



# PREGNANCY ASSOCIATED MORTALITY REVIEW (PAMR) IN MISSOURI

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Mother and Child Health Coalition, Kansas City, MO

# Background

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- Maternal mortality—a rare event in the US
- Each year, an estimated 650 women die in the US due to pregnancy-related complications, 60,000 nearly die from pregnancy complications (CDC)
- Steady increase in pregnancy associated deaths since 1987 with significant racial disparities
- CDC's Safe Motherhood Partnership - 2001

# World Health Organization (WHO) Definition

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Maternal death—death of a woman while pregnant or within 42 days of termination of pregnancy from any cause related to or aggravated by pregnancy or its management but not from accidental or incidental causes

## Maternal Mortality Rate (Ratio)

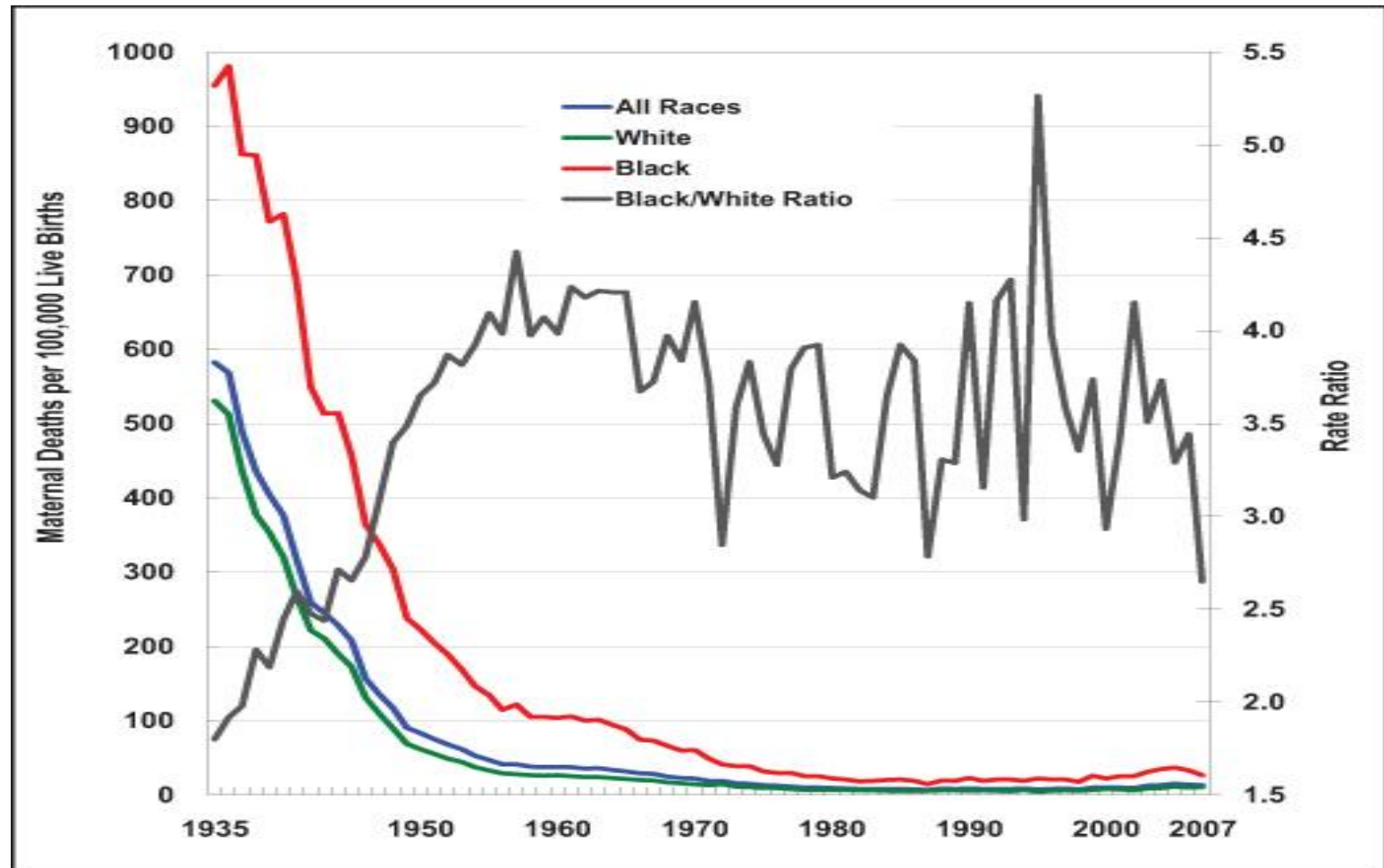
Number of women who die from pregnancy-related causes within 42 days postpartum  $\times 100,000$

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Number of live births in that year

# Maternal Mortality by race, US, 1935-2007

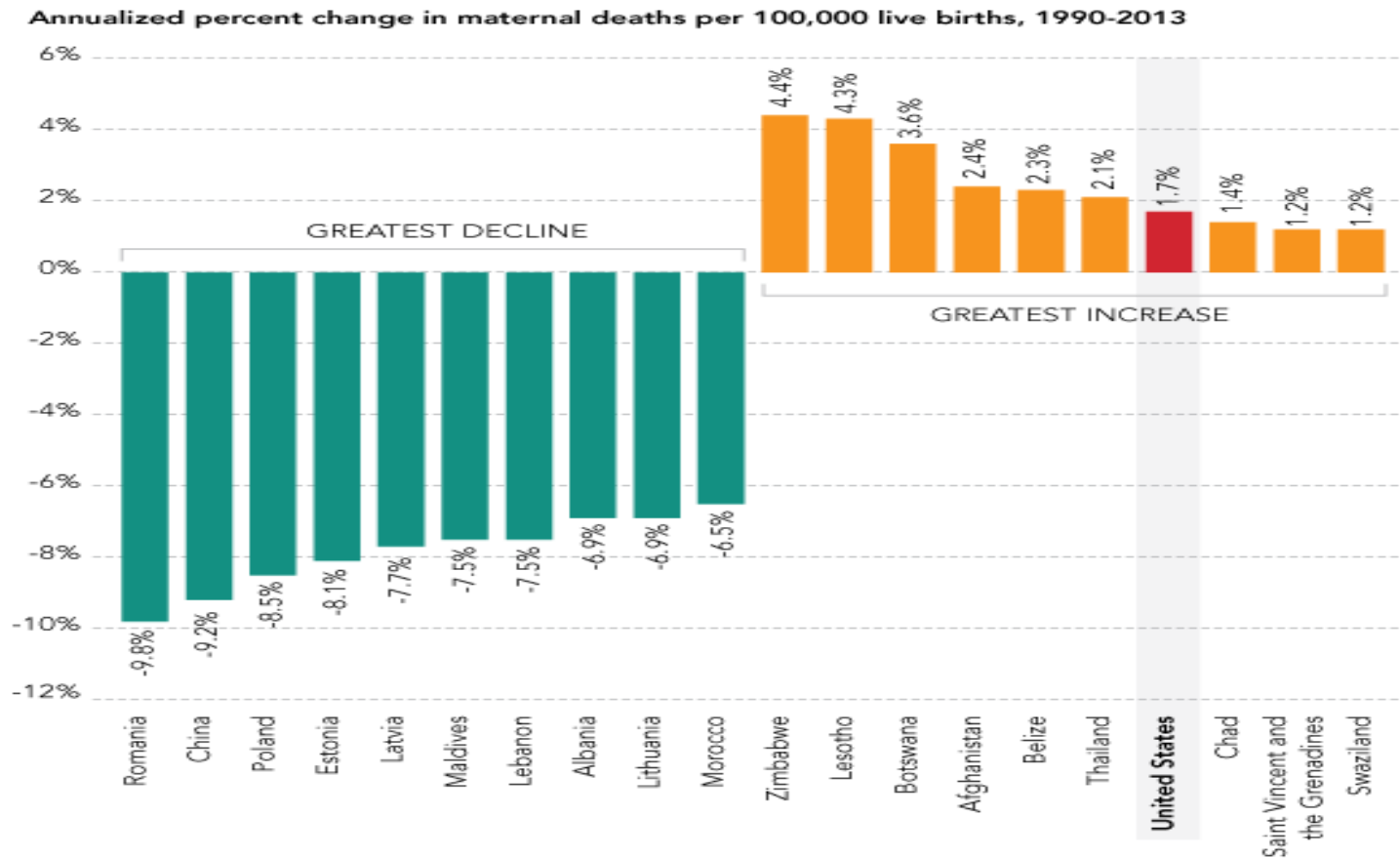
4



Source: <http://www.hrsa.gov/ourstories/mchb75th/mchb75maternalmortality.pdf>

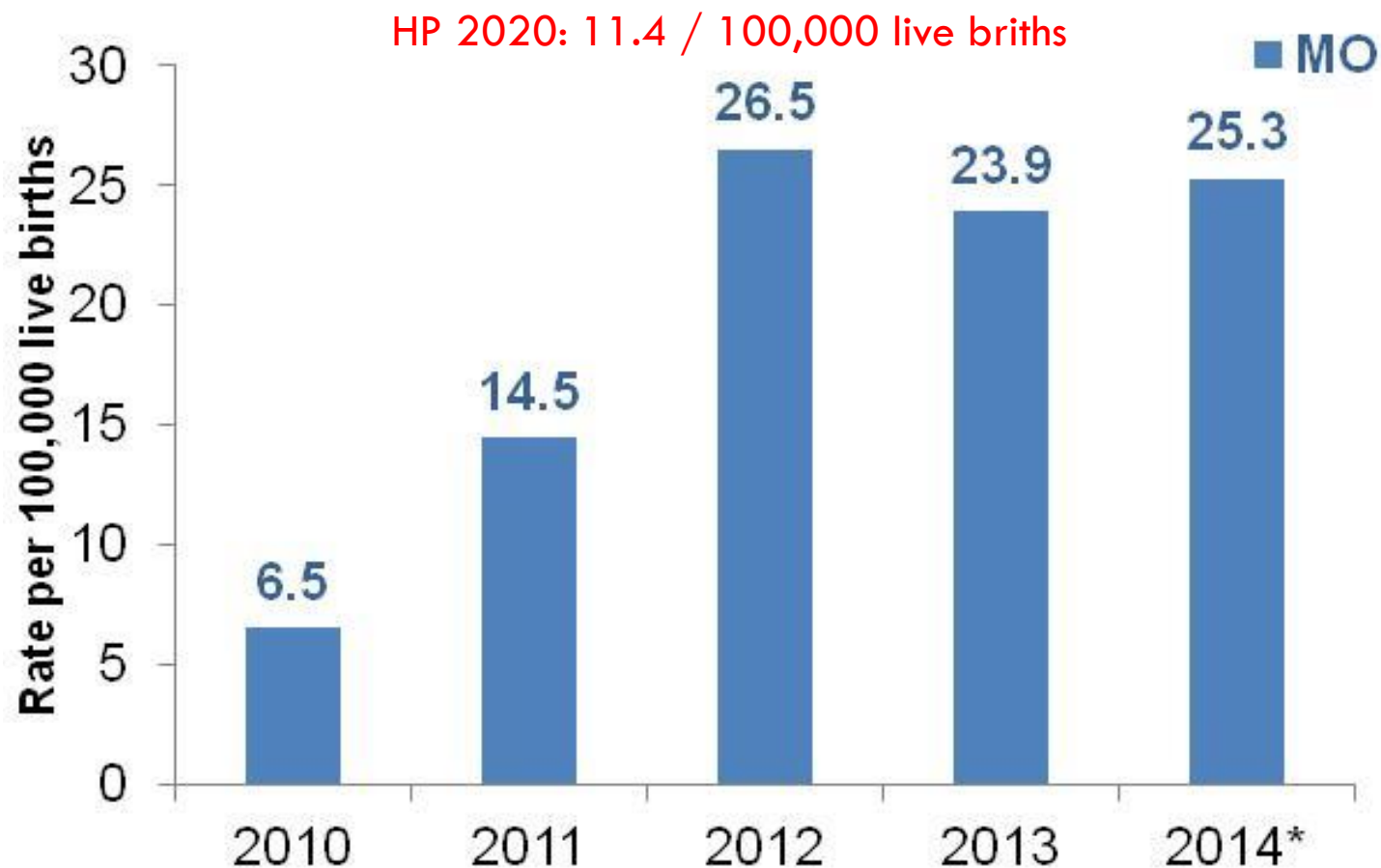
# US is Among Countries Where Maternal Mortality Is On The Rise In Recent Decades

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Source: Global, regional, and national levels and causes of maternal mortality during 1990–2013: a systematic analysis for the Global Burden of Disease Study 2013  
The Institute for Health Metrics and Evaluation, May 2<sup>nd</sup>, 2014, The Lancet

# NPM # 2: Maternal Mortality Rate, MO, 2010-2014



Source: MO data: MO DHSS. Vital Statistics –Deaths, MICA-Births.

Definition: Number of female deaths due to obstetric causes (ICD-10 codes A34, O00-O95, O98-O99) within 42 days of a pregnancy. \* 2014 provisional data.

# Amnesty International Report, 2010

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## DEADLY DELIVERY

THE MATERNAL  
HEALTH CARE CRISIS  
IN THE USA



HEALTH IS A  
HUMAN RIGHT  
AMNESTY  
INTERNATIONAL



“Mothers die not because the United States can't provide good care, but because it lacks the political will to make sure good care is available to all women”

- Larry Cox,  
Executive Director of Amnesty  
International USA.

<http://www.amnestyusa.org/sites/default/files/pdfs/deadlydelivery.pdf>

# ACOG / CDC DEFINITIONS

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## Pregnancy-Associated Death

The death of a women while pregnant or within on year of termination of pregnancy, irrespective of cause

### □ Pregnancy-Related Death

.....irrespective of the duration and site of the pregnancy from any cause **related to or aggravated by her pregnancy** or its management, **but not from accidental or incidental causes.**

### Not-Pregnancy-Related Death

...due to a cause unrelated to pregnancy.



# PREGNANCY RELATED MORTALITY RATIO (PRMR)

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$$\frac{\text{NUMBER OF PREGNANCY RELATED DEATHS}}{\text{NUMBER OF RESIDENT LIVE BIRTHS}} \times 100,000$$

## EXAMPLE:

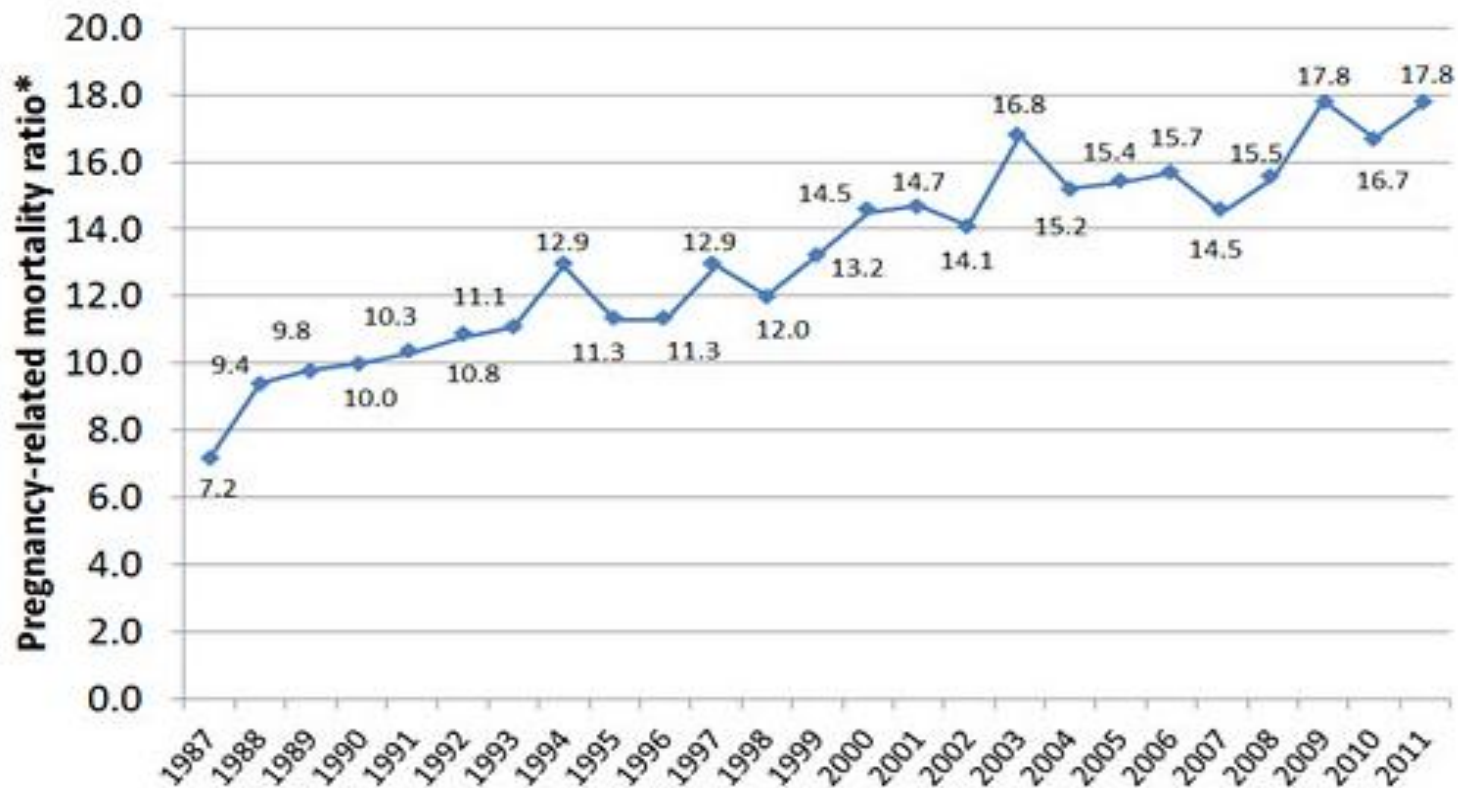
91 pregnancy-related deaths in 2008 among state residents

130,000 live births in 2008 to state residents

$91 / 130,000 \times 100,000 = 70.0$  pregnancy-related deaths  
per 100,000 live births in 2008

# Trends in Pregnancy-Related Mortality in the United States, 1987–2011

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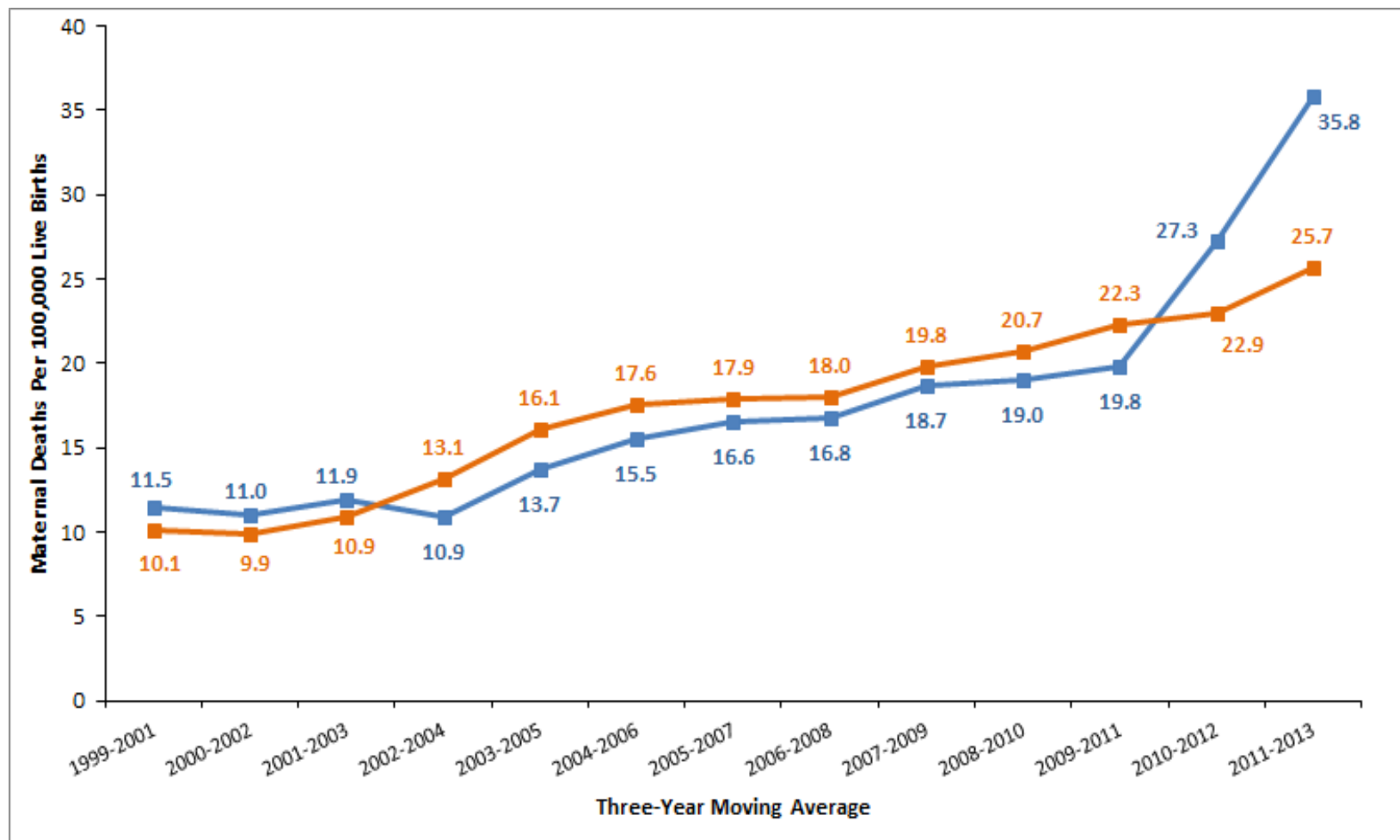


\*Note: Number of pregnancy-related deaths per 100,000 live births per year.

Source: <http://www.cdc.gov/reproductivehealth/maternalinfanthealth/pms.html>

# Maternal Mortality Rates, Missouri 1999-2013

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Source: CDC, NCHS. Underlying Cause of Death 1999-2013 on CDC WONDER Online Database, released 2015. ICD-10 Codes: O00-O99 (Pregnancy, childbirth and the puerperium) <http://wonder.cdc.gov/ucd-icd10.html>

# State Profile – Missouri

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- Missouri Population – 6 million (85% white, 12% AA)
- Women population – 51% (84% white, 13% AA)
- 34% of women in childbearing age (18-44 years) (82% white, 14% AA)

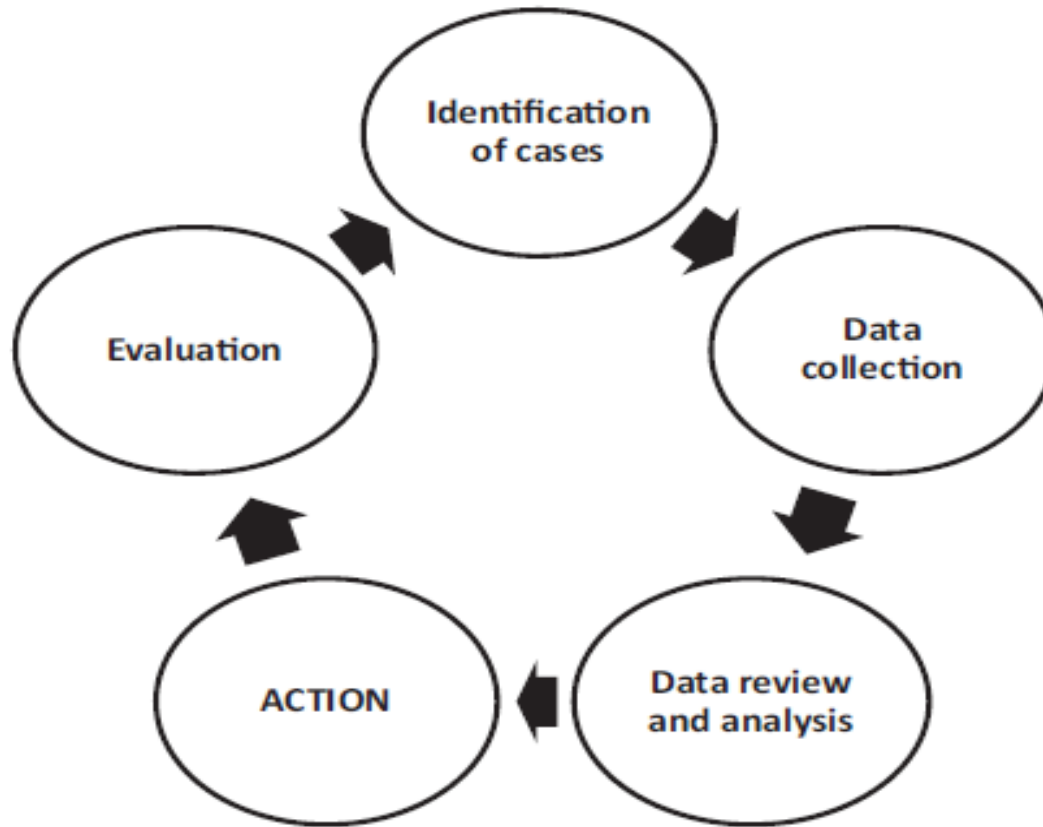
	2014		% Change in number from 2003 to 2014
	# of Live births	% of births	
Overall	75,104	100%	-2.4%
White	59,527	79.3	-6.1%
AA	11,628	15.5	5.5%

% of Medicaid births (2014):

Overall = 40%, Whites = 34%, African-Americans = 71%

# Maternal Mortality Review – Action Cycle

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**Figure** The maternal mortality action cycle.

Source: From Identification and Review to Action—Maternal Mortality Review in the United States, Cynthia J. Berg, *Semin Perinatol* 36:7-13

# MO PAMR OPERATING DEFINITIONS

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- **Pregnancy-Associated Mortality**—a death of a woman, from any cause, while she is pregnant or within 1 year of termination of pregnancy
- Further categorized as:
  - **Pregnancy-Related**
  - **Possibly Pregnancy-Related**
  - **Not Pregnancy Related**



Pregnancy  
Associated  
Mortality

# MO PAMR Board

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- Dr. George Hubbell, MD  
Physician/Ex-Chair Mo. Section of ACOG
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Capital Region Medical Center
- Dr. Alison G. Cahill, MD, BJC, OB/GYN
- Dr. Shayna Conner, MD, BJC, OB/GYN
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Southwest Missouri Forensics
- Patricia Norton, MD  
Family Practice Physician
- Trina Ragain, March of Dimes
- Judy Wilson-Griffin, Perinatal Clinical Nurse  
Specialist, SSM St. Mary's Health Center
- Barbara Gleason, MSN, RN, Nurse  
Manager, Building Blocks/Nurse-Family  
Partnership
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  - Samar Muzaffar, MD, MPH  
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  - Andrea Smith  
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Title V-MCH Block Grant Director
  - Cindy Rackers, Administrator  
Section for Healthy Families and Youth
  - Sharmini Rogers, Chief, Bureau of  
Genetics and Healthy Childhood
  - Jolene Borders, Public Health Consultant  
Nurse, PAMR Coordinator
  - Rita Arni, RD, LD  
WIC Nutrition Specialist

# Overview of MO-PAMR Methodology

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**STEP 1: Identify all deaths occurring during pregnancy or within one year of pregnancy**



**STEP 2: Additional data gathered for each death**

Coroner Reports, Autopsy Results, and additional information from the Death are obtained, abstracted and case summaries prepared.



**STEP 3: Cases selected for PAMR Committee review**



**STEP 4: Medical records abstracted and summarized**



**STEP 5: Cases reviewed by PAMR Committee**

Committee determines whether the death was pregnancy related, or possibly pregnancy related, or not pregnancy related, the cause of death and contributing factors



# Missouri PAMR Case Review 1999-2008

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- Total # of deaths within one year of termination of pregnancy = **466**
- Eliminated Records = **19**
- # of deaths that met criteria for PAMR = **447**

# MO-PAMR CASE REVIEW, 1999-2008

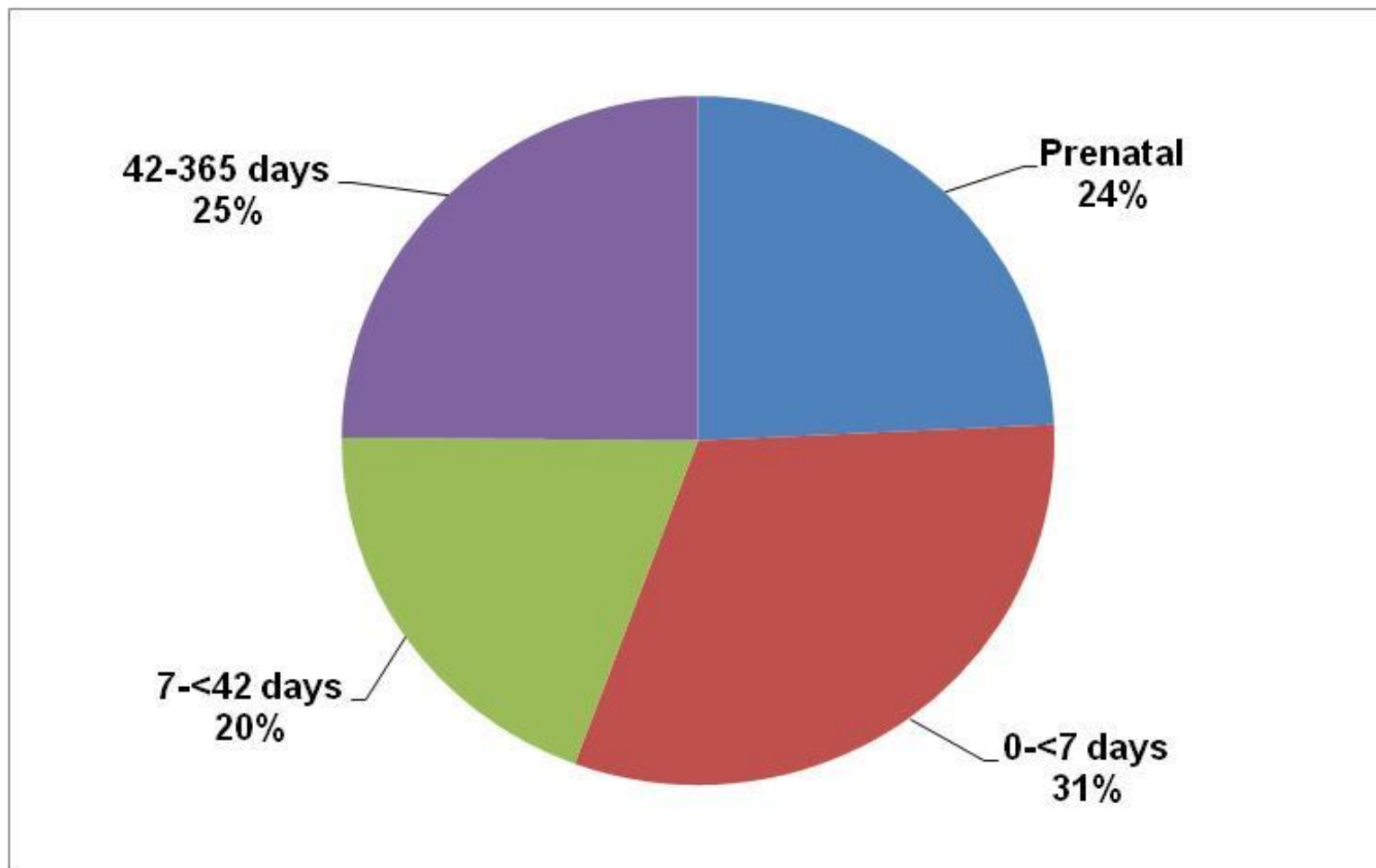
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Category of Death	Count	% of total deaths
PR - Pregnancy related	108	24.2
PPR - possibly pregnancy related	61	13.6
NPR - not pregnancy related	237	53.0
Undetermined	41	9.2
Overall	447	100.0

Totals	YEAR2010	YEAR2011	YEAR2012	YEAR2013	YEAR2014
298	54	55	66	56	67

# Timing of maternal deaths, 1999-2008

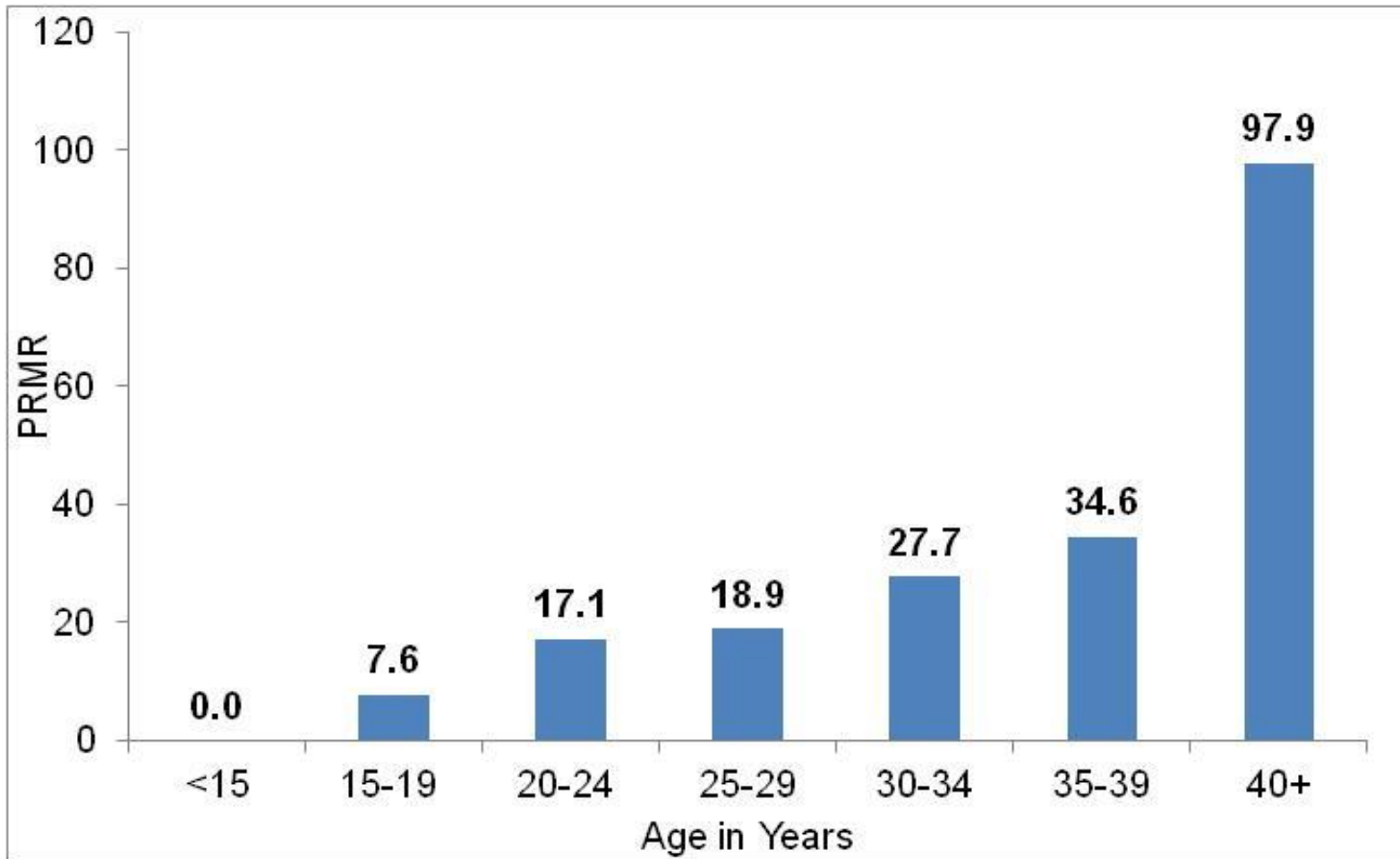
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Source: MO PAMR Deaths Linked to Vital Statistics Birth file

# Age Specific PRMR, 1999-2008

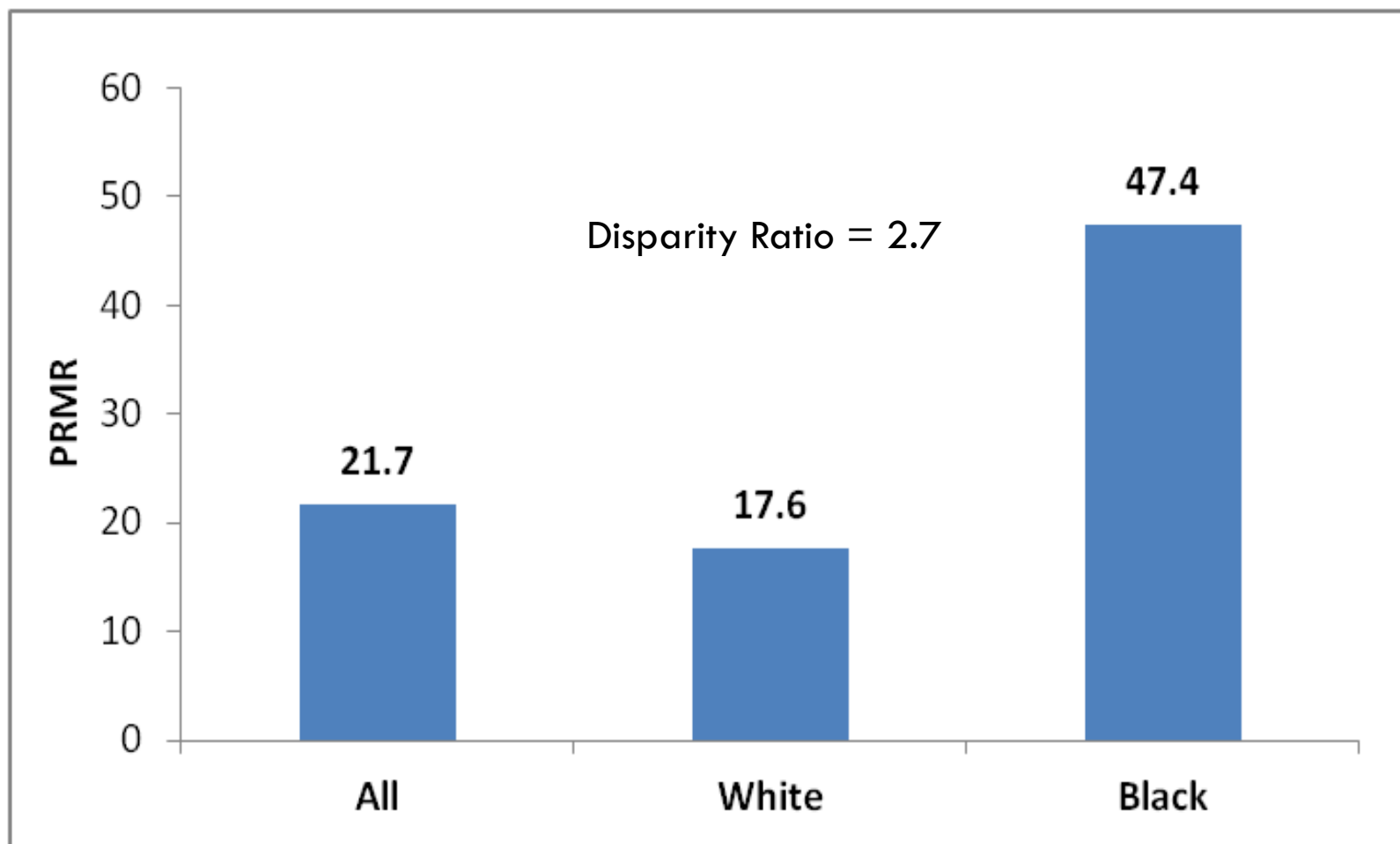
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Source: MO PAMR Deaths Linked to Vital Statistics Birth file

# Racial distribution of MO-PAMR deaths, 1999-2008

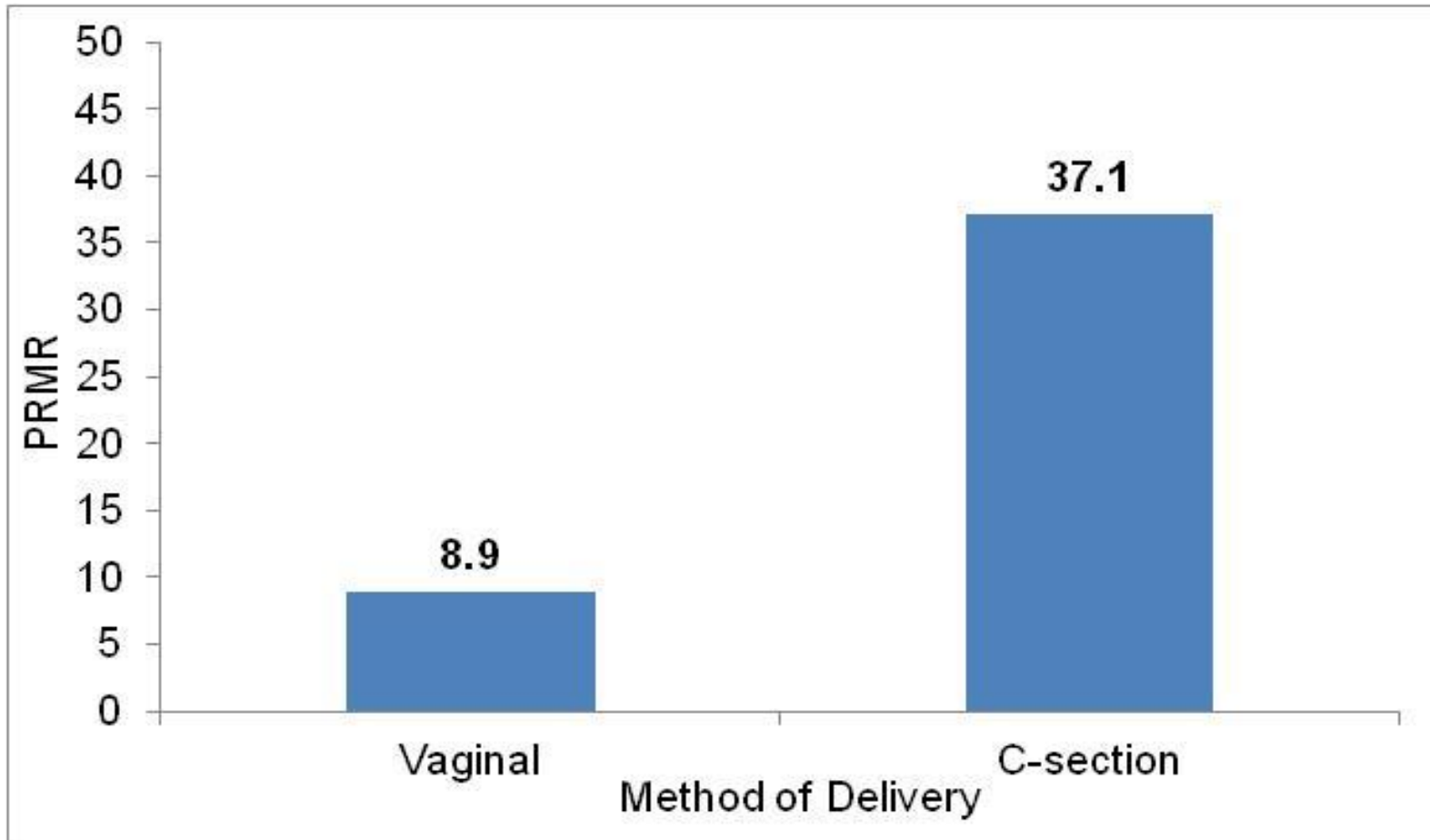
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Source: MO PAMR

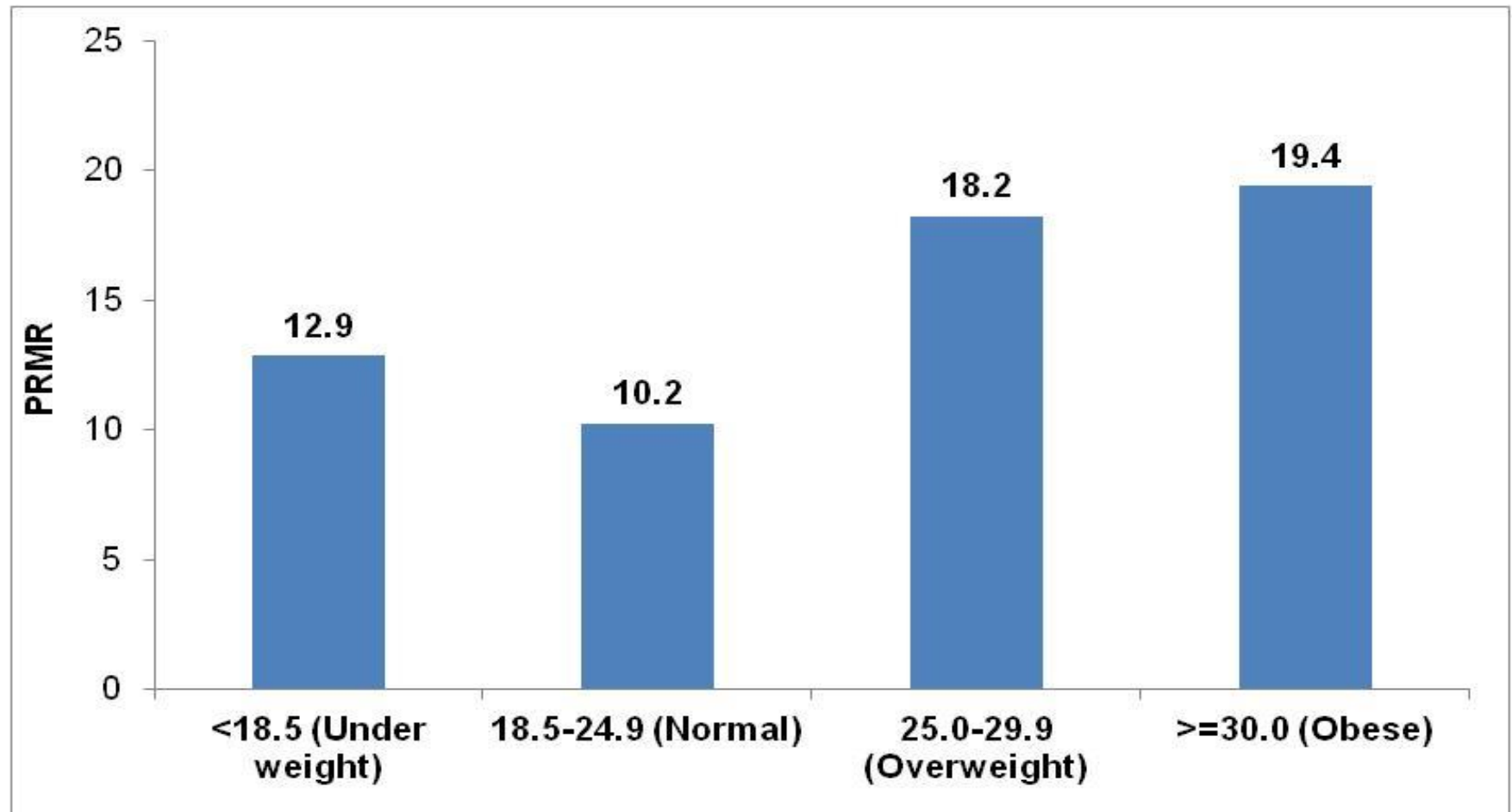
# Method of Delivery among MO-PAMR deaths, 1999-2008

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Source: MO PAMR Deaths Linked to Vital Statistics Birth file

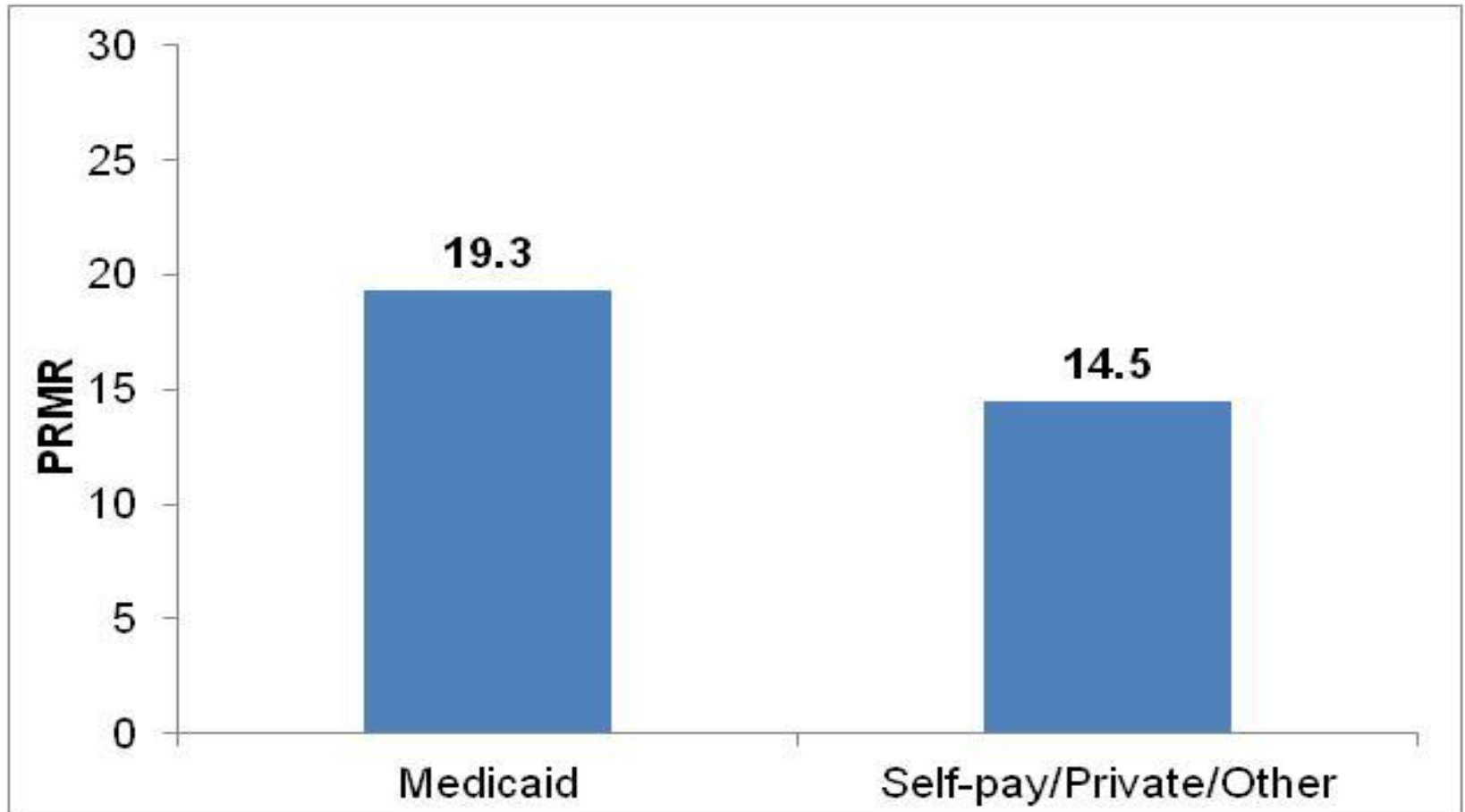
# Maternal Mortality by BMI status, MO, 1999-2008



Source: MO PAMR Deaths Linked to Vital Statistics Birth file

# PRMR by payer source, 1999-2008

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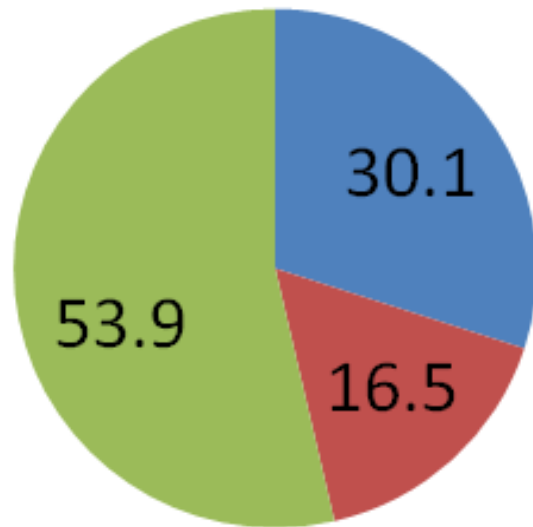
Source: MO PAMR Deaths Linked to Vital Statistics Birth file



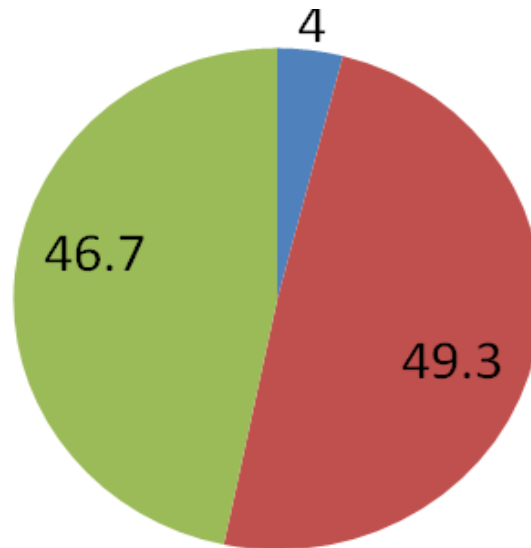
# Health Insurance Status around the time of pregnancy, Missouri, 2007-2012

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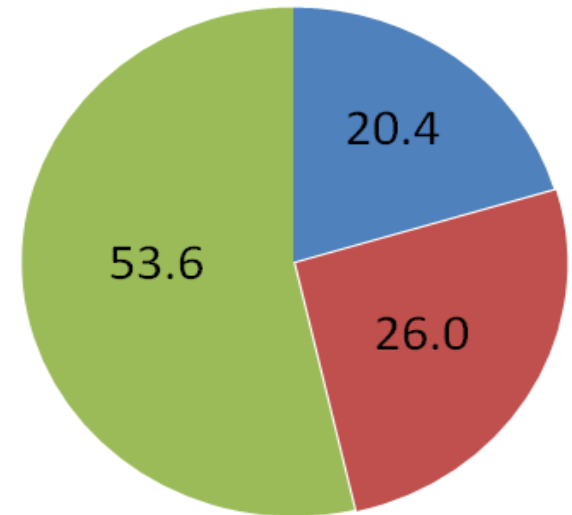
Pre-pregnancy Insurance



PNC/Delivery Insurance



Current Insurance (2012)



No Insurance/Self Pay/Other

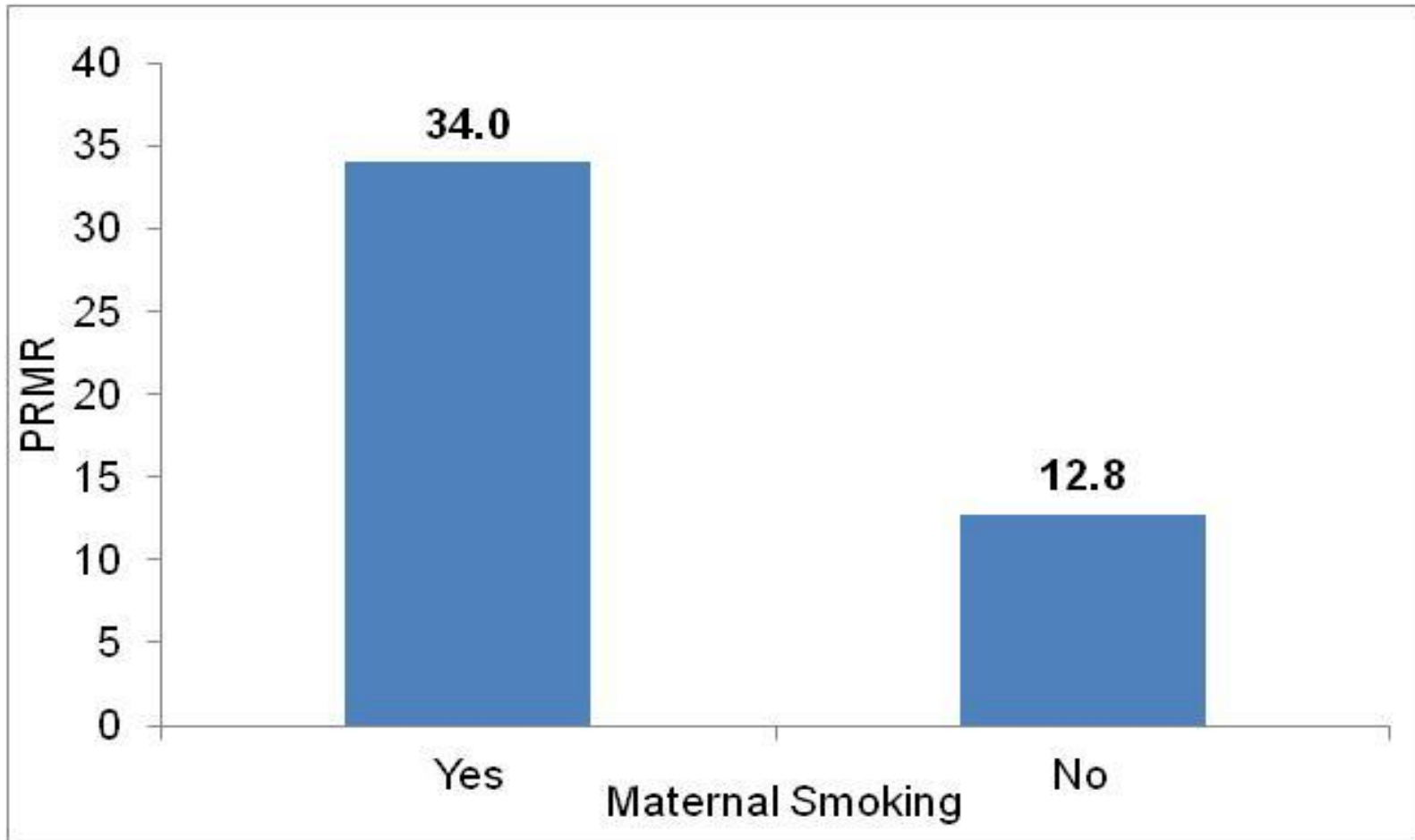
Medicaid

Private Insurance

Source: Missouri Pregnancy Risk Assessment Monitoring System (PRAMS), [www.cdc.gov/PRAMS](http://www.cdc.gov/PRAMS)

# Smoking status among PAMR deaths in MO, 1999-2008

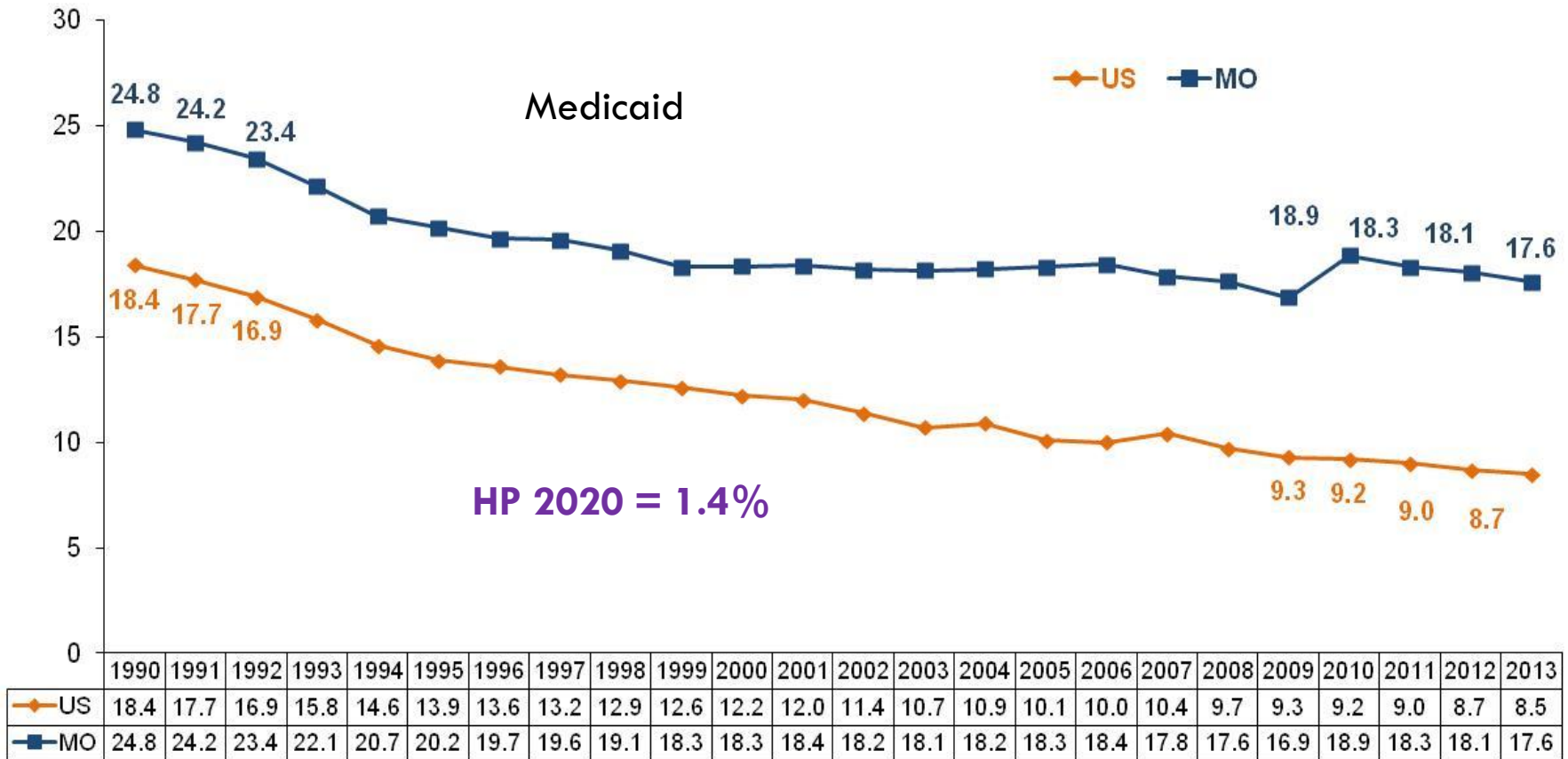
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Source: MO PAMR

# Smoking during pregnancy, US and MO, 1990-2013

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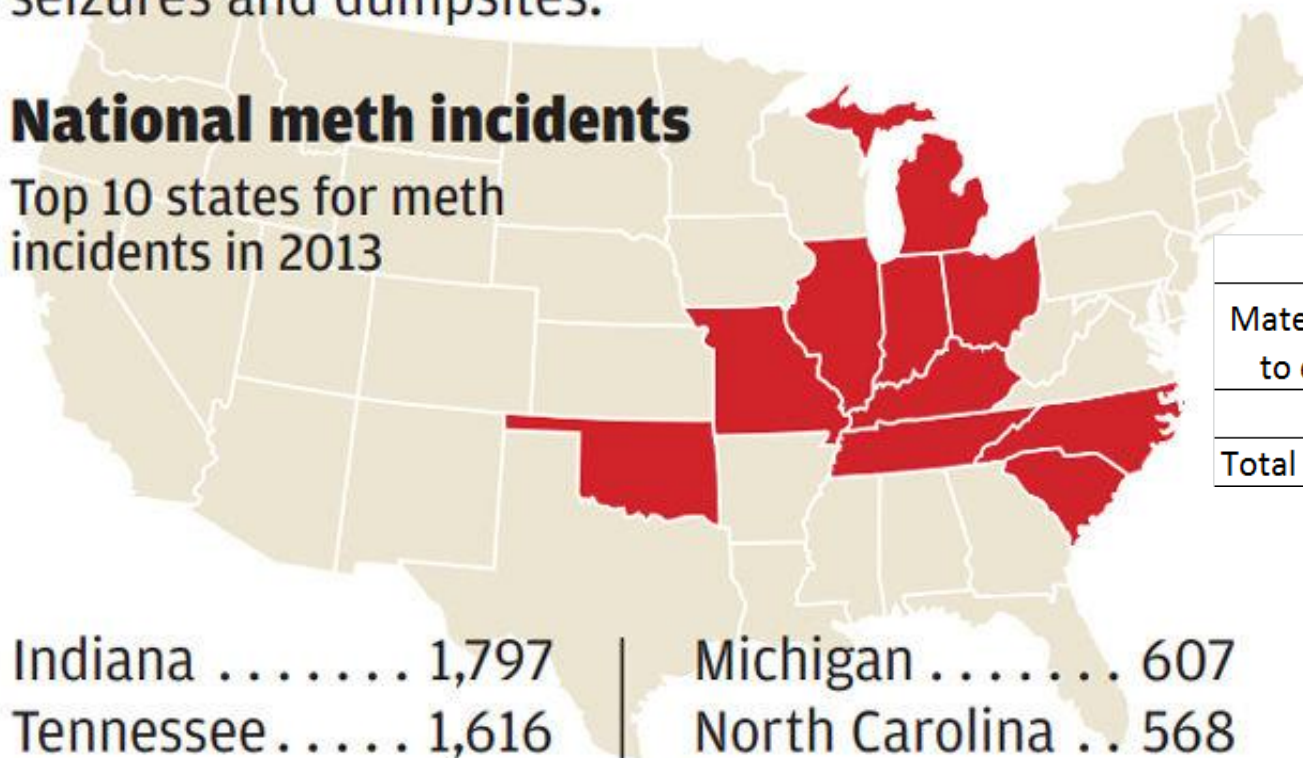
Source: MO DHSS, Birth MICA, [www.health.mo.gov/MICA](http://www.health.mo.gov/MICA) US: CDC, NCHS. National Vital Statistics.  
<http://wonder.cdc.gov/natalty-current.html>

# METHAMPHETAMINE INCIDENTS

These numbers include methamphetamine laboratories, chemical/equipment/glassware seizures and dumpsites.

## National meth incidents

Top 10 states for meth incidents in 2013



Indiana . . . . . 1,797  
 Tennessee . . . . . 1,616  
**Missouri . . . . . 1,495**  
 Ohio . . . . . 1,010  
**Illinois . . . . . 673**

Michigan . . . . . 607  
 North Carolina . . 568  
 Kentucky . . . . . 495  
 Oklahoma . . . . . 436  
 South Carolina . . 397

## Missouri

	2010-2014
Maternal Deaths due to drug overdose	51
Total Maternal Deaths	299

# Causes of pregnancy related deaths, 1999-2008

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Causes of deaths	Number	Percent
Embolism	40	23.7
Other Cardiac Conditions	20	11.8
Cardiomyopathy	17	10.1
Hemorrhage	17	10.1
Hypertension	17	10.1
Malignancy	13	7.7
Infection	7	4.1
Cerebro-Vascular Accident (CVA)	8	4.7
Suicide	7	4.1
Other: causes	23	13.6
Unknown	0	0.0
Total	169	100.0

**Pulmonary Embolism = 28**

**Amniotic Embolism = 12**

**Cardiovascular  
Diseases (21.9%)**

Source: MO PAMR

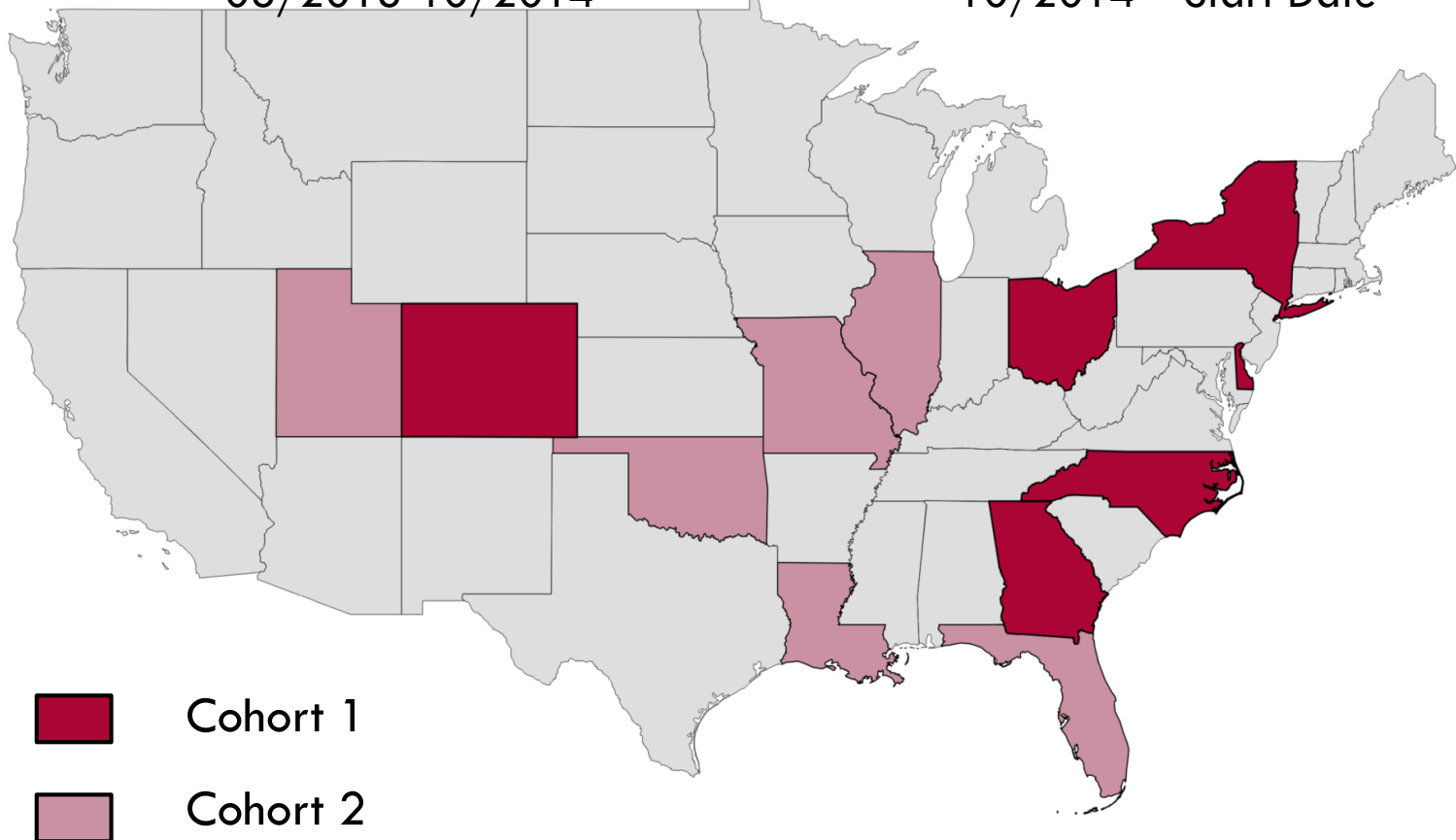
# AMCHP's Every Mother Initiative



Merck for mothers  
Committed to Saving Lives

**Cohort 1: CO, DE, GA, NY, NC, OH**  
08/2013-10/2014

**Cohort 2: FL, IL, LA, MO, OK, UT**  
10/2014 – Start Date



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# Summary

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- MO PAMR - First ever comprehensive review of pregnancy associated deaths in Missouri
- African-Americans have significantly higher maternal mortality rates than any other sub-group
- Significant associations with maternal age, smoking during pregnancy and method of delivery
- Maternal deaths due drug overdose – a significant public health concern
- Embolism and cardiovascular diseases are the leading causes of death

# Acknowledgements

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- MCH Epidemiology Team: Supriya Nelluri, Dr. David McBride, Dr. Praveena Ambati, Mary Mosley Matthew Keller, Rebecca Chitima, Karen Harbert, Bryan Angell, Shirley Veit, Betty Powell
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- Association of Maternal and Child Health Programs (AMCHP)
- CDC PRAMS Project, University of Missouri, Columbia
- Section of Epidemiology for Public Health Practice, Bureau of Vital Statistics, Health Care Data Analysis and Dissemination
- Section of Healthy Families & Youth – Dr. Sharmini Rogers, Jolene Borders
- State Systems Development Initiative (SSDI)