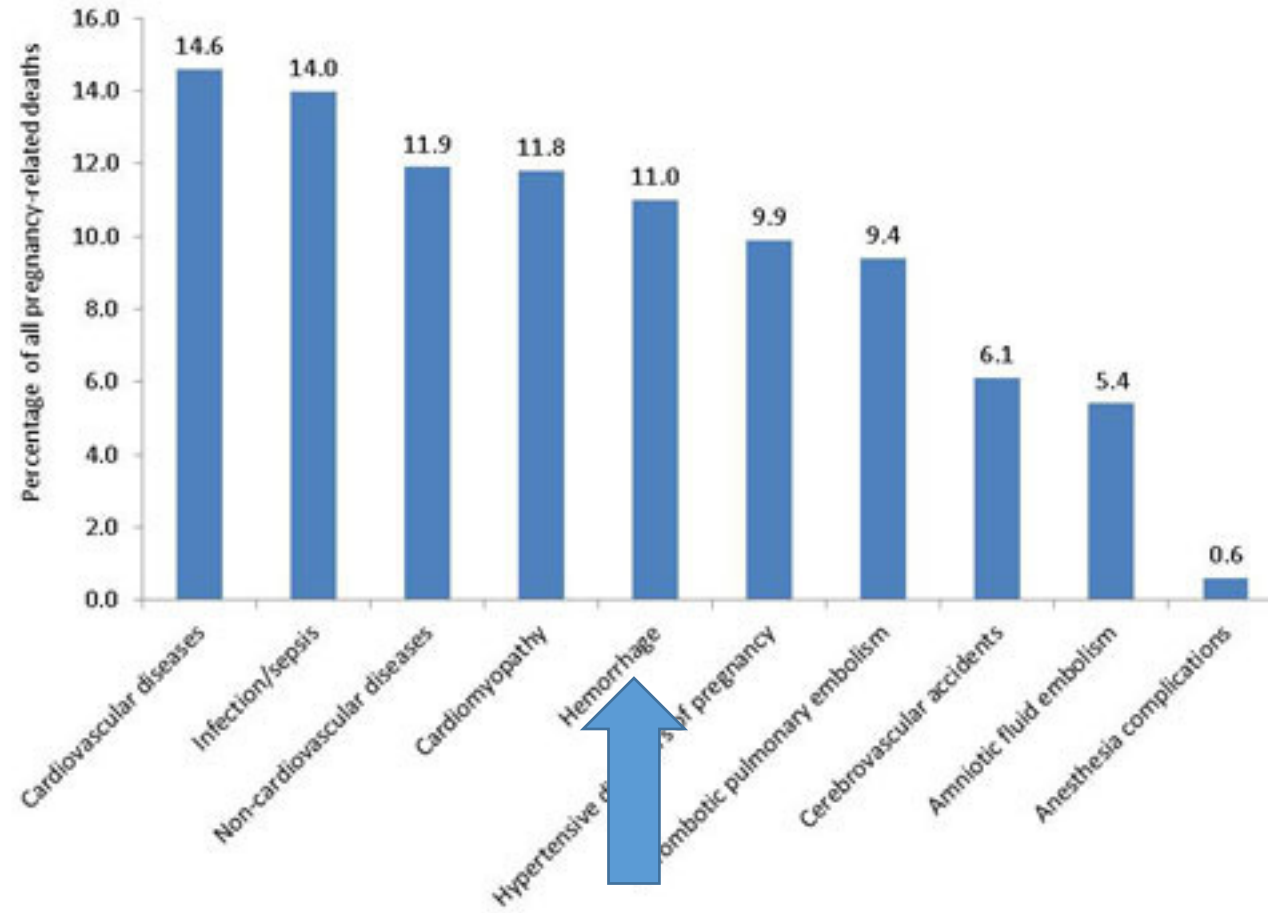
Maternal Mortality During 1990-2013



<https://www.acog.org/About-ACOG/ACOG-Departments/LOMC> accessed 09/04/18

Maternal mortality cumulative causes 1998-2006



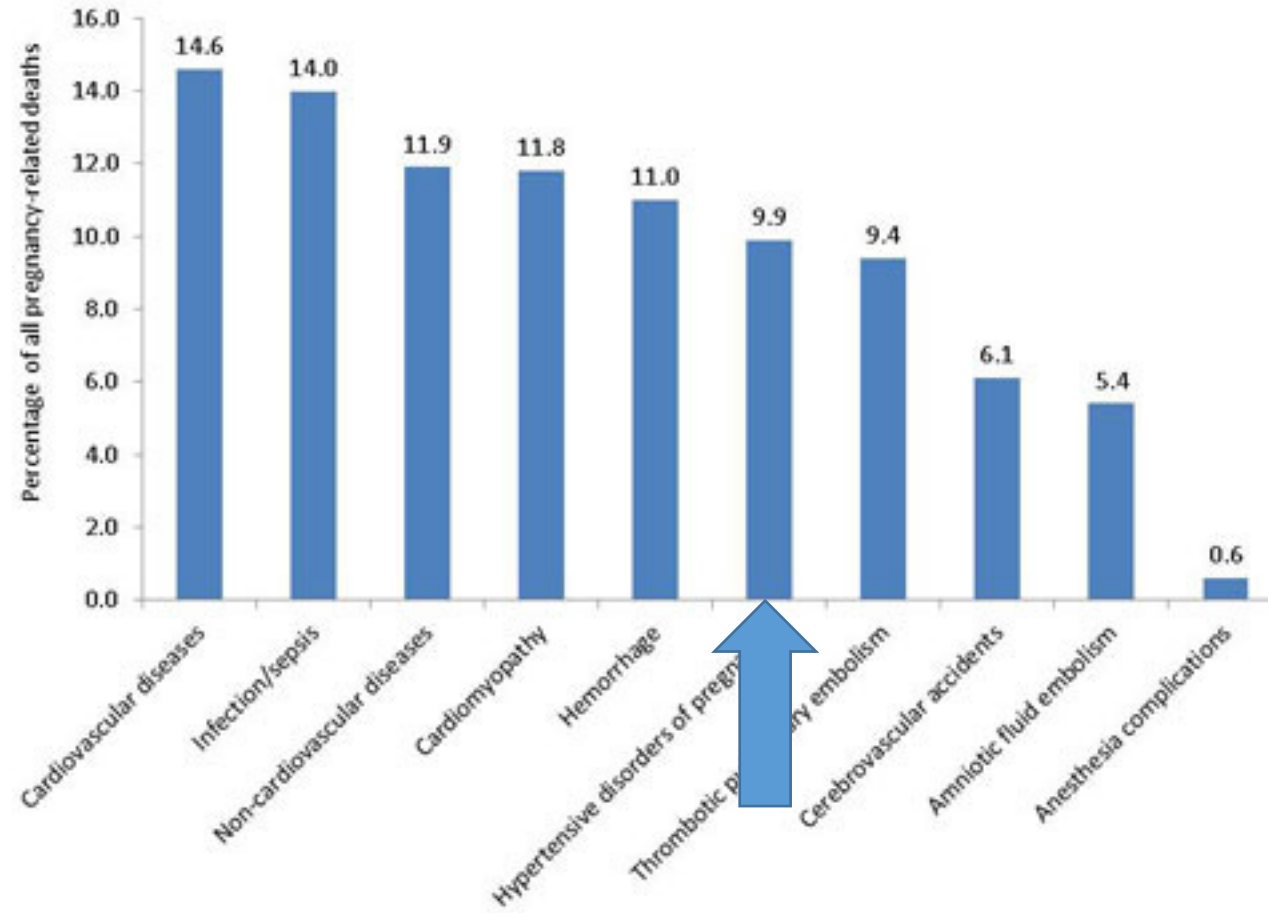




Curtis [Compton/ccompton@ajc.com](mailto:CCompton@ajc.com) Friday, March 09, 2018

“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.”

<https://www.myajc.com/marketing/judge-glenda-hatchett-and-son-fight-for-lives-new-mothers/Z5Jg8DcqSz4NQLMKpP6PML/> Accessed 9/21/18

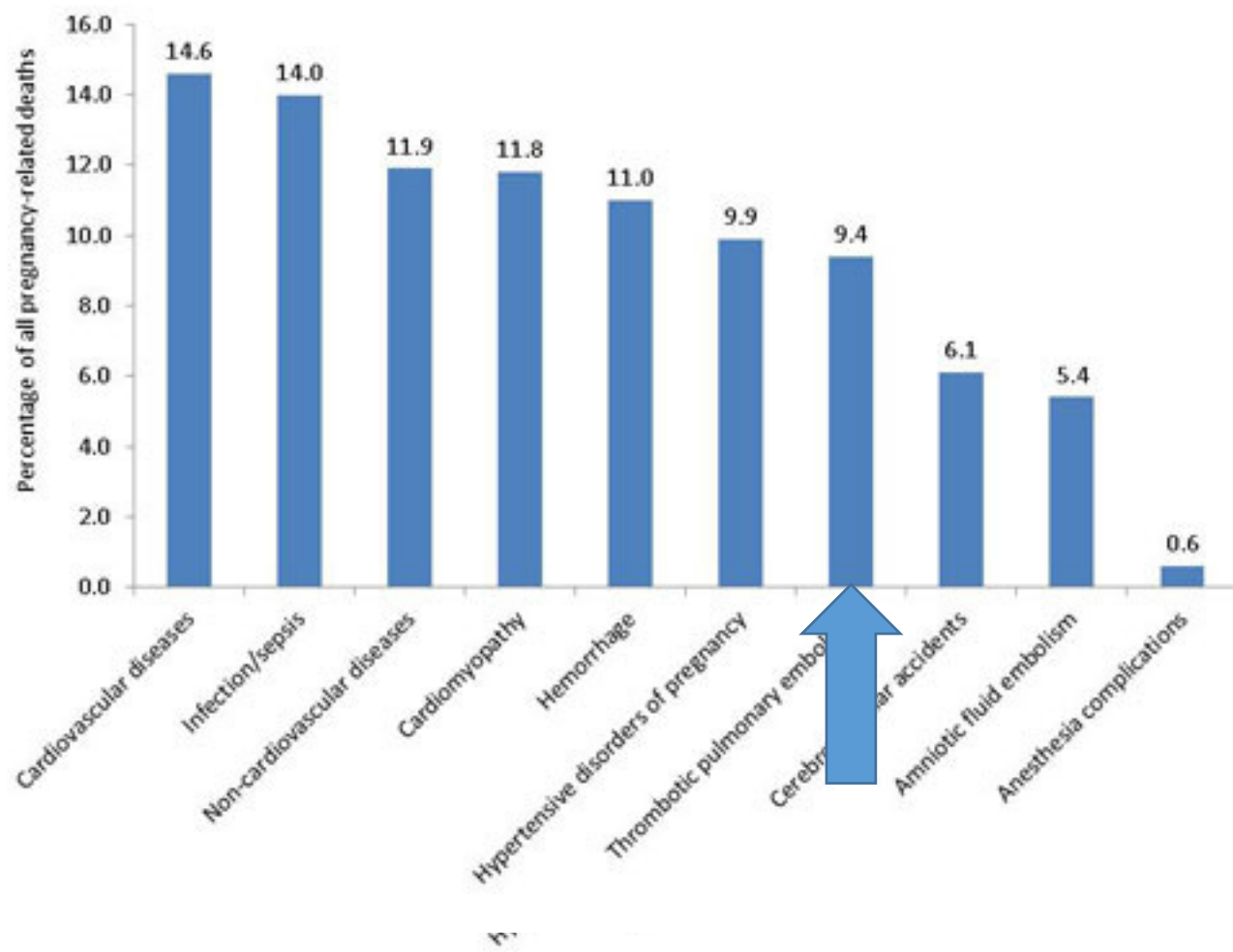




Deidre Johnson *Photo by James Chance*

From the article By Dwyer Gunn 9/4/18, "Why is it so risky to be a 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>

<http://www.latimes.com/sports/more/la-sp-being-serena-hbo-20180508-story.html>

FIG. 2. Race differentials in pregnancy-related mortality in the United States, 1987–2009. *Number of pregnancy-related deaths per 100,000 live births per year.

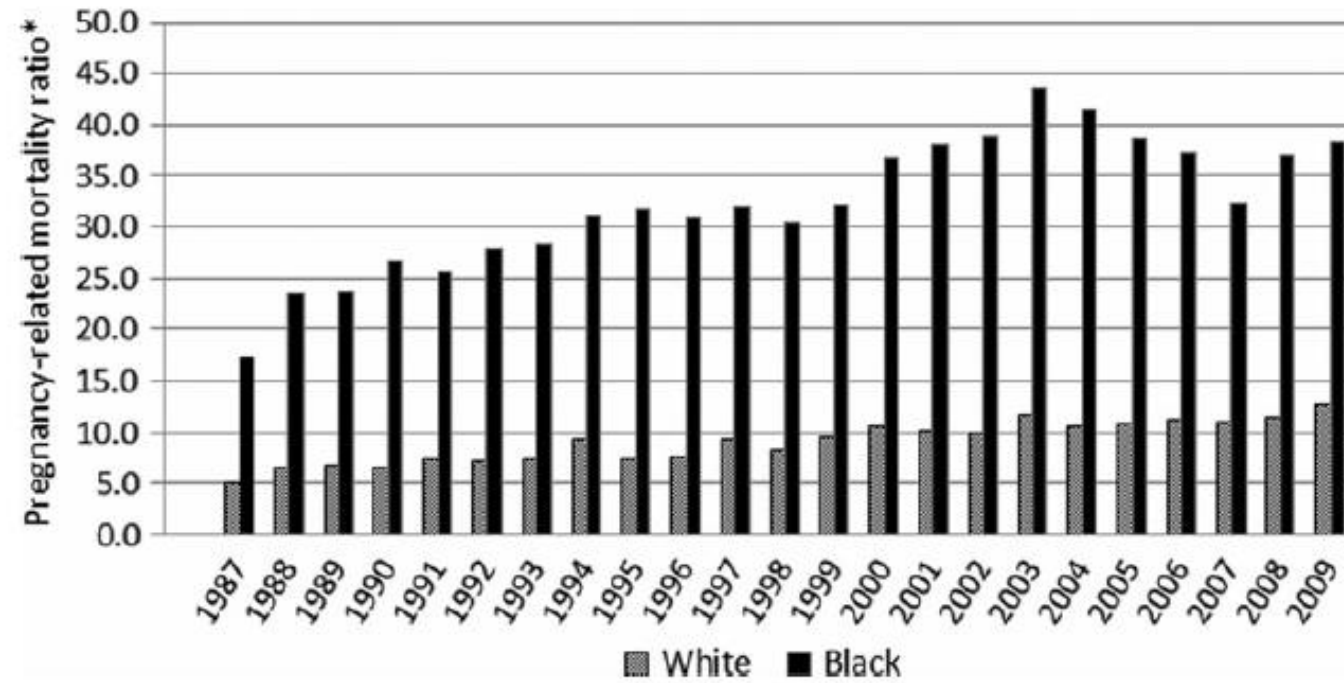


TABLE 2. Crude and adjusted odds ratios for the Black-White gap in maternal mortality, stratified by birth weight and livebirth order, United States, 1979–1986

	Whites		Blacks		Crude odds ratio	Adjusted odds ratio (95% confidence interval)*
	No. of cases	No. of controls	No. of cases	No. of controls		
Group 1: normal birth weight ≥2,500 g, livebirth order 1–3	415	4,643	214	762	3.06	3.53 (2.9, 4.4)
Group 2: normal birth weight ≥2,500 g, livebirth order ≥4	99	464	63	134	2.15	2.13 (1.5, 3.2)
Group 3: low birth weight <2,500 g, livebirth order 1–3	158	284	93	116	1.46	1.51 (1.1, 2.2)
Group 4: low birth weight <2,500 g, livebirth order ≥4	29	23	22	25	1.05	0.91 (0.6, 1.5)

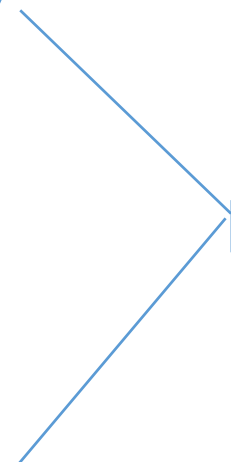
* Adjusted for maternal age (<20, 20–24, 25–29, 30–34, 35–39, ≥40 years), education (<12, 12, 13–15, ≥16 years), Kotelchuck index (6) (no, inadequate, intermediate, adequate, adequate plus care), gestational age (<37, 37–41, ≥42 weeks), year of death (1979–1986), marital status (married, not married),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

Am J Epidemiol 2000;152:413–19.

Maternal
age



Maternal
BMI



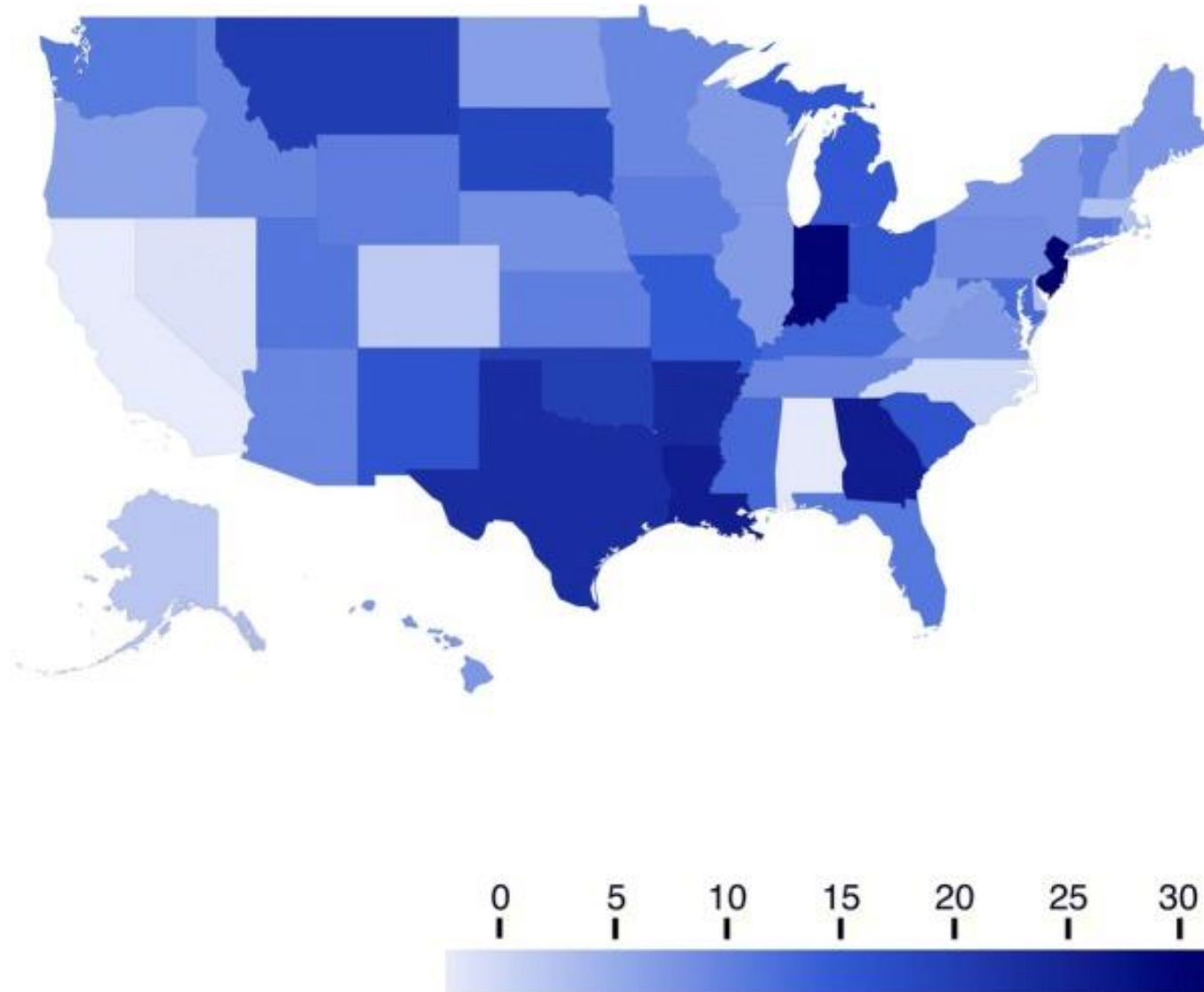
Chronic
Hypertension

Type 2
Diabetes



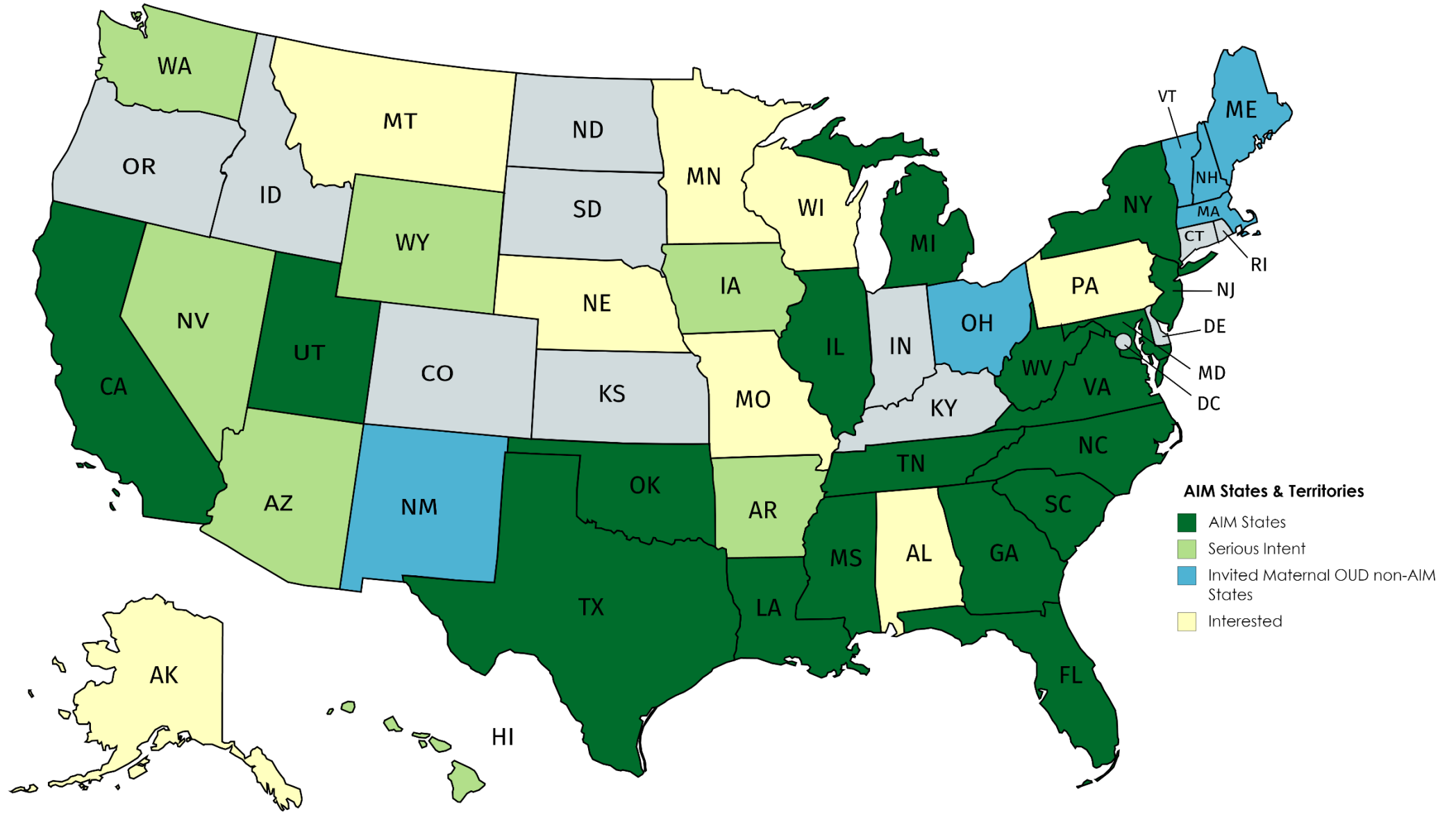
- Postpartum Hemorrhage via uterine atony
- Cardiovascular disease

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 5year 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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- **Listen and learn from the women and their families**
 - **Legislation**
 - **Community involvement**



Curtis Ccompton@ajc.com Friday, March 09, 2018

“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/> Accessed 9/21/18

“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.”

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Deidre Johnson *Photo by James Chance*

**The Center for African American Health,
headed by Deidre Johnson,**
“is dedicated to improving the health and
wellbeing of the African-American community.”
<http://www.caahealth.org/>

“The Center provides culturally-sensitive health education and health promotion programs to African-Americans living in the metro Denver area. “

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

<https://www.coloradotrust.org/content/story/why-it-so-risky-be-black-mother> 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!

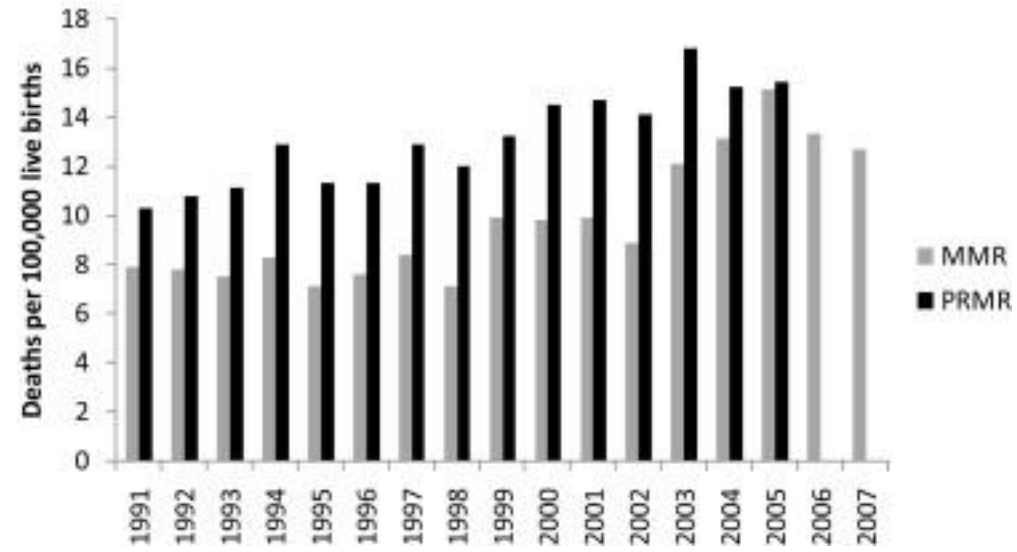


Figure 1 Maternal mortality rates (MMR), 1991-2007; pregnancy-related mortality rates (PRMR), 1991-2005, United States.

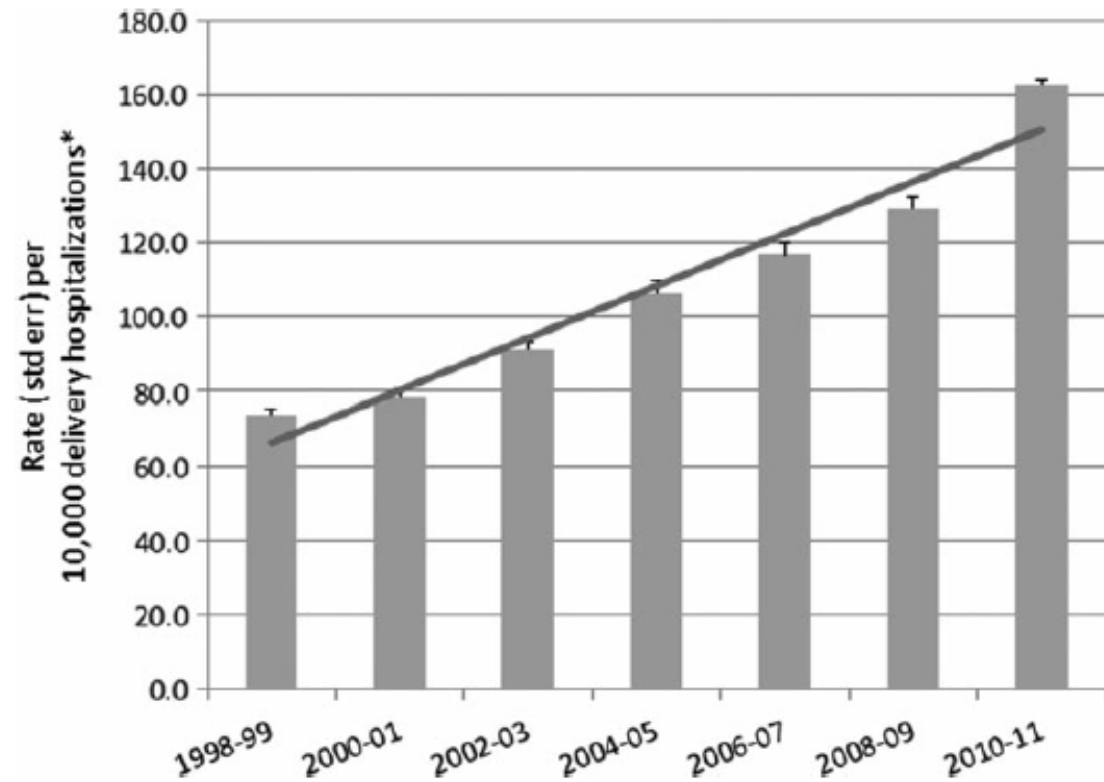
William M. Callaghan

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.¹⁹



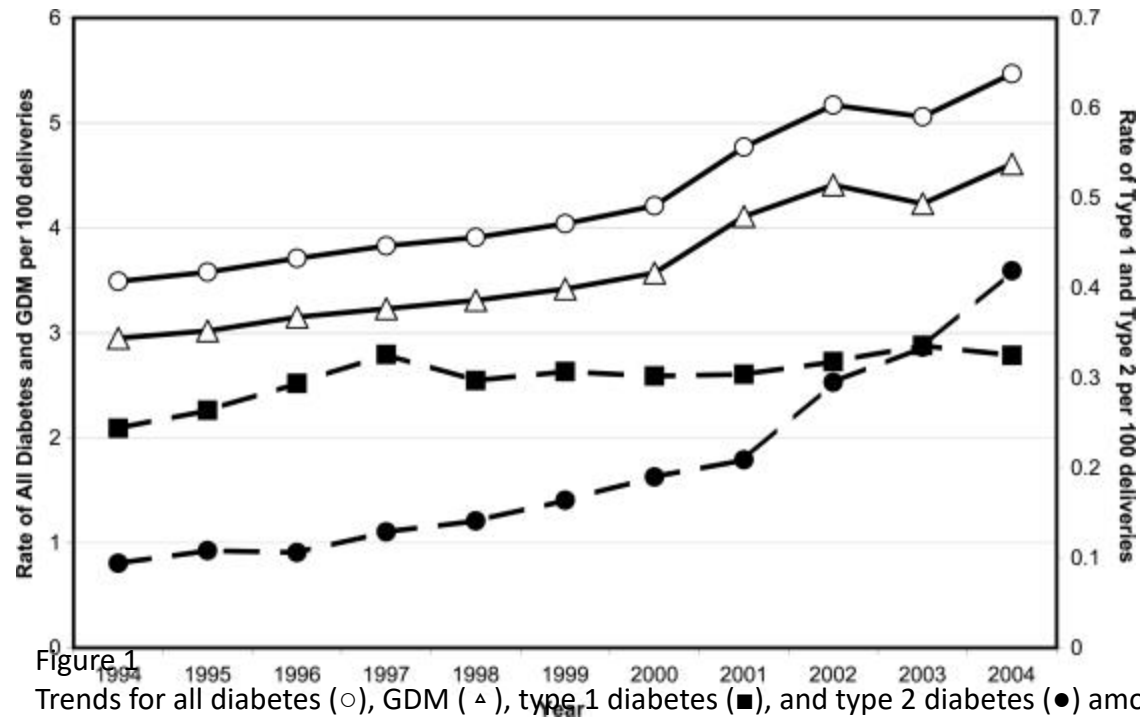


Figure 1

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](#)

Diabetes Care. 2010 April;33(4):768-773.

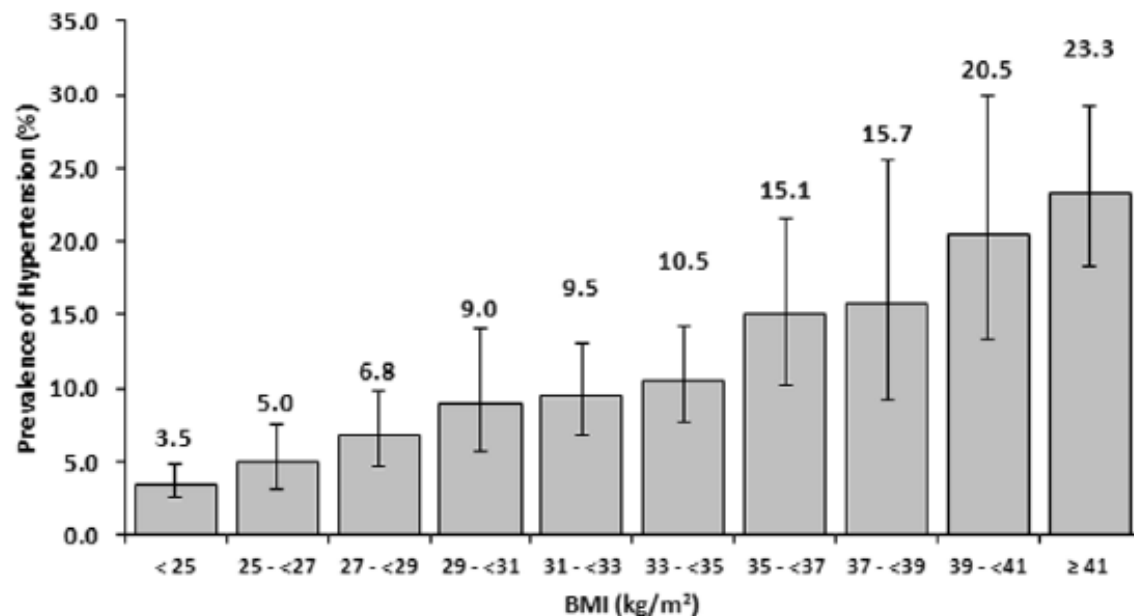
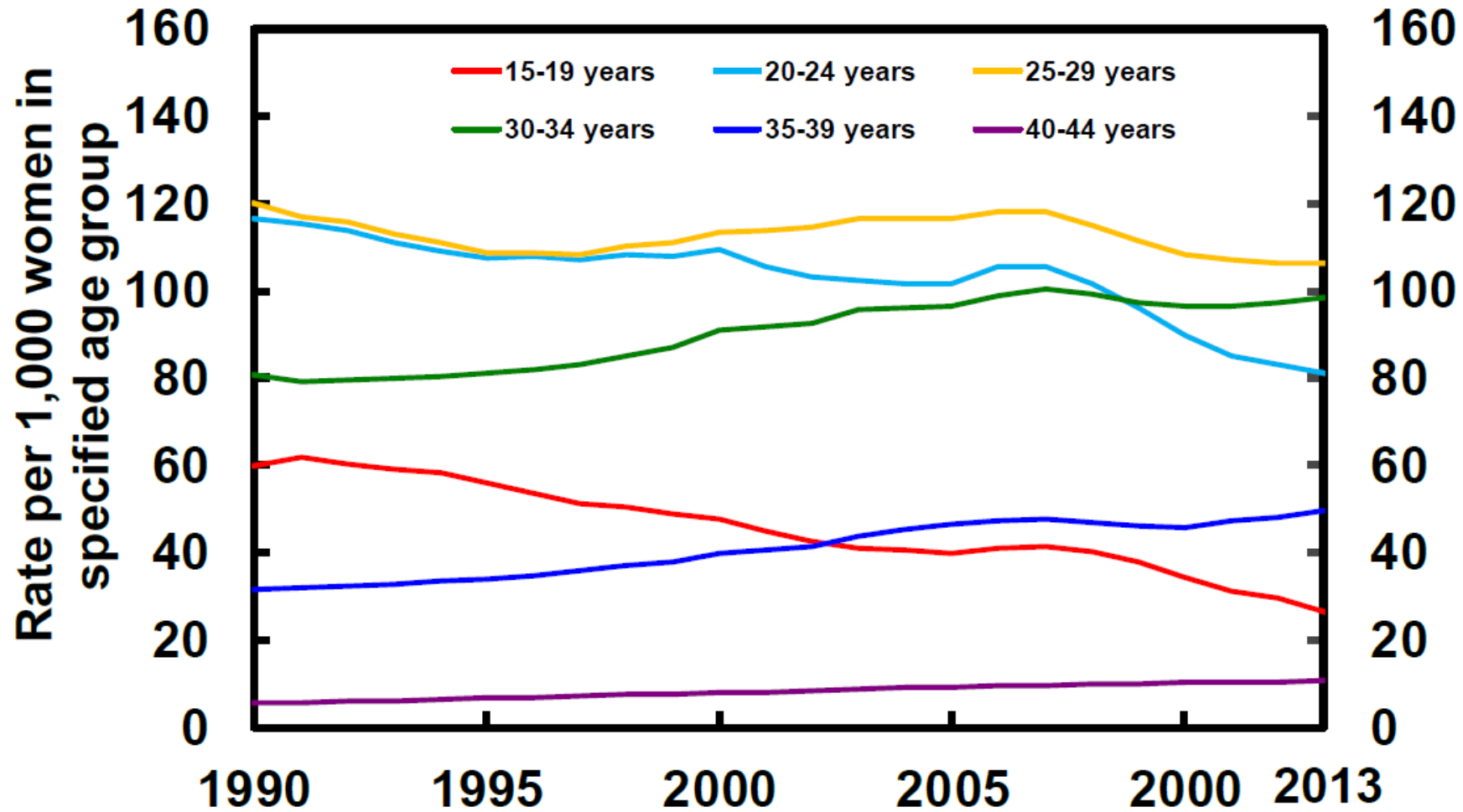


Figure 1. Prevalence¹ of hypertension² by body mass index (BMI) and for reproductive aged women, 20–44, United States, National Health and Nutrition Examination Survey, 1999–2008. 1. Weighted estimates calculated using the examination weight and 95% confidence intervals. 2. Hypertension was defined as an average systolic blood pressure ≥ 140 mmHg, average diastolic blood pressure ≥ 90 mmHg, or self-reported currently taking anti-hypertensives.
doi:10.1371/journal.pone.0036171.g001

**Figure 3. Birth rates, by selected age of mother:
United States, final 1990-2012 and preliminary 2013**

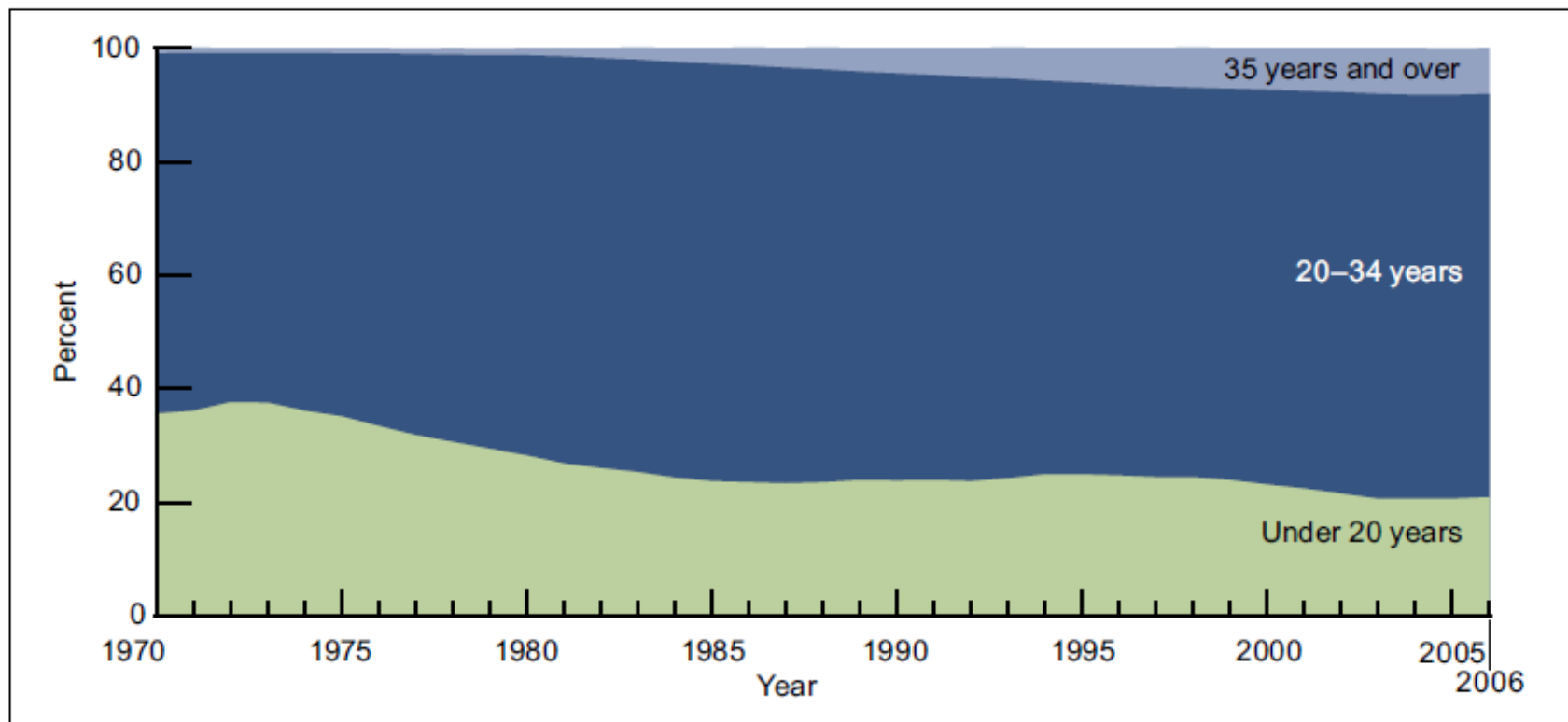


NOTE - Due to software limitation, this graph could not be plotted on a log scale. The published version of this graph will be plotted on a log scale.

NOTES: Rates are plotted on a logarithmic scale.

SOURCE: CDC/NCHS, National Vital Statistics System.

Figure 2. Percentage of first births, by age of mother: United States, 1970–2006



SOURCE: CDC/NCHS, National Vital Statistics System.

NCHS Data Brief ■ No. 21 ■ August 2009

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

T.J. Mathews, M.S., and Brady E. Hamilton, Ph.D.

Table 2. Prevalence of hypertension¹ 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.

Characteristic	Hypertension % (95% CI) ²	Unadjusted OR OR (95% CI)	p-value	Adjusted OR ³ OR (95% CI)	p-value
Age					
20–34	2.7 (2.1–3.4)	Referent		Referent	
35–39	10.0 (8.1–12.2)	4.0 (3.1–5.3)	<0.01	3.3 (2.1–5.2)	<0.01
40–44	18.4 (15.6–21.5)	8.2 (5.9–11.5)	<0.01	8.2 (5.0–13.3)	<0.01