

# DSHS Grand Rounds

May 14

## Healthy Texas Babies: Maternal Mortality and Morbidity Review

Presenters: Lisa M. Hollier, MD, MPH,  
Medical Director, Obstetrics, Texas  
Children's Health Plan; Dorothy Mandell,  
PhD, Texas Dept. of State Health  
Services



Healthy  
Texas  
Babies<sup>SM</sup>

# Logistics

Registration for free continuing education (CE) hours or certificate of attendance through TRAIN at:

<https://tx.train.org>

Streamlined registration  
for individuals not requesting CE hours  
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1. webinar: <http://extra.dshs.state.tx.us/grandrounds/webinar-noCE.htm>
2. live audience: sign in at the door

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# Logistics (cont.)

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Remote sites can send in questions throughout the presentation by using the GoToWebinar chat box or email [GrandRounds@dshs.state.tx.us](mailto:GrandRounds@dshs.state.tx.us).

For those in the auditorium, please come to the microphone to ask your question.

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# Disclosure to the Learner

## **Requirement of Learner**

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## **Commercial Support**

This educational activity received no commercial support.

## **Disclosure of Financial Interests**

Our speaker, Lisa M. Hollier, MD, MPH serves as Medical Director of Obstetrics at Texas Children's Health Plan.

Planning committee members have no relevant financial relationships to disclose.

## **Off Label Use**

There will be no discussion of off-label use during this presentation.

## **Non-Endorsement Statement**

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David Lakey, MD  
DSHS Commissioner  
is pleased to introduce today's  
DSHS Grand Rounds speakers

# Healthy Texas Babies: Maternal Mortality and Morbidity Review

Lisa M. Hollier, MD, MPH, FACOG  
Chair, DSHS Maternal Mortality and Morbidity  
Review Task Force



Dorothy Mandell, PhD  
Epidemiologist, Office of Program Decision  
Support , Division of Family and Community  
Health Services, DSHS



# Learning Objectives

Participant will be able to:

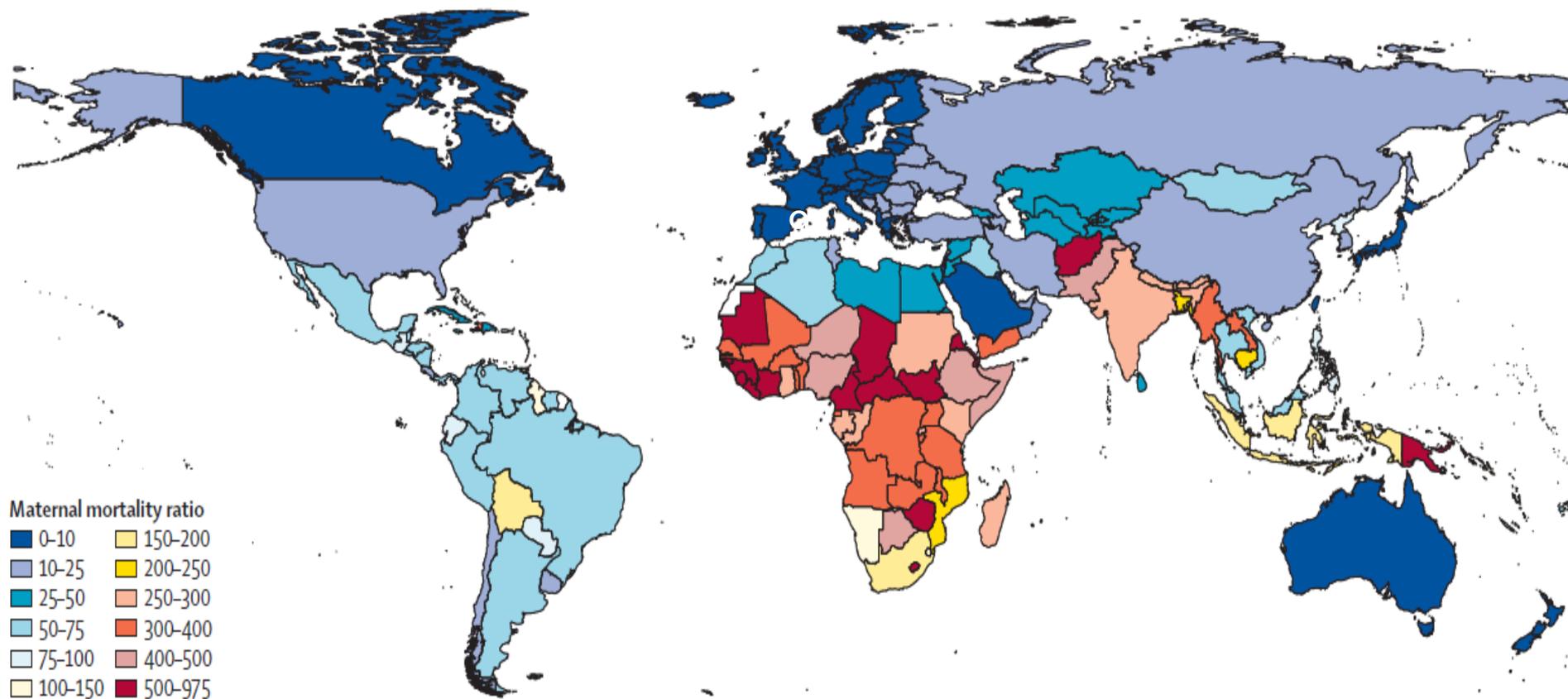
1. Discuss the current trends in maternal morbidity and mortality in Texas and nationally.
2. Describe the purpose of the DSHS Maternal Mortality and Morbidity Review Task Force.
3. Compare and contrast the best practices and outcomes from other state mortality review processes.

# Healthy Texas Babies: Maternal Mortality and Morbidity Review

Lisa M. Hollier, MD, MPH, FACOG  
Chair, DSHS Maternal Mortality and  
Morbidity Review Task Force

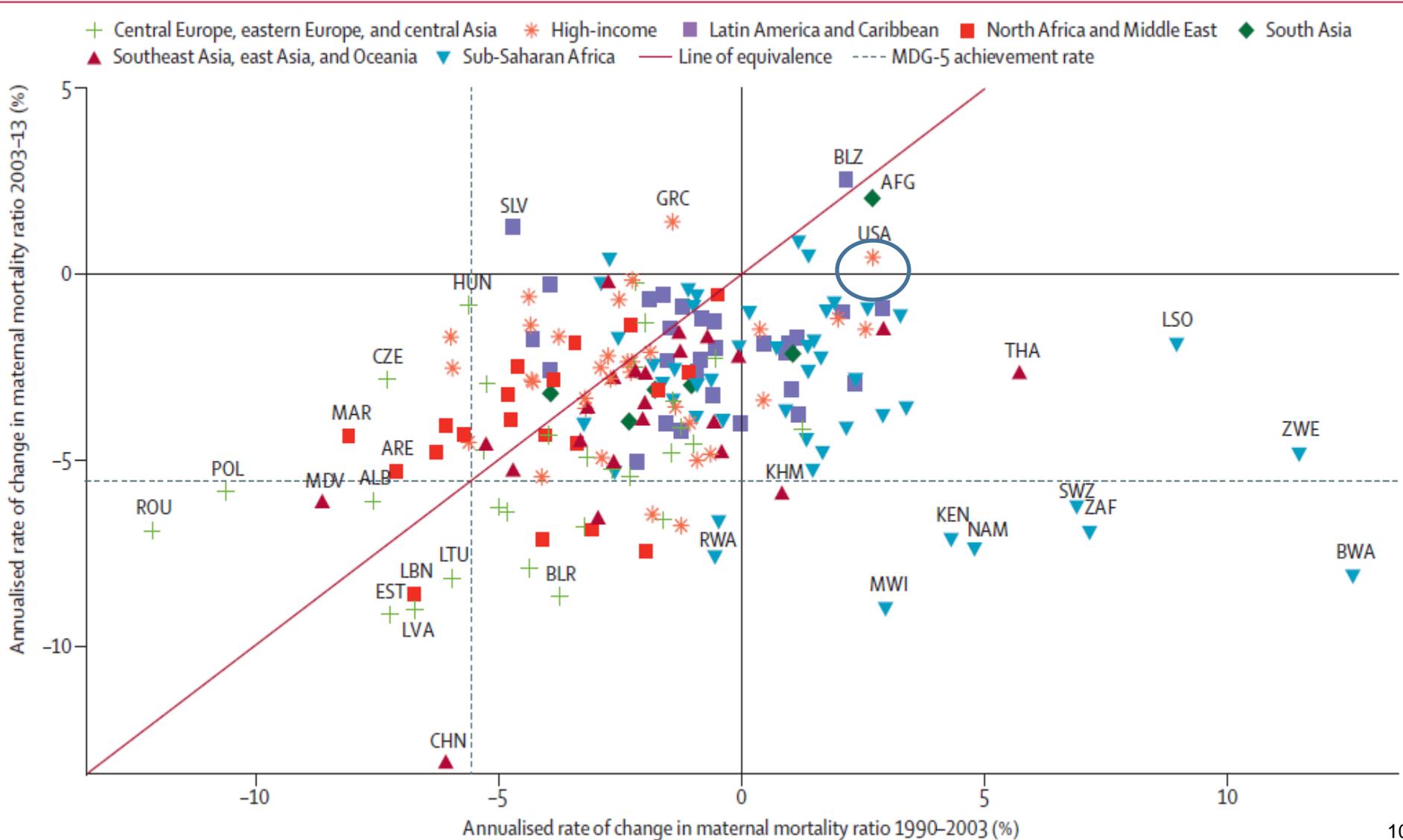


# Maternal Mortality Worldwide

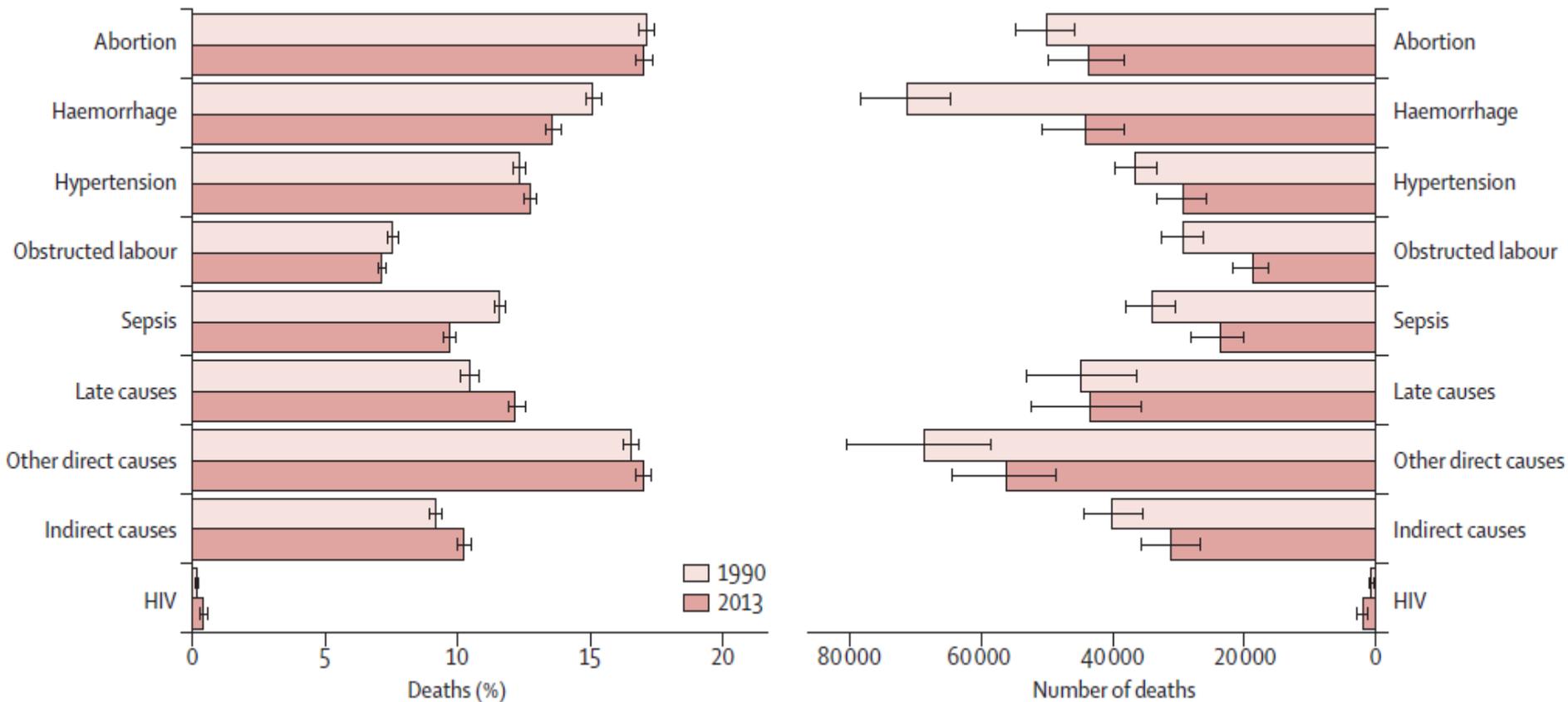


Kassebaum NJ. The Lancet. 2014

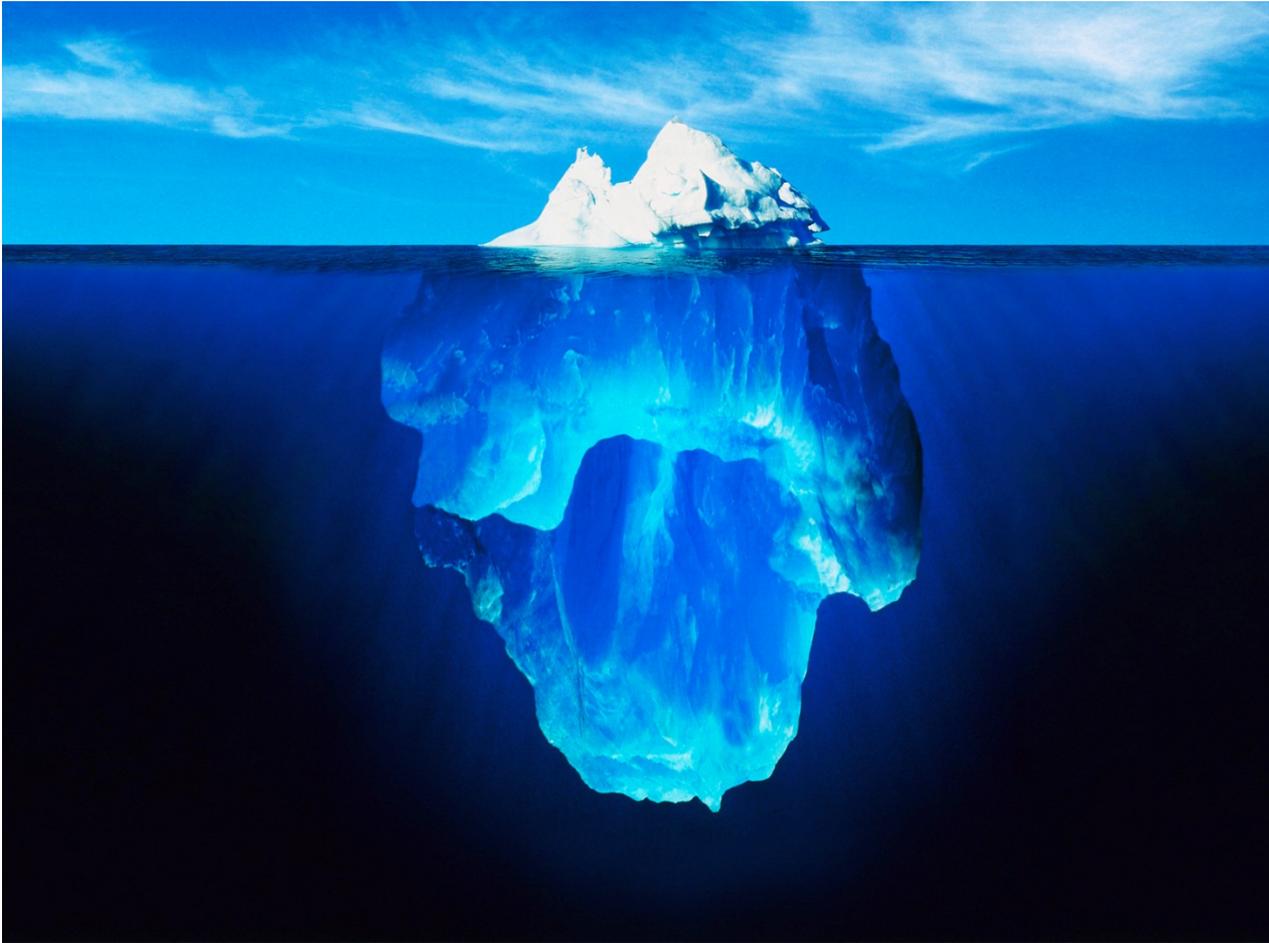
# Maternal Mortality Worldwide



# World Wide Causes of Death



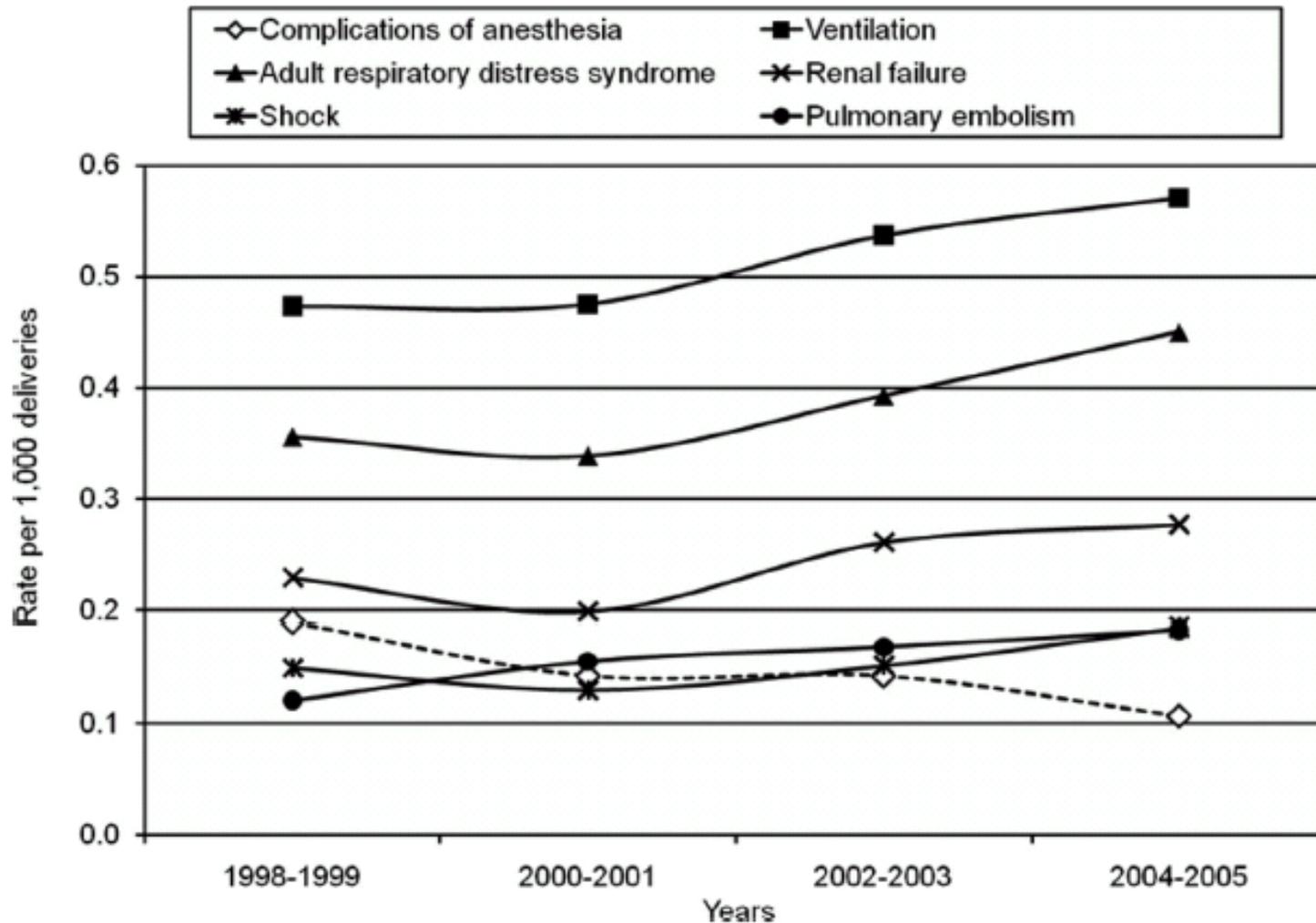
Mortality is the “tip of the iceberg”



# Severe Maternal Morbidity

- For every woman who dies, about 50 more suffer a severe complication or a near miss.
  - Link between maternal mortality, particularly preventable maternal deaths, and severe maternal morbidity
- Prevalence of delivery hospitalizations in which a woman suffered severe morbidity increased by 27% to affect approximately 34,000 women in the United States each year
  - From 6.4 per 1,000 delivery hospitalizations in 1998-1999 to 8.1 per 1,000 deliveries in 2004-2005

# Severe Maternal Morbidity



# Maternal Complications

- 1.3 million US women each year face a complication in pregnancy or childbirth that has an adverse effect on their health
- One in four California women experienced complications during childbirth hospitalization and non-white women were more likely to suffer morbidity
- Research also indicates that approximately 30% to 40% of near misses in the United States are preventable

# Continuum of Morbidity and Mortality

- Percentage contribution of causative factors somewhat different, though hemorrhage and hypertensive diseases were near the top
- Probability of progression along the morbidity/mortality continuum was significantly related to preventability.
- Association specifically due to provider factors, incomplete or inappropriate management, as opposed to system or patient factors

# Severe Maternal Morbidity

**Table IV** The relationship between types of preventability and clinical diagnosis with different points on the morbidity/mortality continuum\*

	Overall comparison	Death vs near miss		Near miss vs other severe morbidity	
	<i>P</i> value	Odds ratio	95% CI	Odds ratio	95% CI
System factors	.96	0.84	0.14-4.87	1.20	0.33-4.33
Provider factors	<.01	1.71	0.31-9.34	4.22	1.41-12.66
Patient factors	.49	0.34	0.05-2.29	1.82	0.51-6.54
Diagnosis	<.01				
Cardiac		11.93	1.00-149.06	0.49	0.07-3.58
Hemorrhage (ref)		—			
Infection		0.89	0.12-6.83	1.24	0.30-5.21
PIH		0.79	0.09-6.95	0.15	0.04-0.58
Other <sup>†</sup>		9.58	1.46-62.83	1.05	0.23-4.74

\* The estimates for types of preventability and diagnosis shown here were adjusted for race/ethnicity (overall *P* = .82), maternal age (overall *P* = .76), parity (overall *P* = .18), marital status (overall *P* = .06), and insurance status (overall *P* = .01).

<sup>†</sup> CVA, embolism, renal, and other medical conditions.

# Costs of Complications

- Childbearing women and newborns account for nearly one quarter of all hospital stays in the United States each year, making childbirth by far the most common reason for hospitalization.
- In the state of Texas in 2011, Medicaid covered the cost of 56% of births and costs for pregnancy and newborn care in Texas accounted for 16% of Medicaid expenditures.

# Cost of Complications

- Data from a 2002 U.S. study
  - High blood pressure during pregnancy
    - Associated with an average hospital stay of 3.5 days
    - Average total cost per stay of \$9,800 compared to \$5,774 for a normal pregnancy and delivery
  - Premature rupture of membranes
    - Average length of stay in hospital of 12.6 days
    - Average charges of \$20,753 (1997 dollars) per woman.

# Costs of Complications

- From 1996 to 2006, the number of women diagnosed with postpartum hemorrhage increased by 36%, resulting in an average increase in expenditures of \$3,277 per woman affected.
- Total expenditures for postpartum hemorrhage rose from \$5 million in 1996 to \$9.1 million in 2006.

# Costs of Complications

- The value of a life lost to premature mortality has significant “costs” associated with it
  - U.S. Health and Human Services agencies estimate the cost of a woman’s death to be between three and five million dollars.

# Reviewing Maternal Death

- Assessment of maternal deaths occurs at multiple levels and for multiple primary purposes.
  - Hospital-based mortality reviews, including root cause analyses

# Reviewing Maternal Death

- Intrapartum maternal deaths (related to the birth process)
  - Sentinel events that are reviewable under The Joint Commission's Sentinel Event Policy
  - Important practice that can identify problems that need to be addressed in that particular facility

# Reviewing Maternal Death

- Approximately 28 states have active committees for the purpose of maternal mortality case review
  - California and Florida have long standing programs with demonstrated success
  - State-based maternal mortality review can systematically combine reviews of all the deaths in the state
    - More robust analysis to identify systemic problems
    - Provide a baseline that can be used in monitoring interventions that are implemented

# Results into Action

- Maternal mortality review process in the United Kingdom is referred to as “Enquiry”.
  - Processes arose from the efforts of concerned local obstetricians, midwives, and public health officials more than a hundred years ago.
  - Overwhelming strength of successive Enquiry Reports has been the impact their findings have had on maternal and newborn health in the United Kingdom.

# Results into Action -- Success

- Royal College of Obstetricians and Gynaecologists (RCOG) and the National Institute for Clinical Excellence have published a range of evidence-based national clinical guidelines, many of which have arisen from recommendations made in Saving Mothers' Lives reports.

# Results into Action

- Sharpest fall in maternal mortality was in deaths from thromboembolism after introduction of the 2004 RCOG national guideline “Thromboprophylaxis during pregnancy, labour and after normal vaginal delivery.”
- A second example is the sharp decline in maternal deaths in the late 1990s, which followed an earlier RCOG guideline on thromboprophylaxis after cesarean delivery.

# Results into Action -- Success

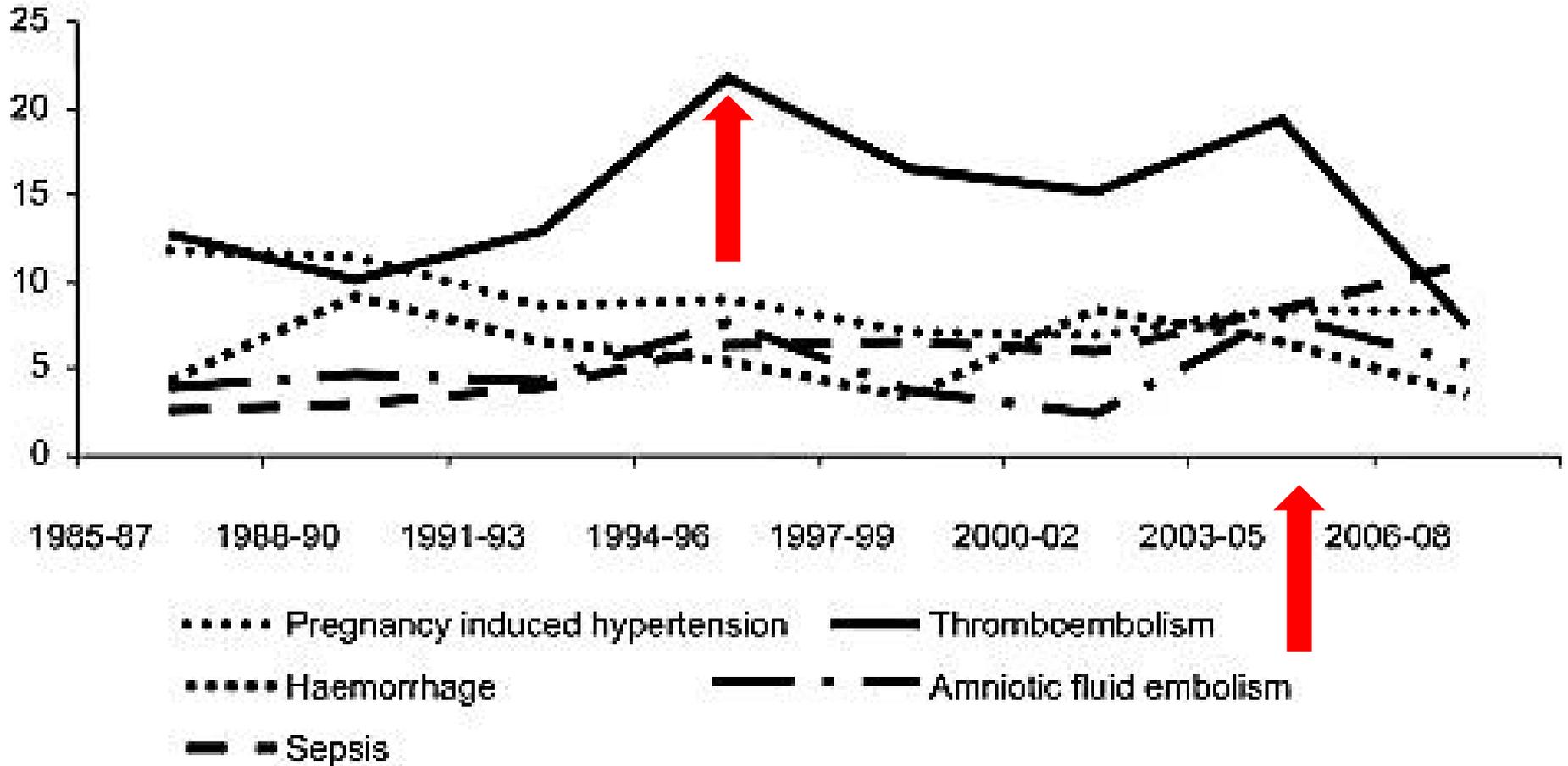


Figure 2 Direct death rates by cause, per 100,000 maternities: UK 1985-2008

**Saving Mothers' Lives: The Continuing Benefits for Maternal Health From the United Kingdom (UK) Confidential Enquires Into Maternal Deaths**

# Results into Action

Volume 118, Supplement 1, March 2011

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**BJOG**  
An International Journal of  
Obstetrics and Gynaecology

## **Saving Mothers' Lives**

**Reviewing maternal deaths to make  
motherhood safer: 2006–2008**



# Results into Action -- Success

- Decline in deaths from suicide following the introduction of national guidelines which made recommendations for the prediction, detection and treatment of mental disorders in women during pregnancy and the postnatal period (up to 1 year after delivery).

# HB 1085/SB 495

- Texas Maternal Mortality and Morbidity Review Task Force legislation
  - Introduced by State Representative Armando Walle and State Senator Joan Huffman

# Task Force

The task force shall

- Study and review
  - (A) Cases of pregnancy-related deaths
  - (B) Trends in severe maternal morbidity
- Determine the feasibility of the task force studying cases of severe maternal morbidity
- Make recommendations to help reduce the incidence of pregnancy-related deaths and severe maternal morbidity in this state

# Task Force

- **Composition**

- Four physicians specializing in obstetrics, at least one of whom is a maternal fetal medicine specialist
- One certified nurse-midwife
- One registered nurse
- One physician specializing in family practice
- One physician specializing in psychiatry
- One physician specializing in pathology
- One epidemiologist, biostatistician, or researcher of pregnancy-related deaths
- One social worker or social service provider
- One community advocate in a relevant field
- One medical examiner or coroner responsible for recording deaths
- A representative of the department's family and community health programs
- The state epidemiologist for the department or the epidemiologist's designee

# Key Elements

- The department and task force may consult with any relevant experts and stakeholders, including:
  - Anesthesiologists
  - Intensivists or critical care physicians
  - Substance abuse treatment specialists
  - Hospital staff or employees
  - Paramedics or other emergency medical response personnel
  - Hospital-based risk management specialists
  - Public health experts
  - Law enforcement officials

# Key Elements

- Review process is confidential
  - Examples: California and Florida
    - Trained nurses abstract each record which allows the case to be completely de-identified with regard to location, hospital, physician, and patient

# For the Future

- GOAL:
  - Reduction in maternal mortality and severe morbidity
  - Reduction in ethnic disparities in maternal morbidity and mortality

# Understanding Maternal Mortality & Morbidity in Texas

Dorothy Mandell, PhD  
Epidemiologist  
Office of Program  
Decision Support, DSHS



*Special thank you to:*

*Sonia Baeva, MA*

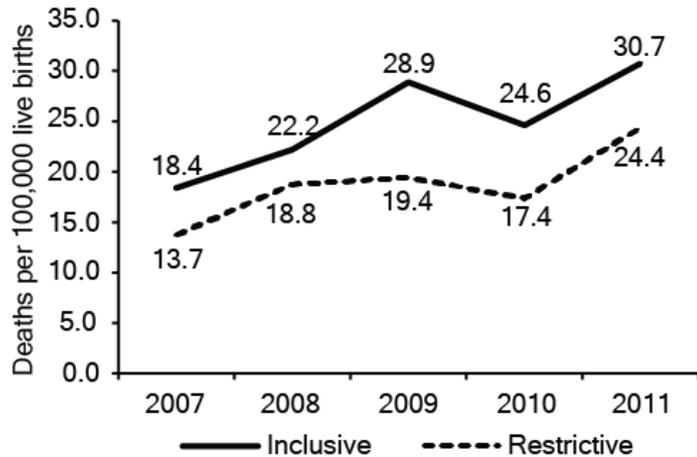
*Epidemiologist*

*Office of Program Decision Support*

*Family and Community Health Services*

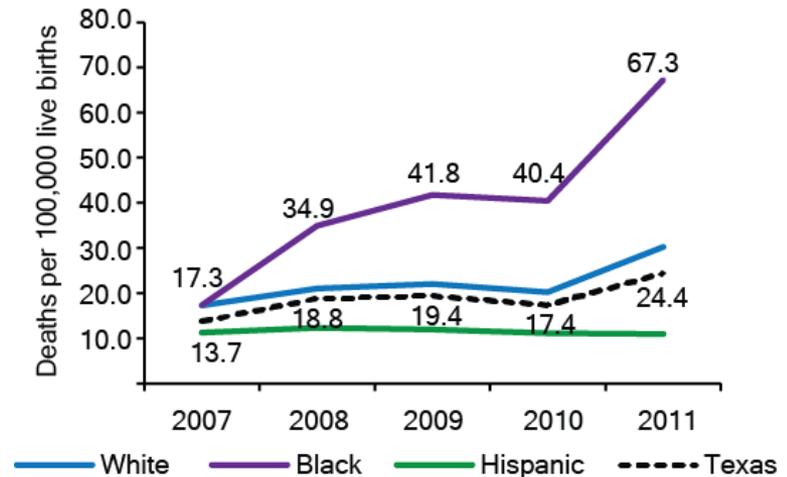
# Maternal Mortality Rates in Texas

Maternal Mortality Rate in Texas 2007-2011: Differences between Vital Statistics Definitions Inclusive of All Obstetrics Codes and Restricted Based on the Pregnancy Checkbox



Source: Vital Statistics Death Files  
Prepared by: Office of Program Decision Support, FCHS, DSHS, 2014

Maternal Mortality Rate by Race/Ethnicity, Texas 2007-2011



Source: Vital Statistics Death Files: ICD10 O00-O959, O98-O999, A34 & Check Box  
Prepared by: Office of Program Decision Support, FCHS, DSHS, 2014

# M3FT: Pregnancy-Related Death Identification

## Inclusion

- Women with “currently pregnant” check box at time of death
- Women successfully matched to a live birth file or a fetal death file

## Exclusions

- Motor Vehicle Deaths
- Cancer Deaths
- Women older than 50 years old
- Deaths occurring more than 365 days after delivery

## Matching Results:

2011 Death Cohort: 145

2012 Death Cohort: 150

137 w/live birth &

158 checkbox

# 2012 & 2011 Maternal Death Cohort\*: Characteristics

\*women with a live birth

## 2011 Birth File

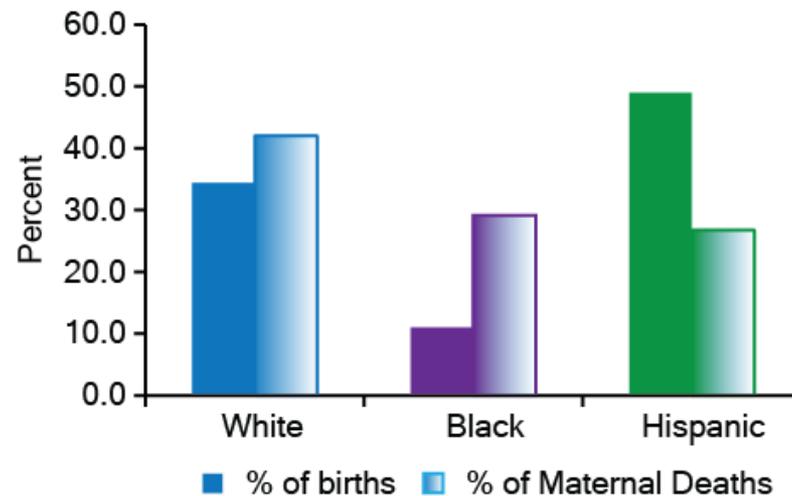
- Caesarian Sections:
  - 21.6% Primary
  - 13.7% Repeat
- Obesity
  - 23.2%
- First Trimester Prenatal Care
  - 62.4%
- Hypertension
  - 6.3%
- Diabetes
  - 4.9%

## 2012 & 2011 Death Cohort

- Caesarian Sections:
  - 30.7% Primary
  - 22.6% Repeat
- Obesity
  - 29.3%
- First Trimester Prenatal Care
  - 57.7%
- Hypertension
  - 19.0%
- Diabetes
  - 13.1%

# 2012 & 2011 Maternal Death Cohort: Characteristics

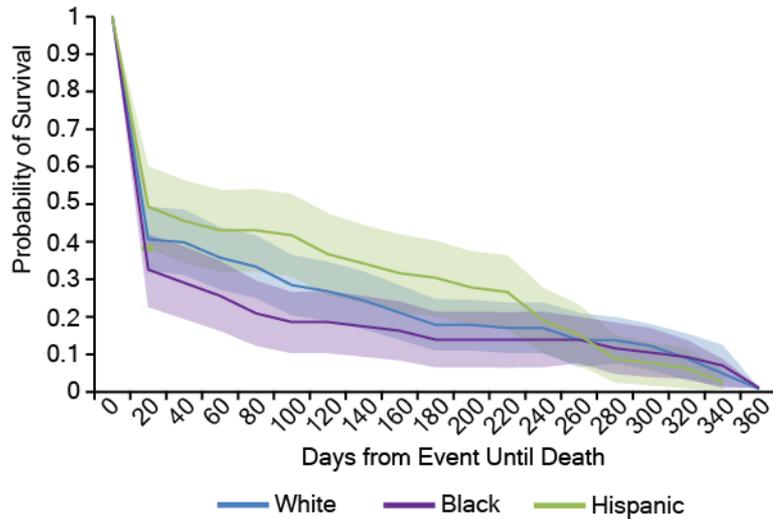
Representation of Racial/Ethnic Groups in Birth File  
and Maternal Death Cohort



Source: Linked Death-Birth Files, 2011 & 2012 Maternal Death Cohorts  
Prepared by: Office of Program Decision Support, FCCHS, DSHS, 2014

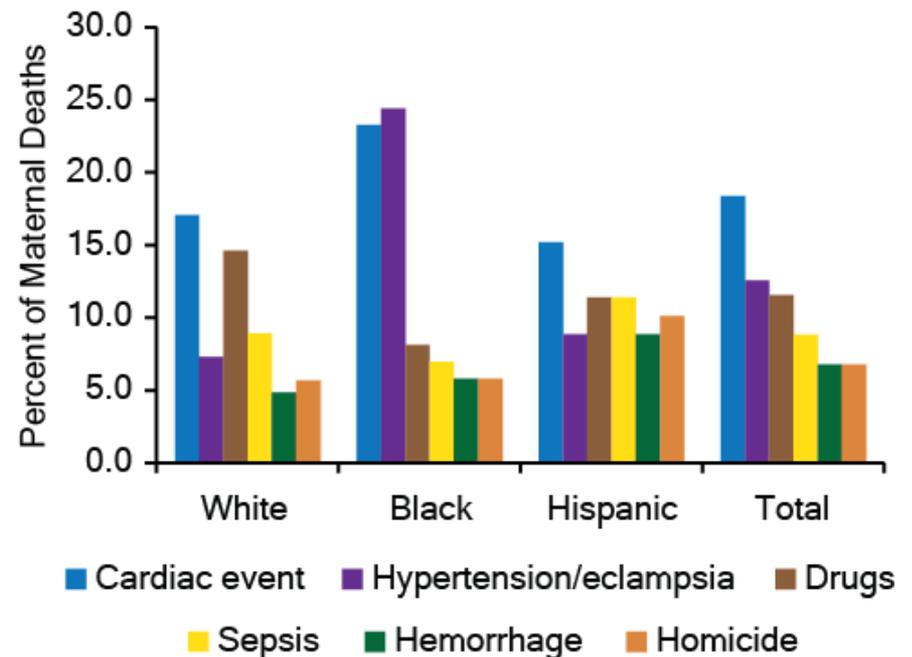
# Racial/Ethnic Differences in 2011 & 2012 Maternal Death Cohorts

2011 & 2012 Maternal Death Cohorts, Survival Time by Race/Ethnicity



Source: Linked Death-Birth Files, 2011 & 2012 Maternal Death Cohorts  
Prepared by: Office of Program Decision Support, FCHS, DSHS, 2014

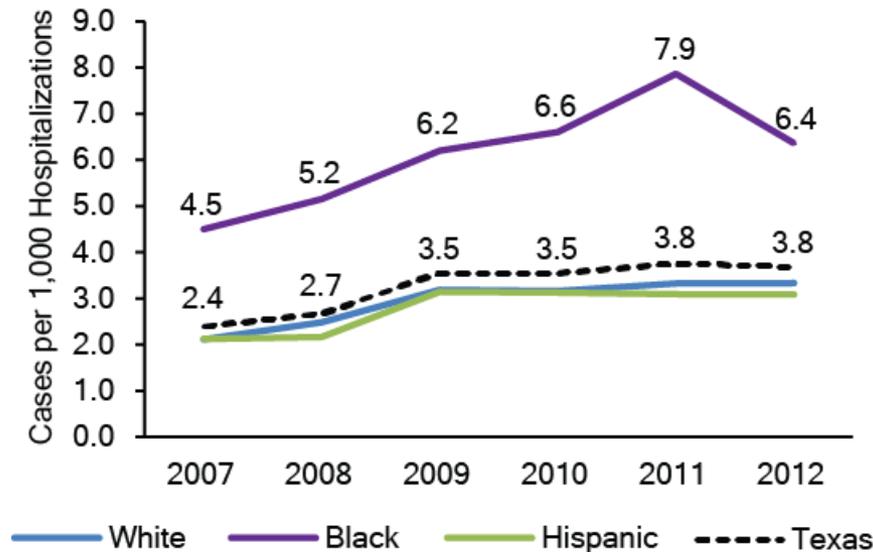
2011 & 2012 Maternal Death Cohorts, Six Most Prevalent Causes of Death by Race/Ethnicity



Source: Linked Death-Birth Files, 2011 & 2012 Maternal Death Cohorts  
Prepared by: Office of Program Decision Support, FCHS, DSHS, 2014

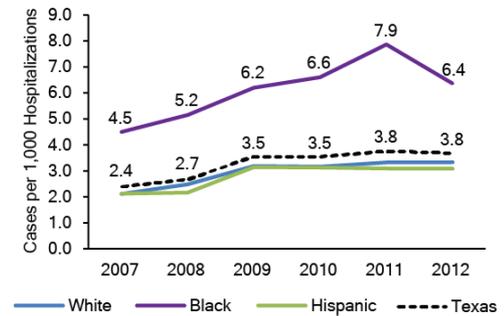
# Severe Maternal Morbidity: 2007-2012

Texas 2007-2012 Severe Maternal Morbidity Rate  
by Race/Ethnicity

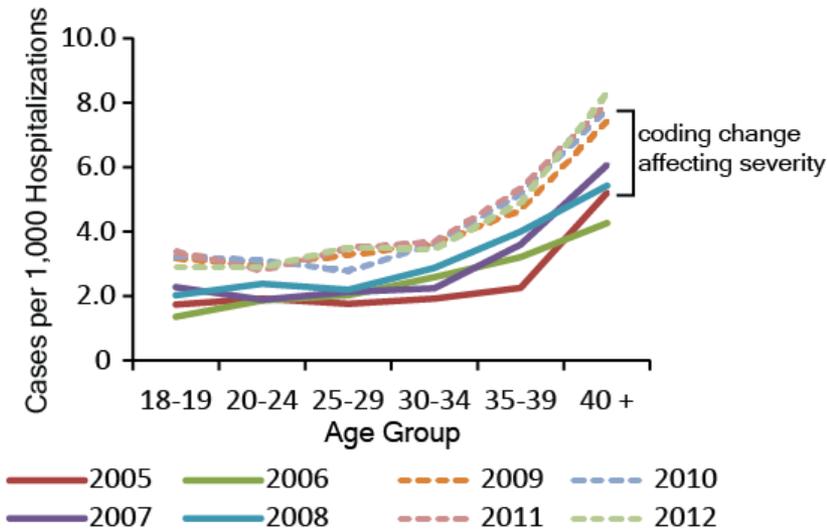


Source: 2007-2012 Texas Hospital Discharge Public Use Data:  
Risk of Mortality High & Extreme for Identified Deliveries  
Prepared by: Office of Program Decision Support, FCHS, DSHS, 2014

# Morbidity: Age & Race/Ethnicity

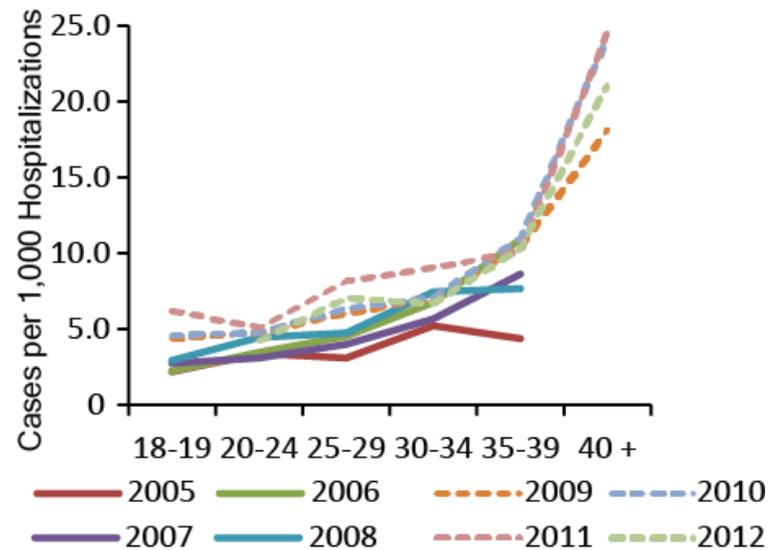


2005-2012 Distribution of Severe Morbidity by Age Group



Source: 2005-2012 Texas Hospital Discharge Public Use Data:  
Risk of Mortality High & Extreme for Identified Deliveries  
Prepared by: Office of Program Decision Support, FCHS, DSHS, 2014

2005-2012 Distribution of Severe Morbidity for Black Women by Age Group



Source: 2005-2012 Texas Hospital Discharge Public Use Data:  
Risk of Mortality High & Extreme for Identified Deliveries  
Prepared by: Office of Program Decision Support, FCHS, DSHS, 2014

# 2011 County-Level Risks for Severe Morbidity

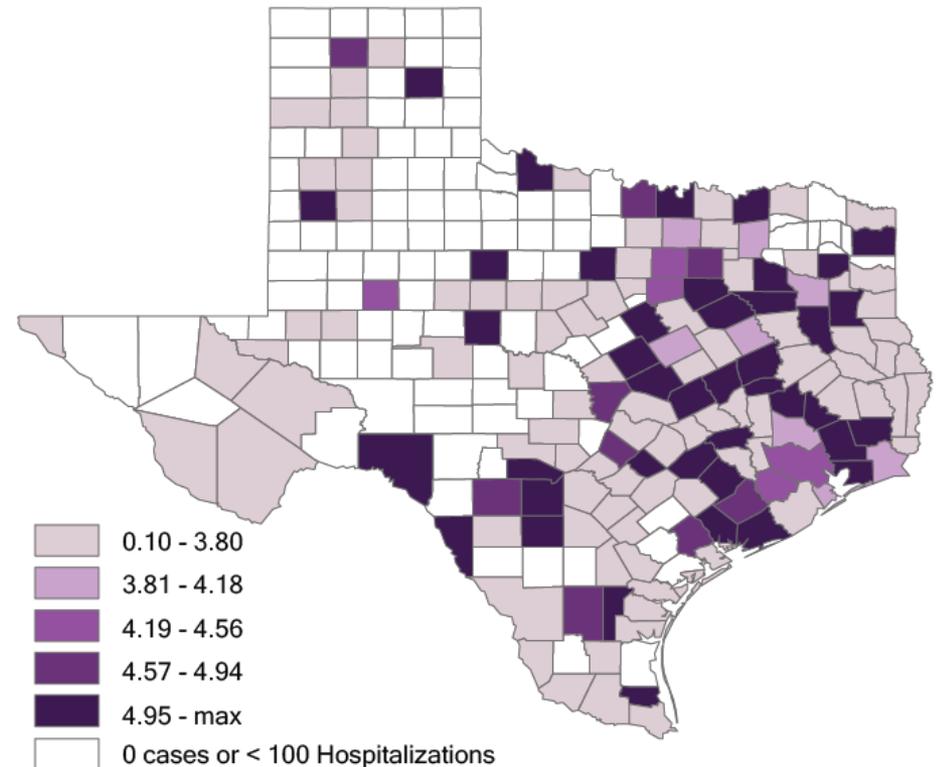
## No Significant Relations:

- Low birth weight
- Preterm birth

## Significant Relations:

- Prenatal Care ( $r^2=.06$ )
- Obesity ( $r^2=.09$ )
- Obesity & PNC ( $r^2=.11$ )

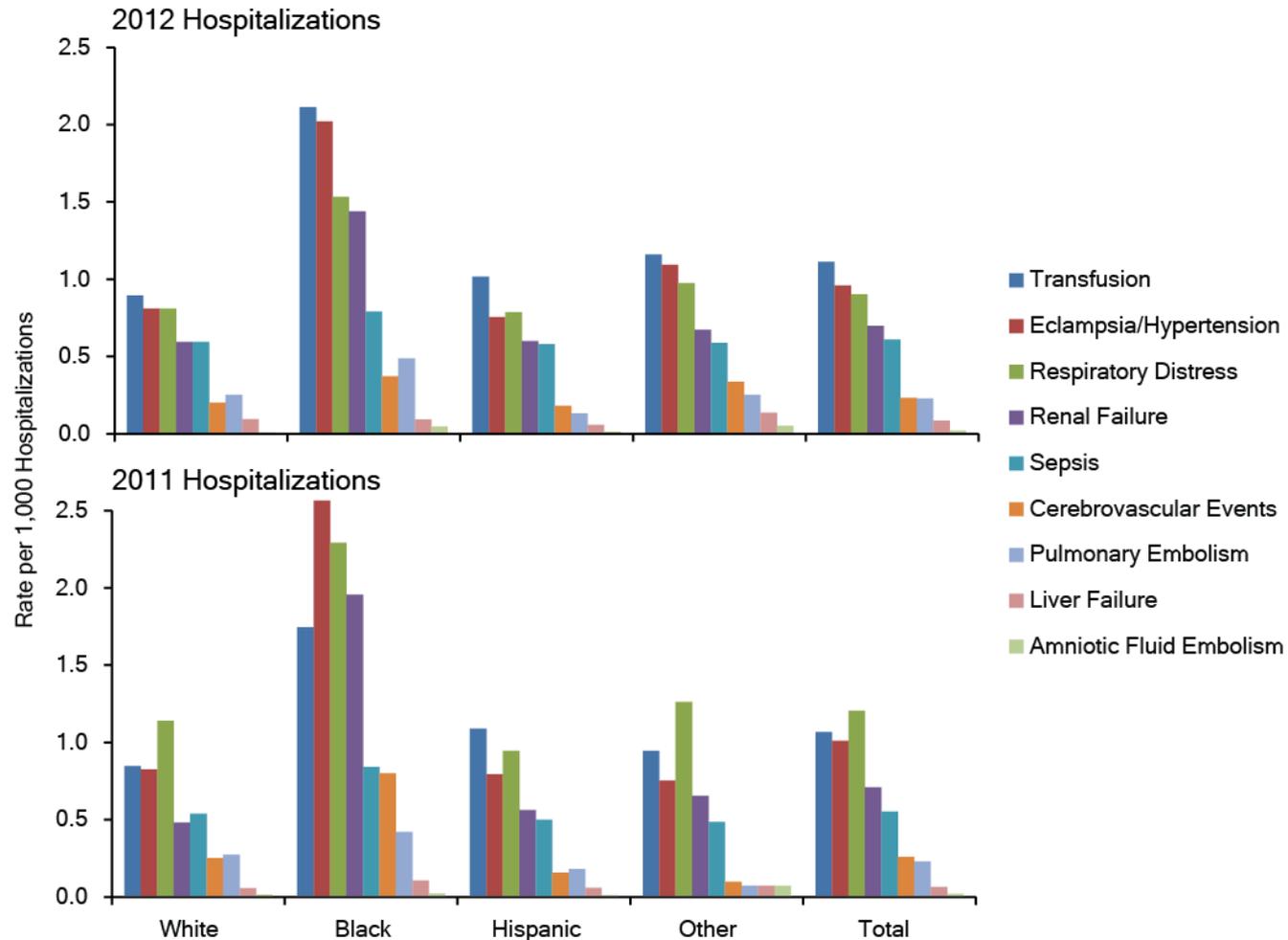
Texas, 2011 Severe Morbidity Rates (per 1,000 Hospitalizations)



Source: Texas Hospital Discharge Public Use Data:  
Risk of Mortality High & Extreme for Identified Deliveries  
Prepared by: Office of Program Decision Support, FCHS, DSHS, 2014

# 2011 & 2012 Severe Morbidity

2011 & 2012, Rates\* of Different Severe Morbidity Diagnoses by Race/Ethnicity



\*Rates are not mutually exclusive as the majority of women have more than one diagnosis

Source: Texas Hospital Discharge Public Use Data:

Risk of Mortality High & Extreme for Identified Deliveries

Prepared by: Office of Program Decision Support, FCHS, DSHS, 2014

# Summary of Findings

## Mortality

- Drug overdoses as the third leading cause of death
- Disparity of the death rate for black women
- Women with late prenatal care, obesity pre-pregnancy, hypertension, or diabetes are over-represented in the identified death cohort

## Morbidity

- Disparity and sharp increase in the morbidity for black women, especially with older women
- Differences between race/ethnicity for leading causes of morbidity
- Concentration of late prenatal care and pre-pregnancy obesity in the county is predictive of the county's morbidity rate

# Questions and Answers



Remote sites can send in questions by typing in the *GoToWebinar* chat box or email [GrandRounds@dshs.state.tx.us](mailto:GrandRounds@dshs.state.tx.us).

For those in the auditorium, please come to the microphone to ask your questions.

Sam B. Cooper III, LMSW-IPR  
Director, Specialized Health  
Services Section, DSHS

# DSHS Grand Rounds Fall Semester 2014

Wednesday, October 8, 2014

Wednesday, October 15, 2014

Wednesday, October 22, 2014

Wednesday, October 29, 2014

Wednesday, November 5, 2014

Wednesday, November 12, 2014

