



The Epidemiology of Infant Mortality in Ohio: An Overview

Elizabeth J. Conrey, RD, PhD

State Maternal and Child Health Epidemiologist

Acknowledgements

- ODH Center for Public Health Statistics and Informatics
 - John Paulson
 - Connie Geidenberger
 - Carrie Hornbeck
 - John Bonza
 - Ken Plunkett
- State Epidemiology Office

Overview

- Ohio: 8th highest Infant Mortality Rate in US
- Higher rates in some areas of state
- Predominantly black/white (97%)
- Large feto-infant mortality disparity
- No mortality rate change in last decade
- Disparity due more to birth weight distribution than birth weight specific mortality
- Greatest opportunities for improving feto-infant mortality
 - maternal health
 - infant care

Reported Vital Events

Conception

Live Birth

1 Year

Gestation

Infancy

20 wks

28 days

1

2

5

3

4

6

Fetal Death

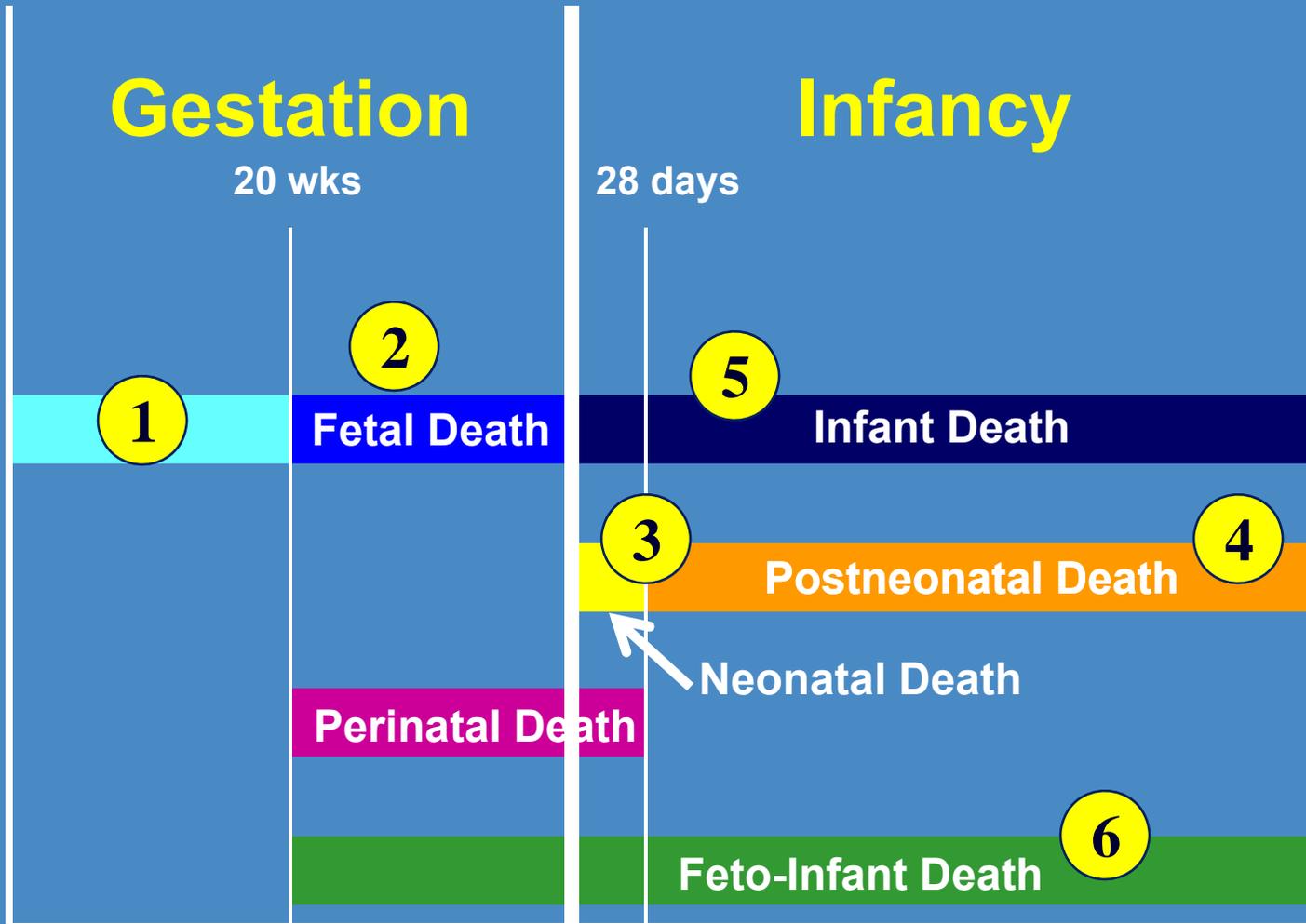
Infant Death

Postneonatal Death

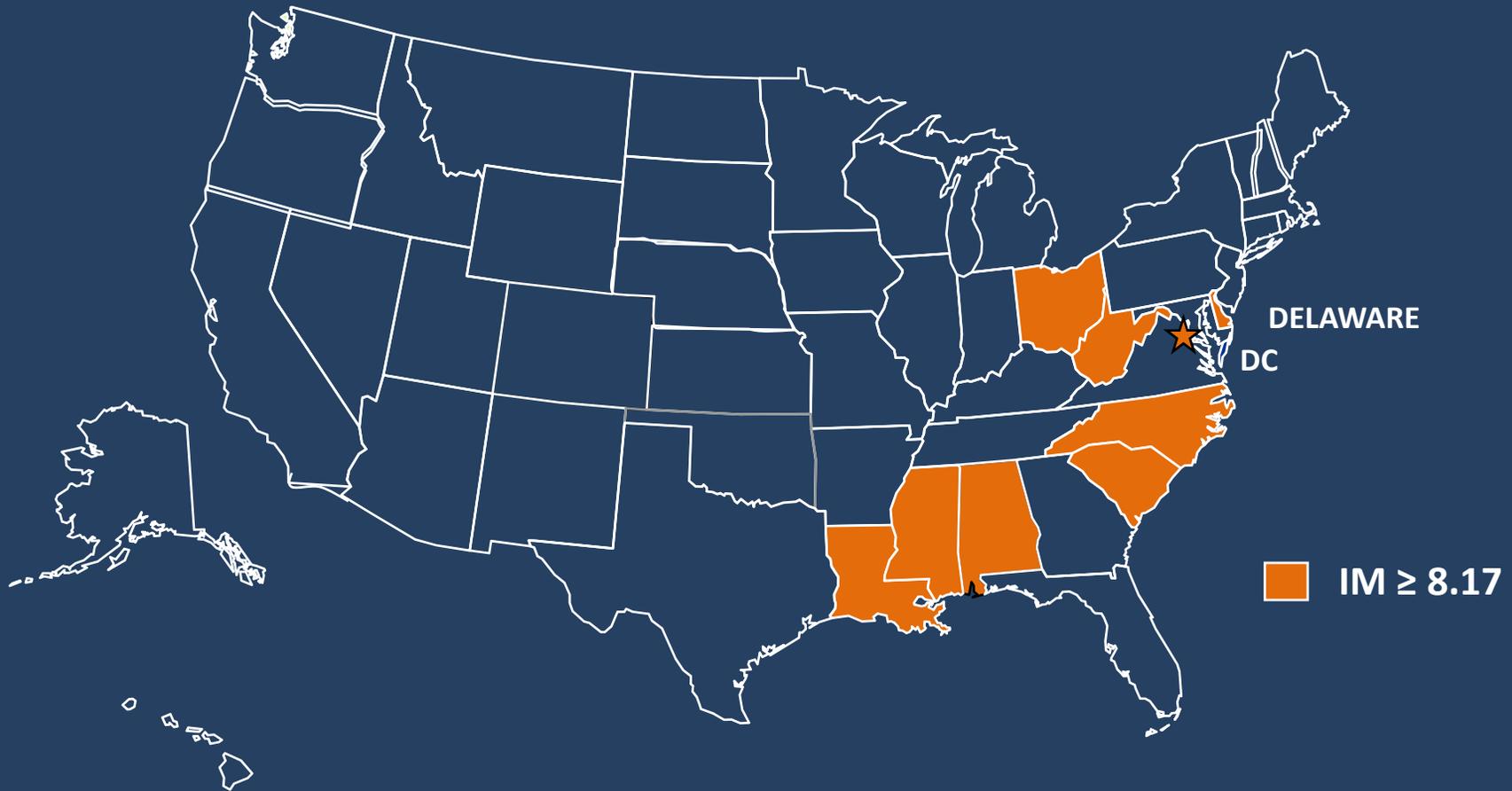
Perinatal Death

Neonatal Death

Feto-Infant Death



Highest 10 Infant Mortality Rates— US, 2005

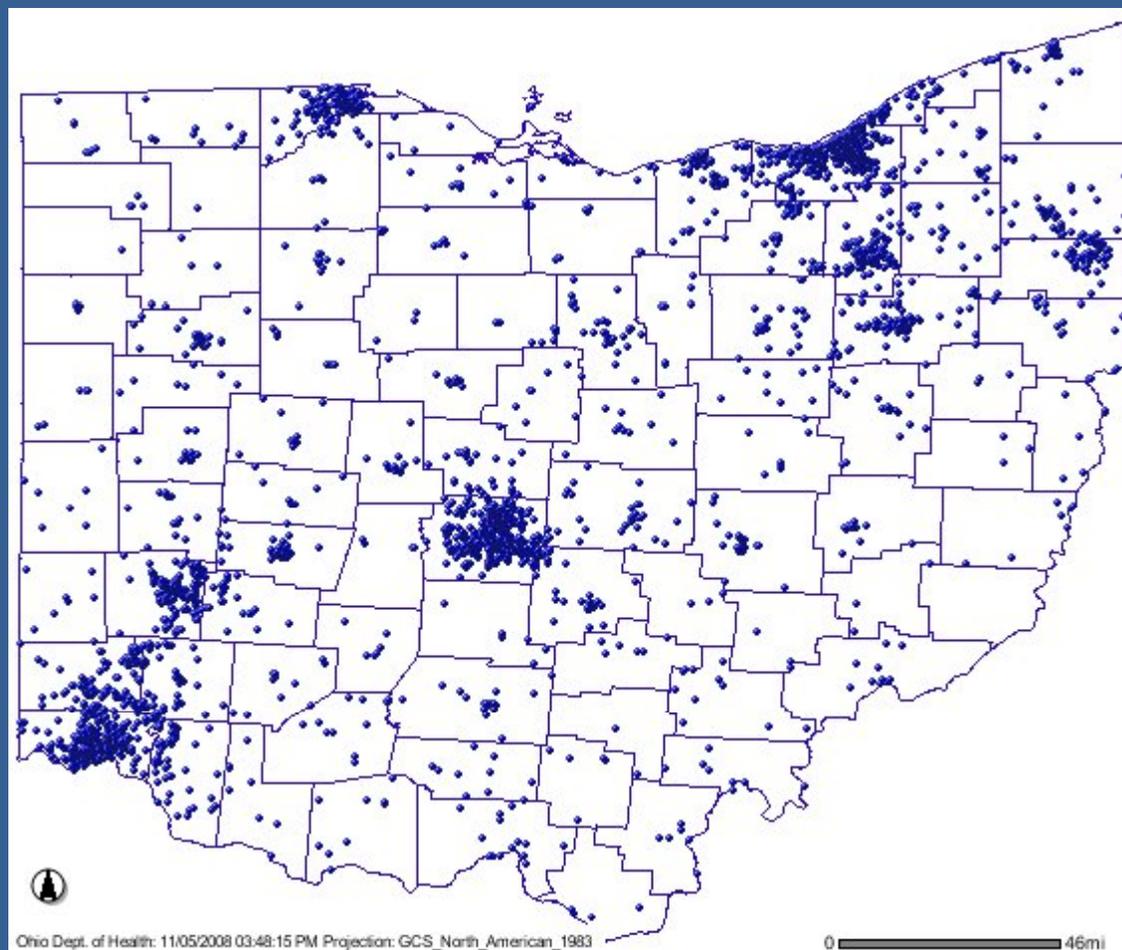


Source: National Center for Health Statistics

Infant Mortality Rankings – 1960-2002, Developed Countries

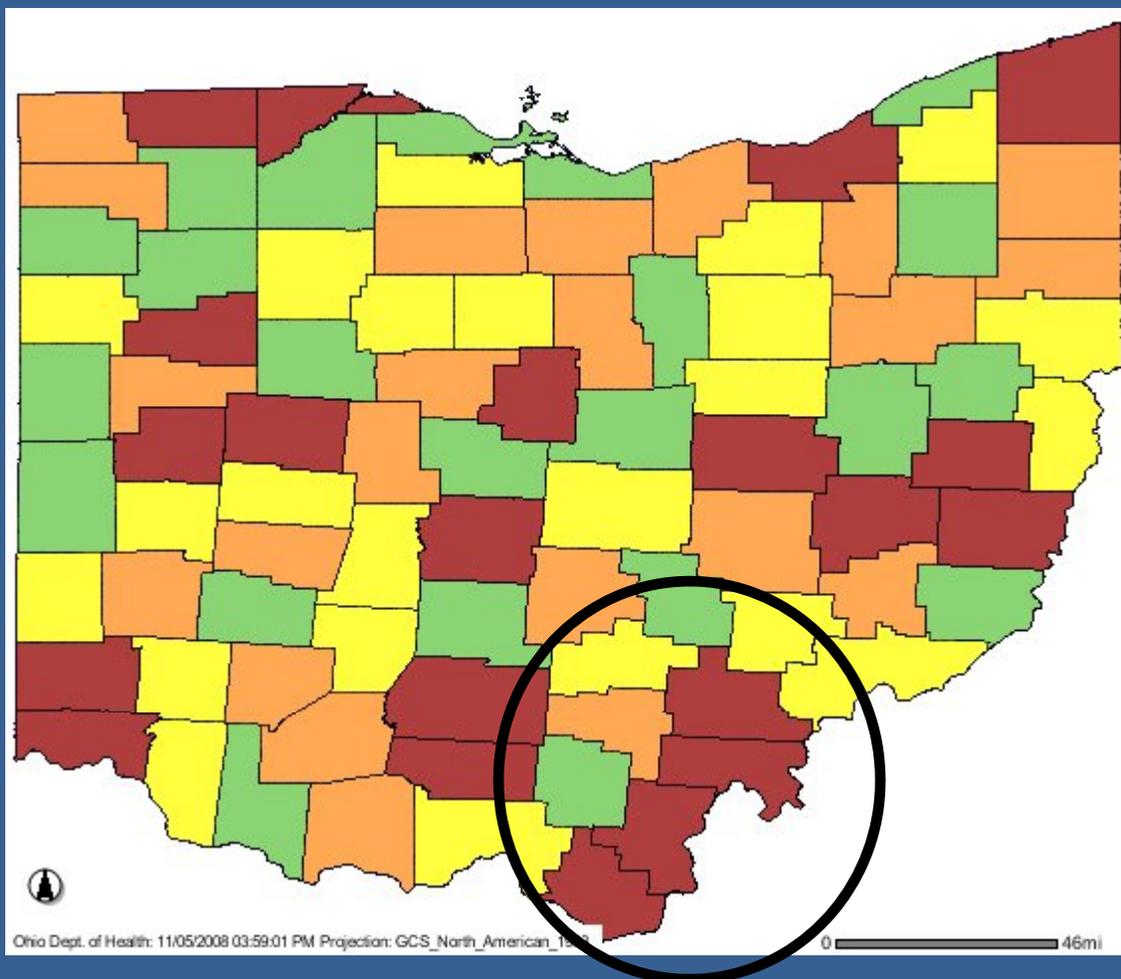
	1960	1970	1980	1990	2000	2004
1	Sweden	Sweden	Sweden	Japan	Singapore	Singapore
2	Netherlands	Netherlands	Japan	Finland	Hong Kong	Hong Kong
3	Norway	Norway	Finland	Sweden	Japan	Japan
4	Czech Rep.	Japan	Norway	Hong Kong	Sweden	Sweden
5	Australia	Finland	Denmark	Singapore	Finland	Norway
6	Finland	Denmark	Netherlands	Switzerland	Norway	Finland
7	Switzerland	Switzerland	Switzerland	Canada	Spain	Spain
8	Denmark	New Zealand	France	Norway	Czech Rep.	Czech Rep.
9	Eng. & Wales	Australia	Canada	Germany	Germany	France
10	New Zealand	France	Australia	Netherlands	Italy	Portugal
11	United States	Engl. & Wales	Ireland	France	France	Germany
12	Scotland	Canada	Hong Kong	Denmark	Austria	Italy
13	N. Ireland	Israel	Singapore	N. Ireland	Belgium	Greece
14	Canada	Hong Kong	Engl. & Wales	Spain	Switzerland	Netherlands
15	France	Ireland	Scotland	Scotland	Netherlands	Switzerland
16	Slovakia	Scotland	Belgium	Austria	N. Ireland	Belgium
17	Ireland	United States	Spain	Engl. & Wales	Australia	Denmark
18	Japan	Czech Rep.	Germany	Belgium	Canada	Israel
19	Israel	Belgium	United States	Australia	Denmark	Austria
20	Belgium	Singapore	New Zealand	Ireland	Israel	Australia
21	Singapore	Germany	N. Ireland	Italy	Portugal	Ireland
22	Germany	N. Ireland	Austria	New Zealand	Engl. & Wales	Scotland
23	Cuba	Slovakia	Italy	United States	Scotland	Engl. & Wales
24	Austria	Austria	Israel	Greece	Greece	Canada
25	Greece	Bulgaria	Czech Rep.	Israel	Ireland	N. Ireland
26	Hong Kong	Puerto Rico	Greece	Cuba	New Zealand	New Zealand
27	Puerto Rico	Spain	Puerto Rico	Czech Republic	United States	Cuba
28	Spain	Greece	Cuba	Portugal	Cuba	Hungary
29	Italy	Italy	Bulgaria	Slovakia	Poland	Poland
30	Bulgaria	Hungary	Costa Rica	Puerto Rico	Slovakia	United States
31	Hungary	Poland	Slovakia	Bulgaria	Hungary	Slovakia
32	Poland	Cuba	Russian Fed.	Hungary	Puerto Rico	Puerto Rico
33	Costa Rica	Romania	Hungary	Costa Rica	Costa Rica	Chile
34	Romania	Portugal	Portugal	Chile	Chile	Costa Rica

Geographic Location of Infant Deaths— Ohio, 2004-6



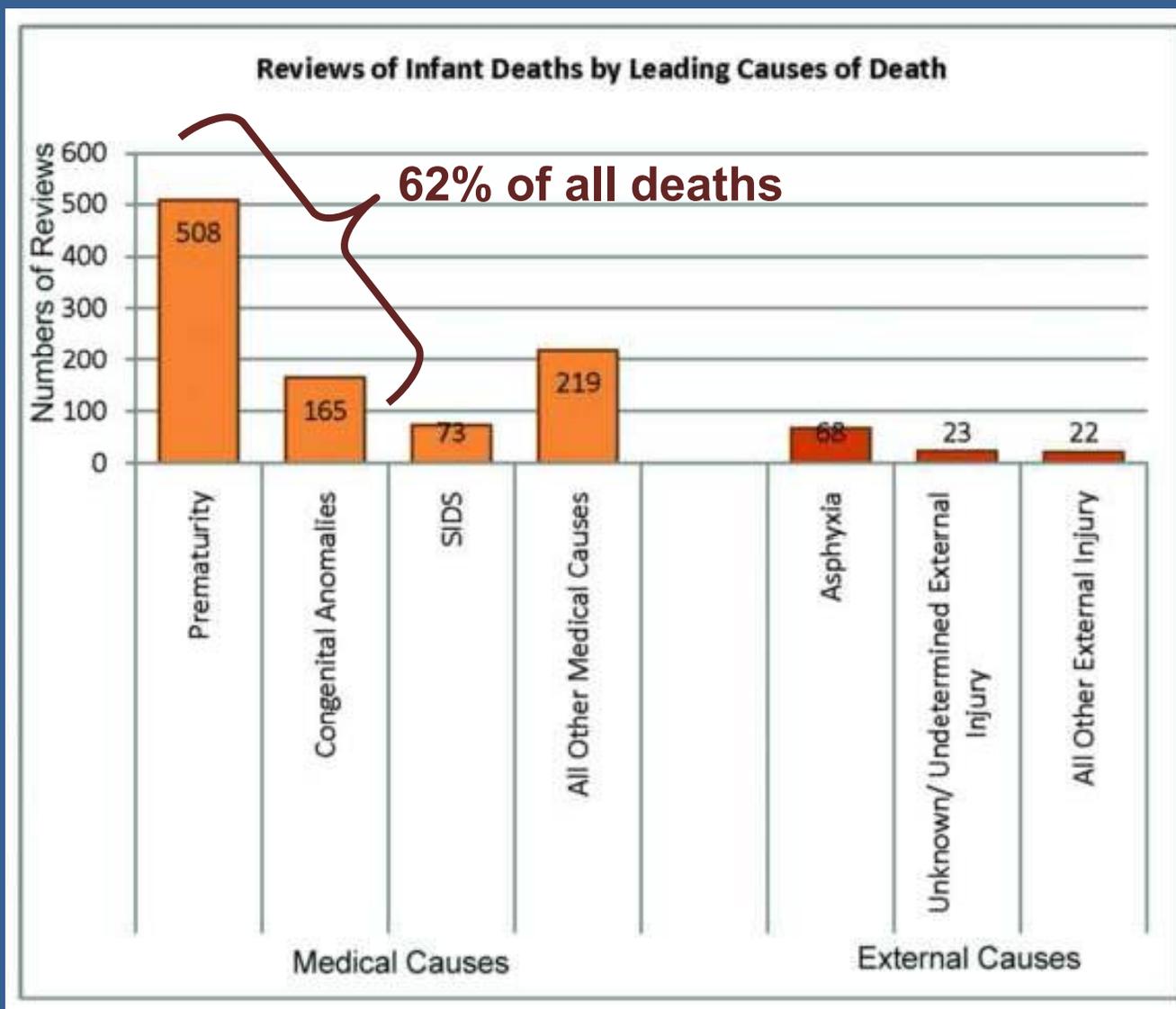
Source: Ohio Public Health Analysis Network (OPHAN) and Ohio Vital Statistics. From 2004 through 2006, 3,535 infant deaths occurred in Ohio, however, 346 death certificates were not able to be geocoded beyond the county level and are not included in this illustration.

Infant Mortality Rate by County Quartiles— Ohio, 2004-6

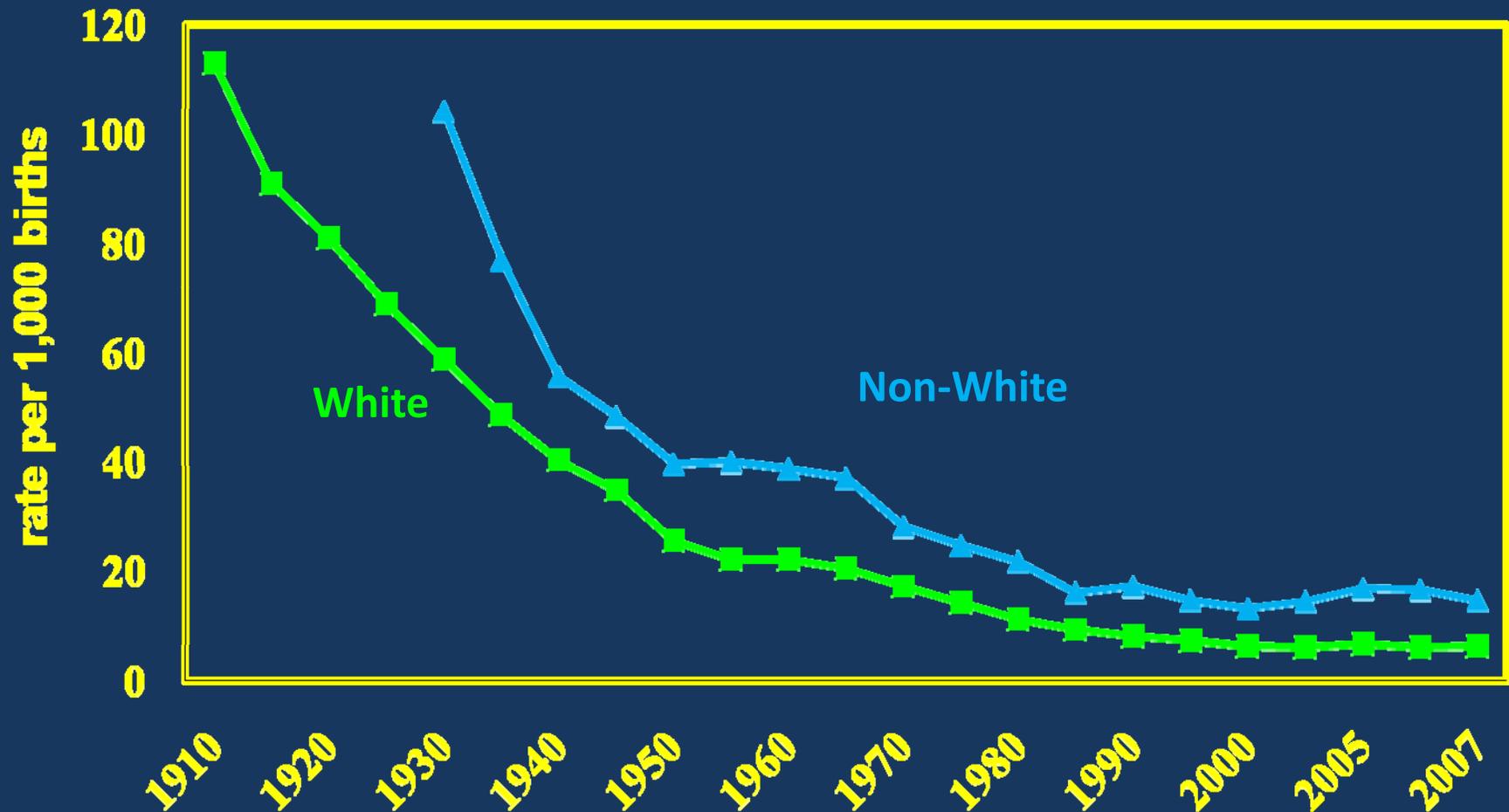


From 2004 through 2006, 3,535 infant deaths occurred in Ohio, however, 346 death certificates were not able to be geocoded beyond the county level and are not included in this illustration

Child Fatality Review– Ohio, 2006

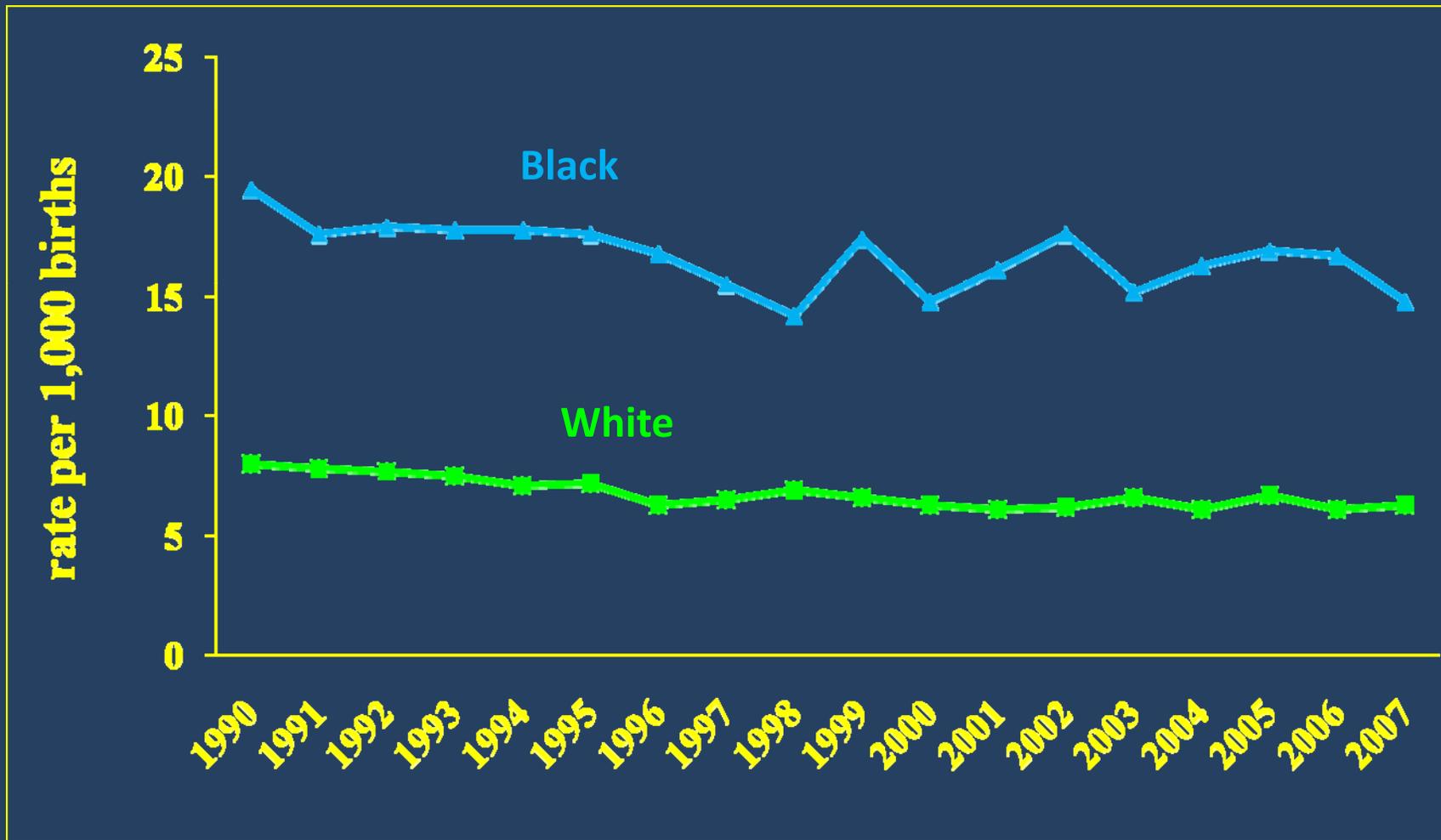


Infant Mortality by Race— Ohio, 1910-2005

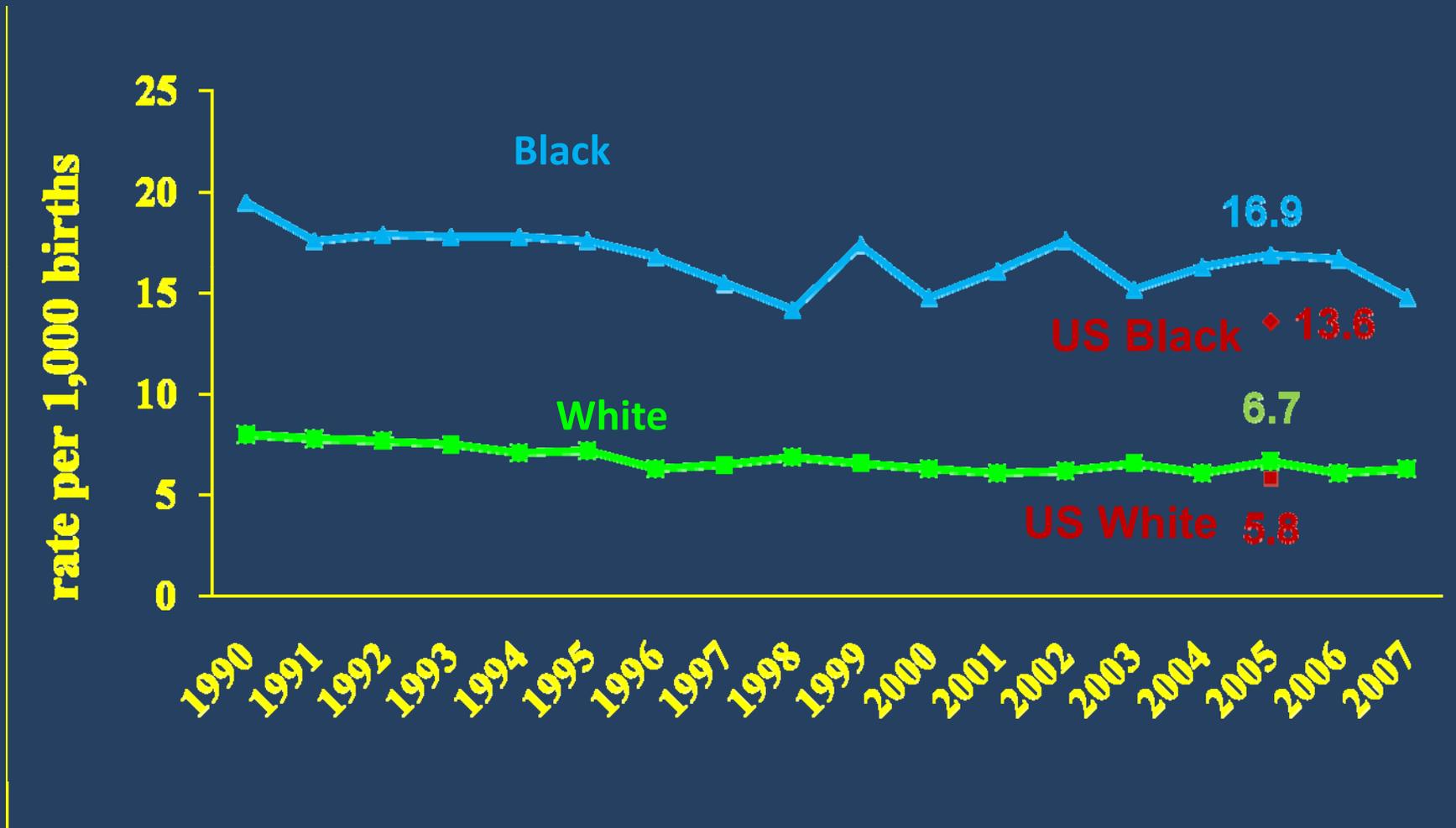


Ohio Vital Statistics. Beginning in 1989 specific race groups were collected. In this chart the rates for 1990-2005 are for Whites and African Americans.

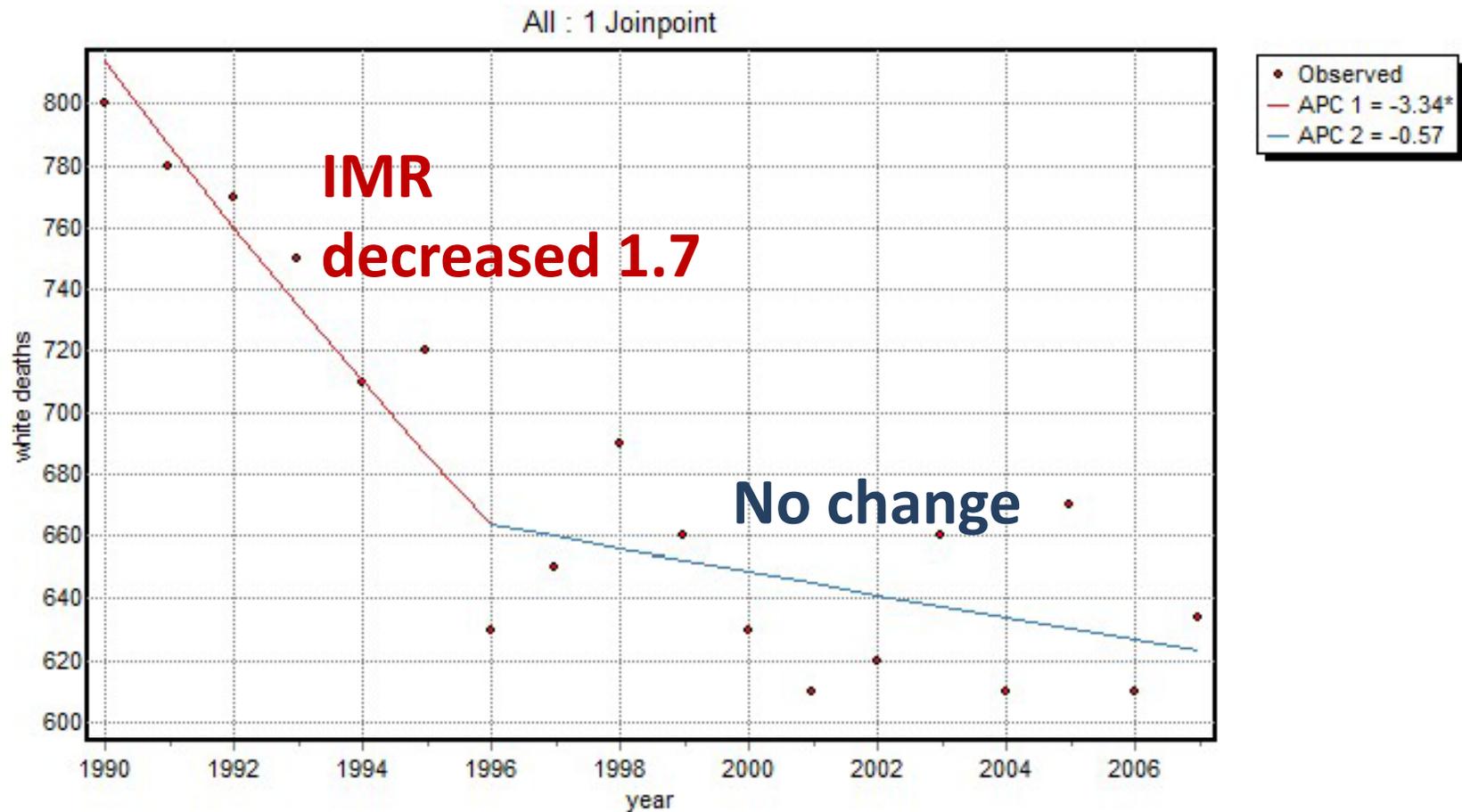
Infant mortality rates by race— Ohio, 1990-2007



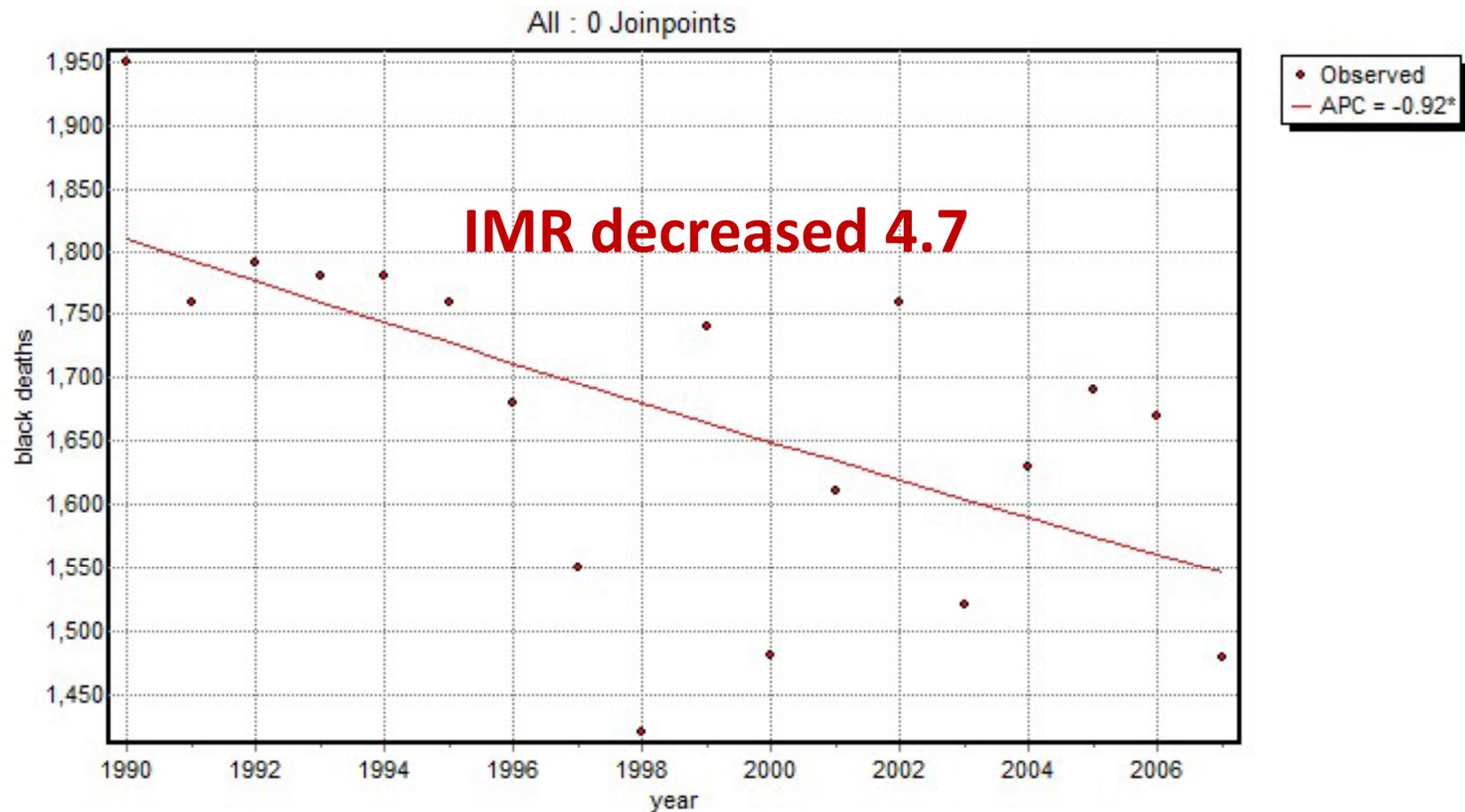
Infant mortality rates by race— Ohio, 1990-2007



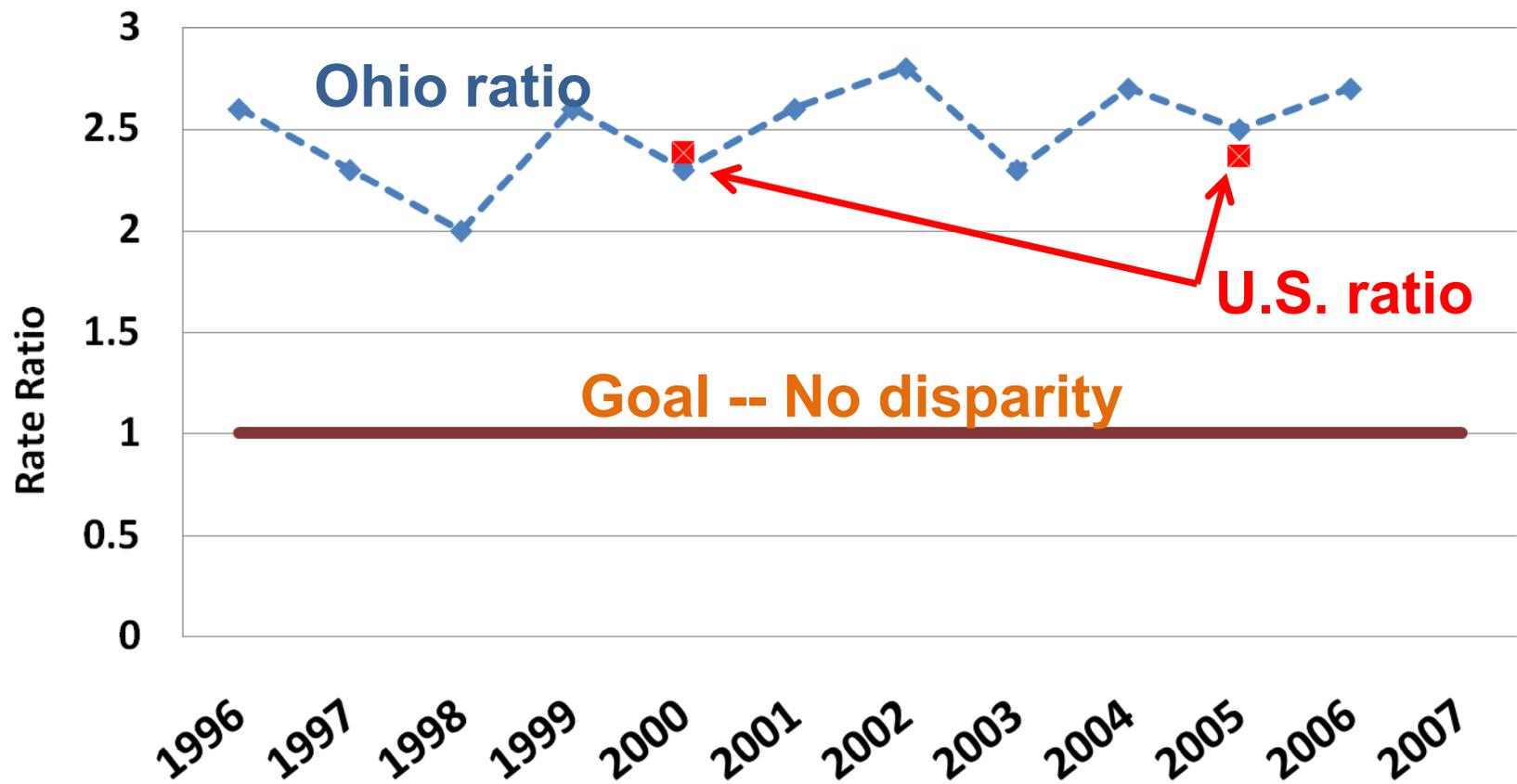
White Infant Mortality– Ohio, 1990-2007



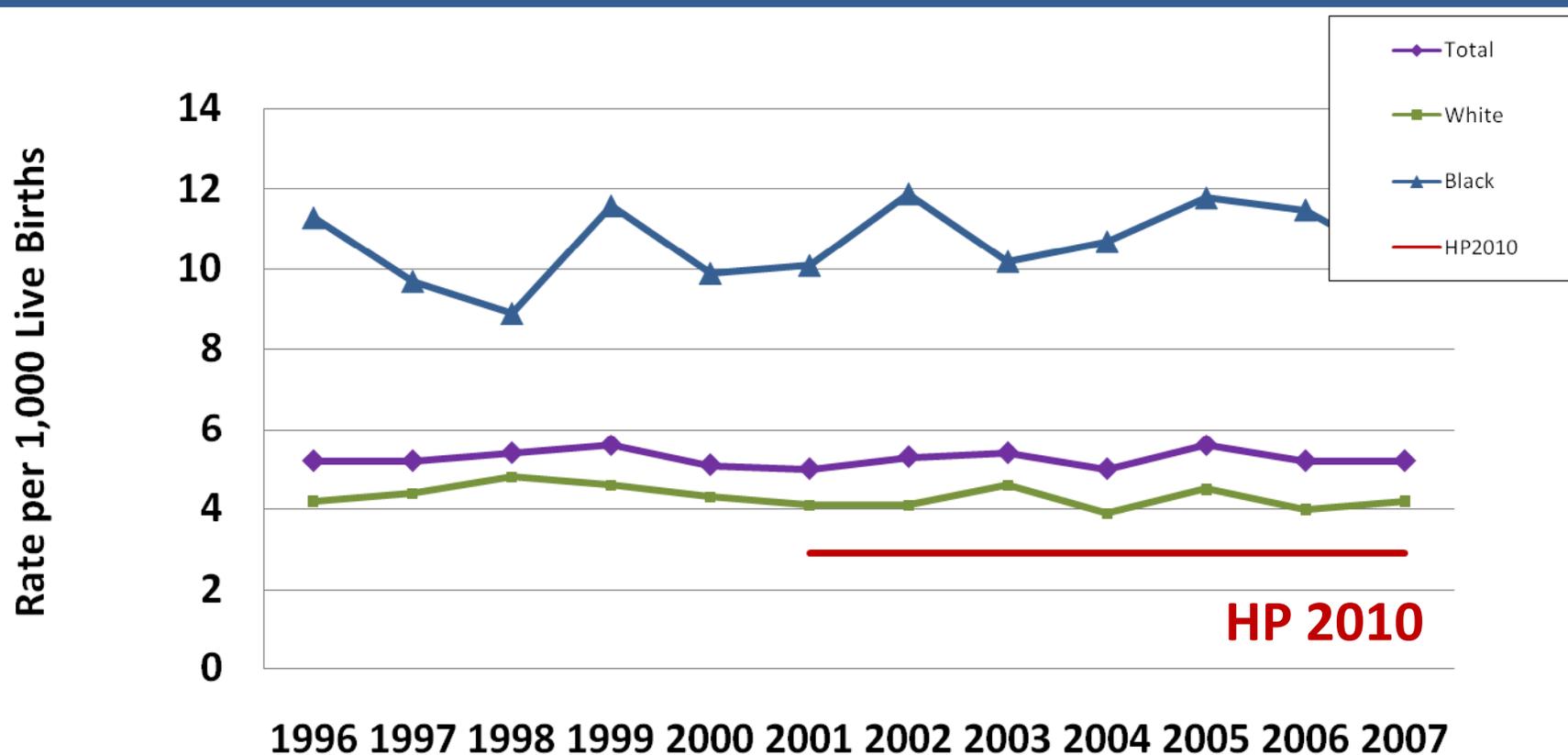
Black Infant Mortality– Ohio, 1990-2007



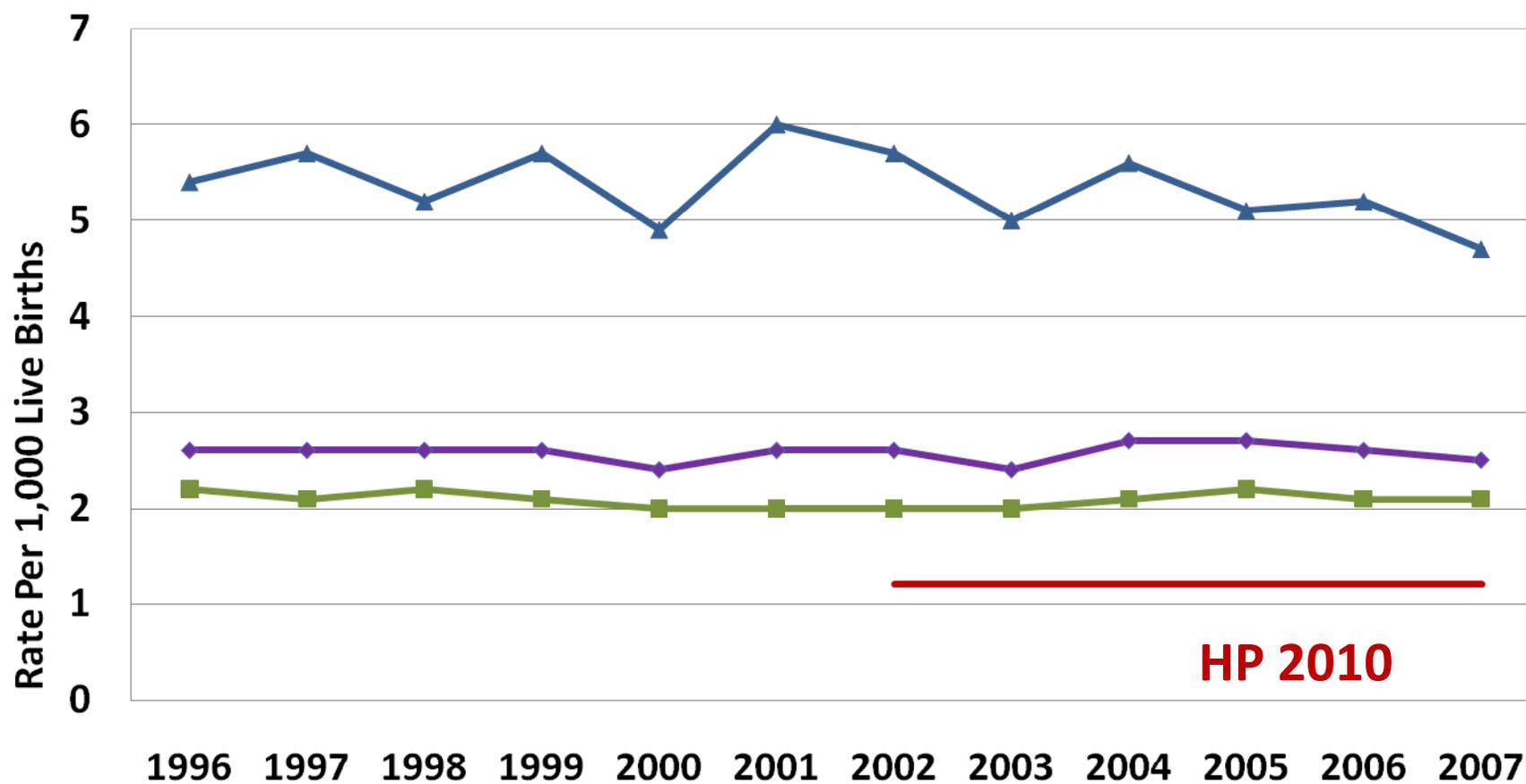
Ratio of Black to White Infant Mortality– Ohio, 1996-2007



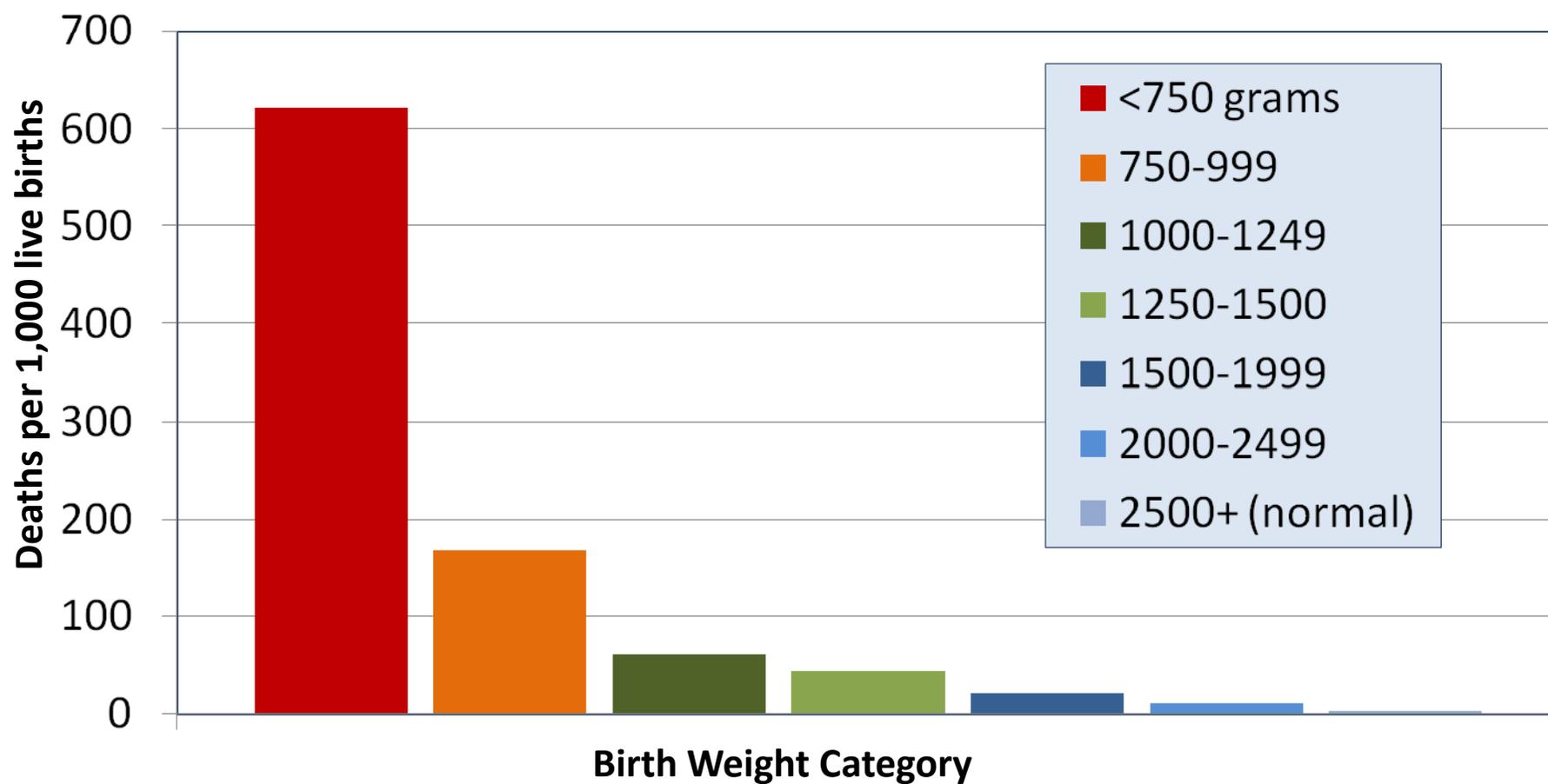
Neonatal Mortality Rate per 1,000 Live Births, by Race— Ohio, 1996-2007



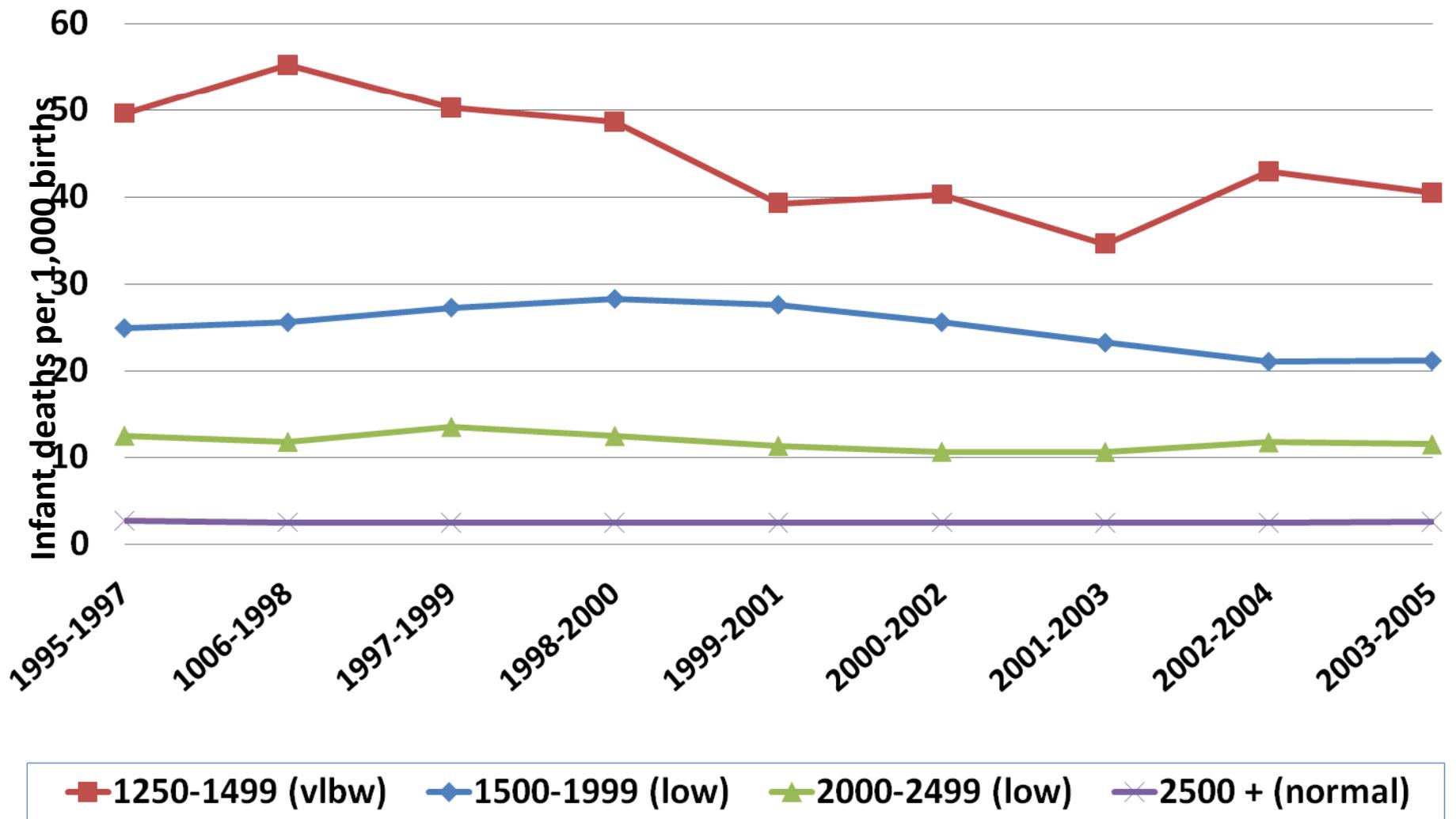
Postneonatal Mortality Rate per 1,000 Live Births, by Race— Ohio, 1996-2007



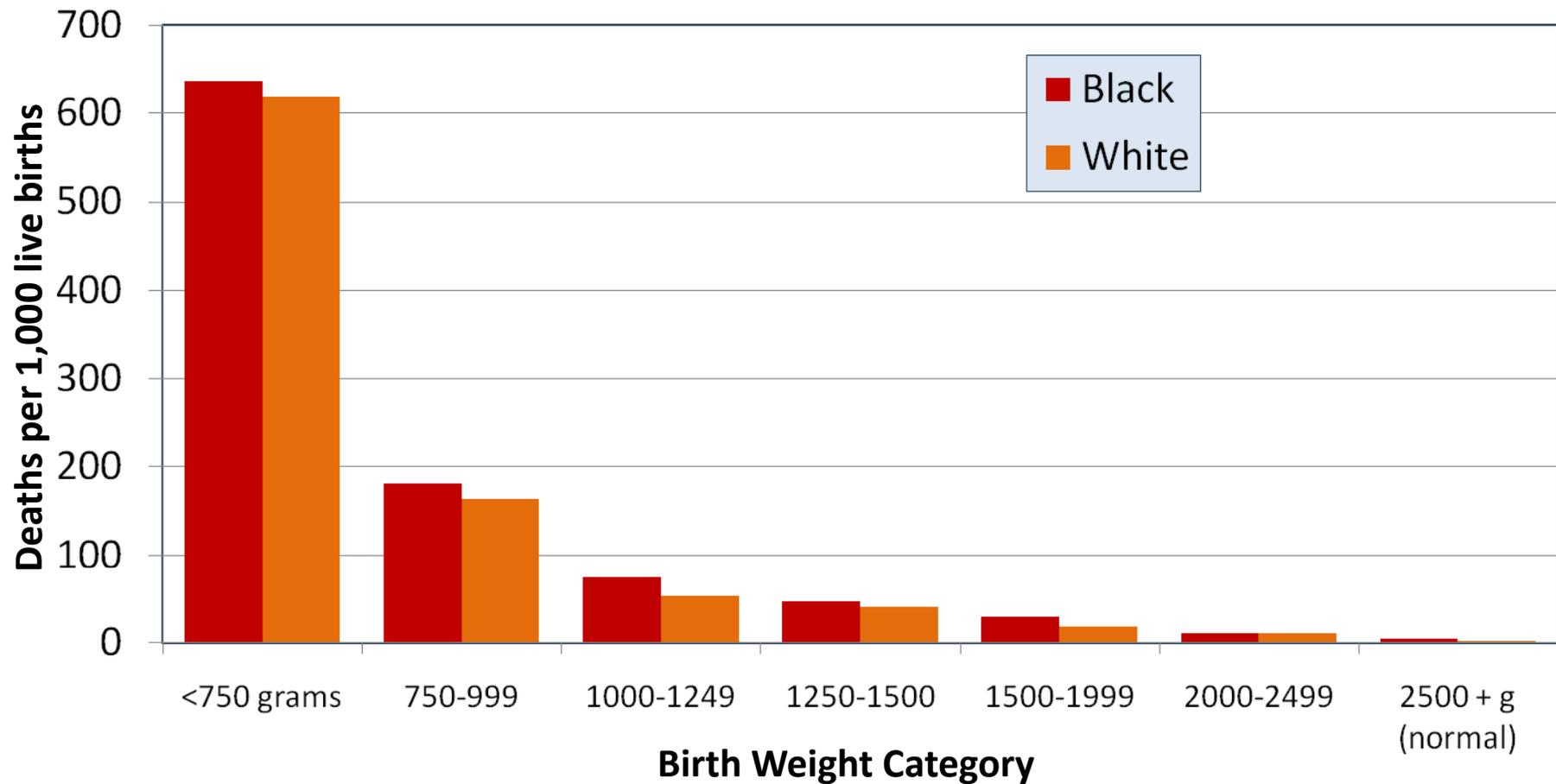
Infant Mortality Rate by Birth Weight— Ohio, 2004-5



Infant Mortality Rates by Birth Weight in 3-year Rolling Averages— Ohio, 1995-2005



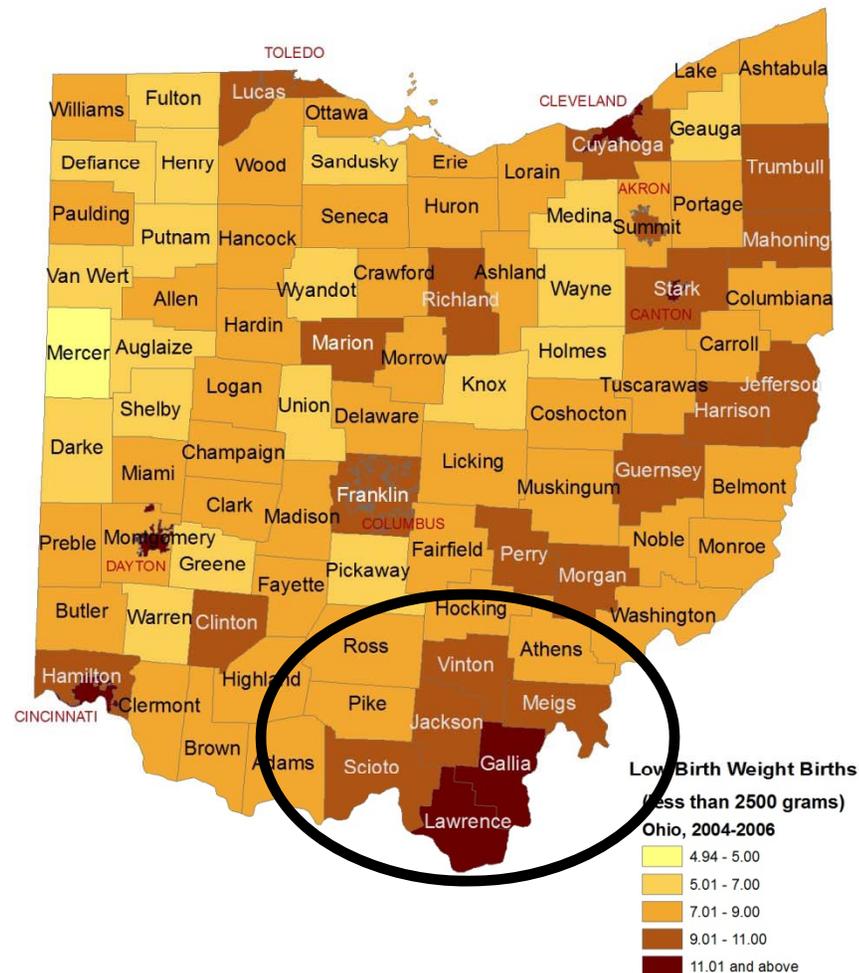
Infant Mortality Rate by Birth Weight and Race— Ohio, 2004-5



A25

Update with 2005
Administrator, 2/24/2009

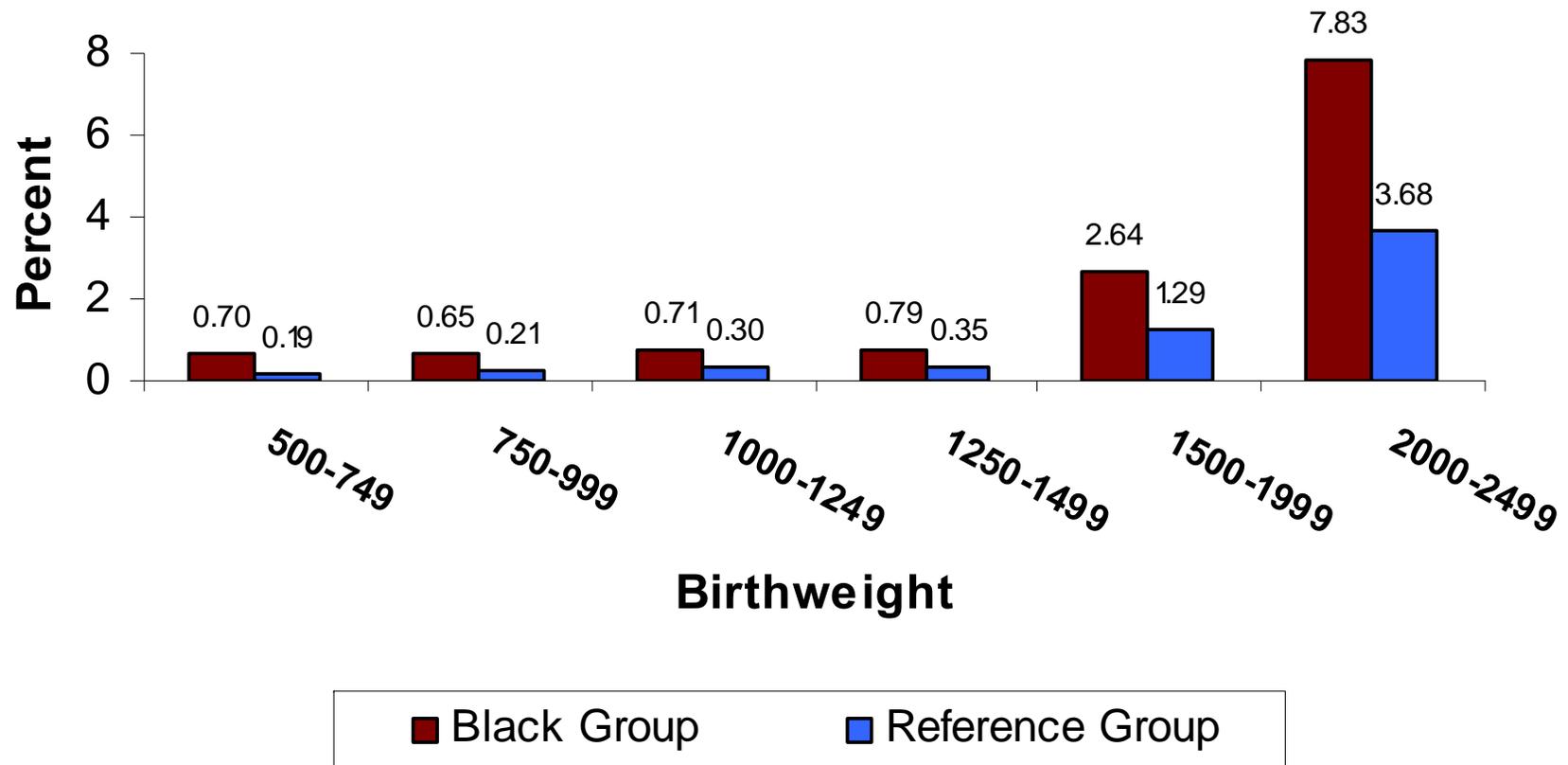
Low Birth Weight (<1500g) by County and Selected Cities— Ohio, 2004-6



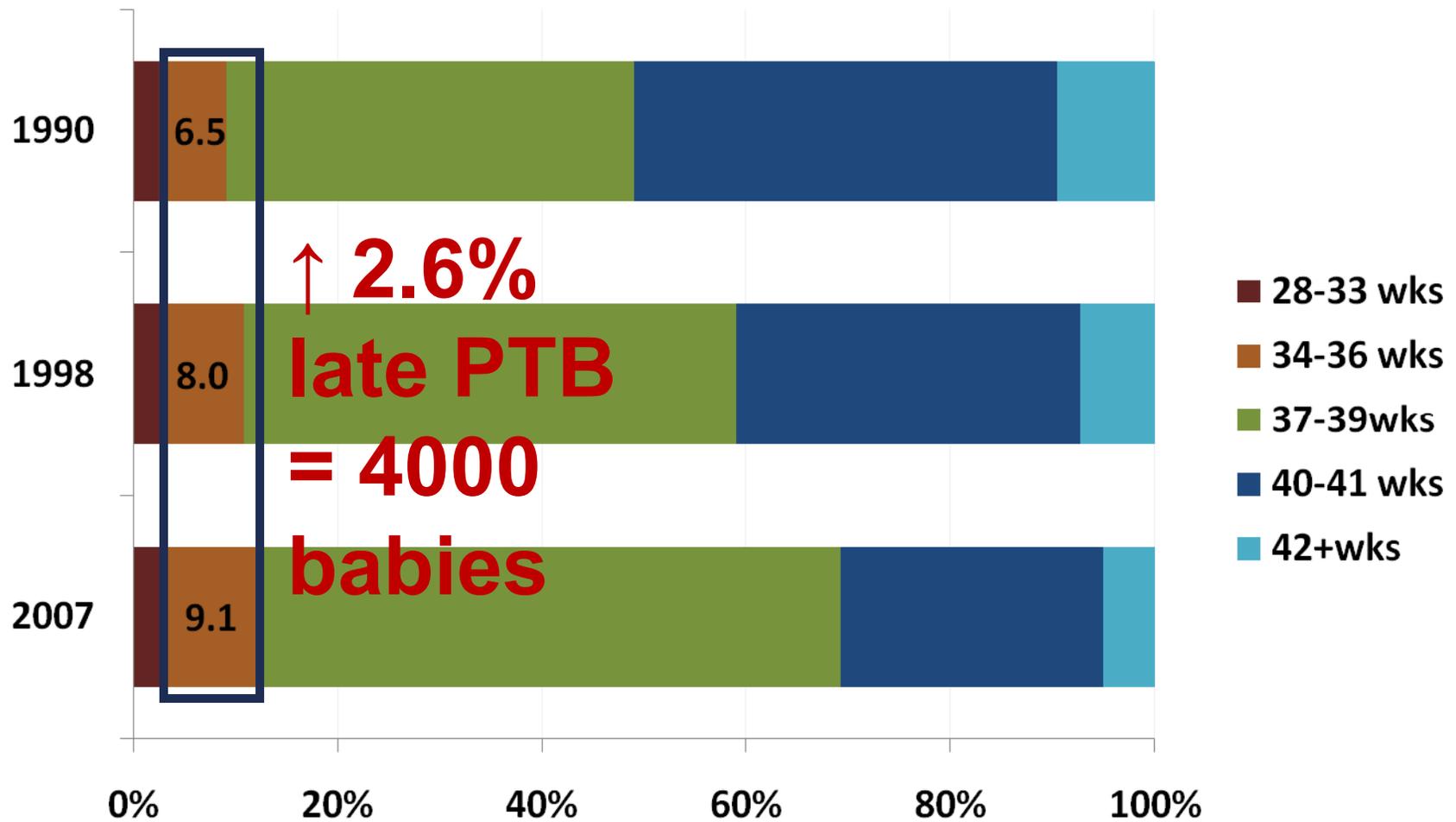
Healthy People 2010 Goal: 5.0 percent
 Infant Mortality Rate for Ohio 2004-2006: 8.7 percent
 Source: Ohio Vital Statistics

Birth Weight Distribution by Race— Ohio, 1999-2002

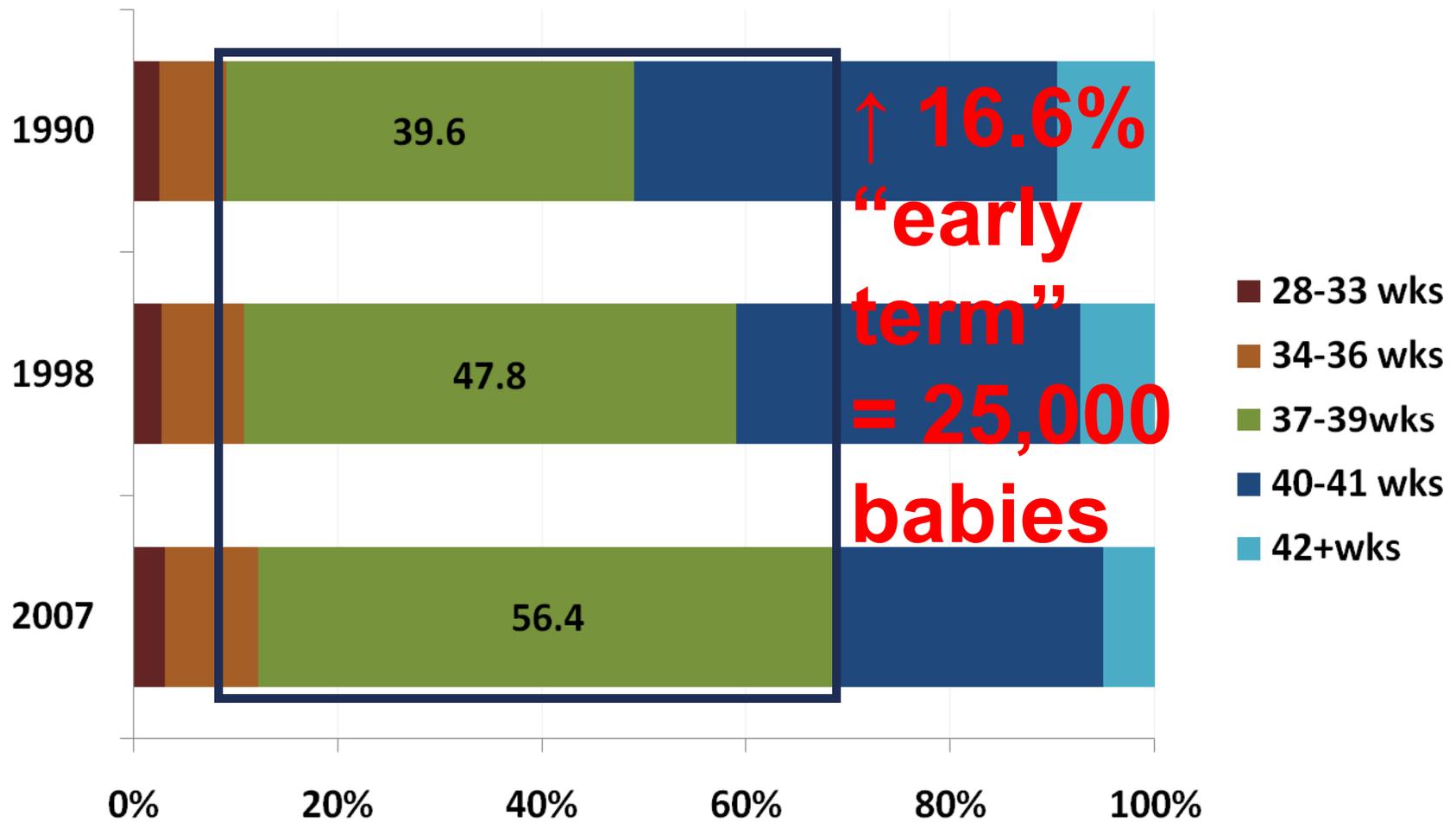
Percent of Birthweight Distribution (< 2,500 g) between Black and Reference Groups



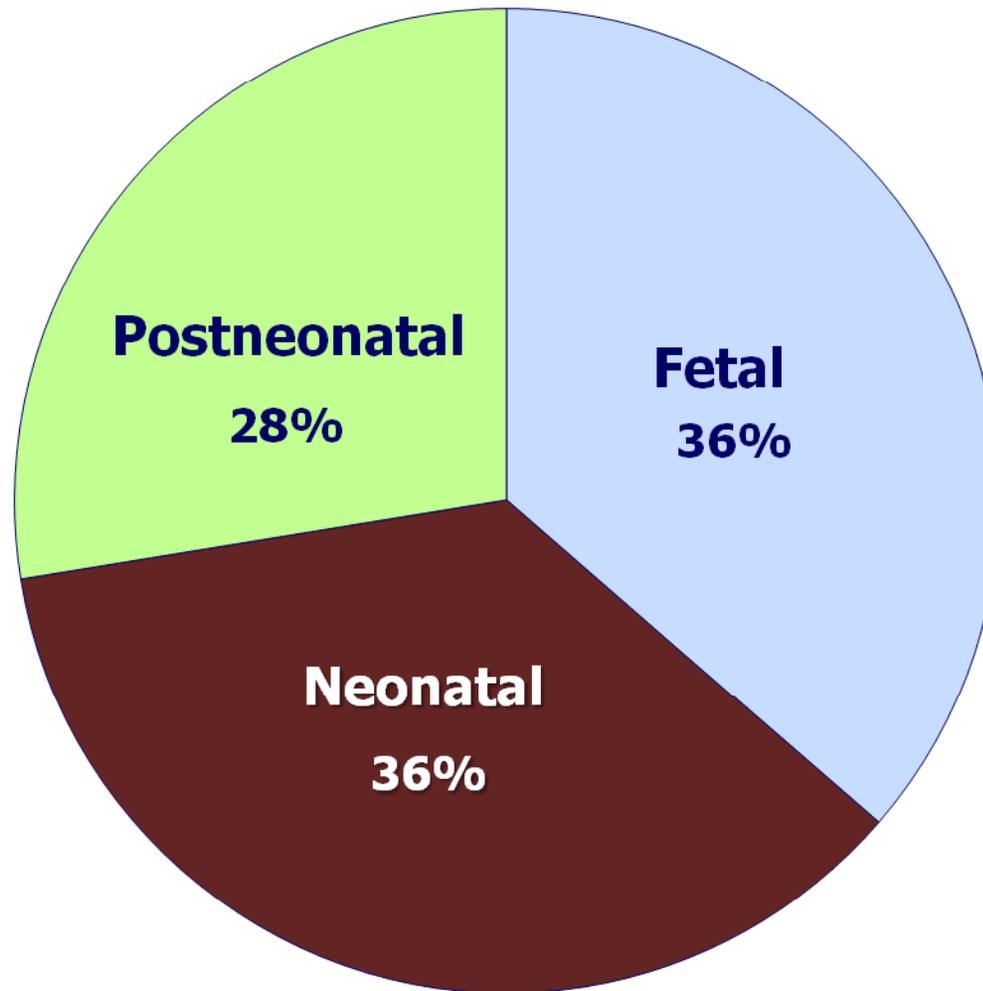
Proportion of Births by Gestational Age Grouping and Birth Year– Ohio



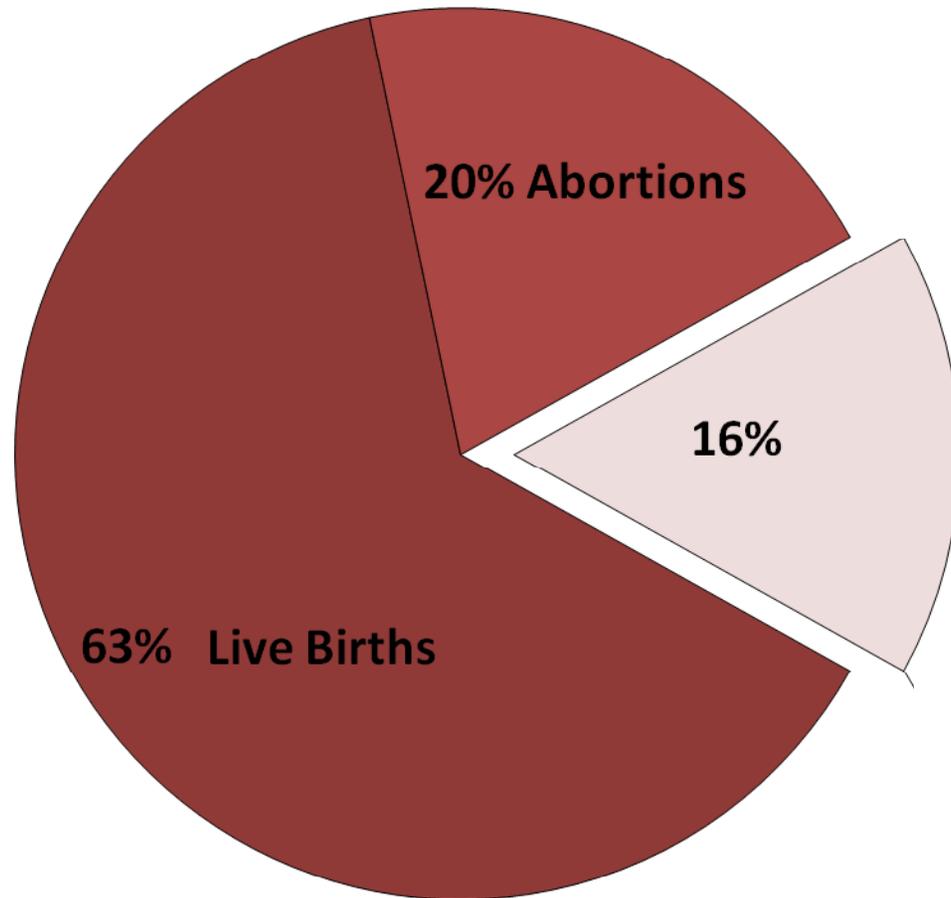
Proportion of Births by Gestational Age Grouping and Birth Year– Ohio



Feto-Infant Deaths— Ohio, 1999-2002



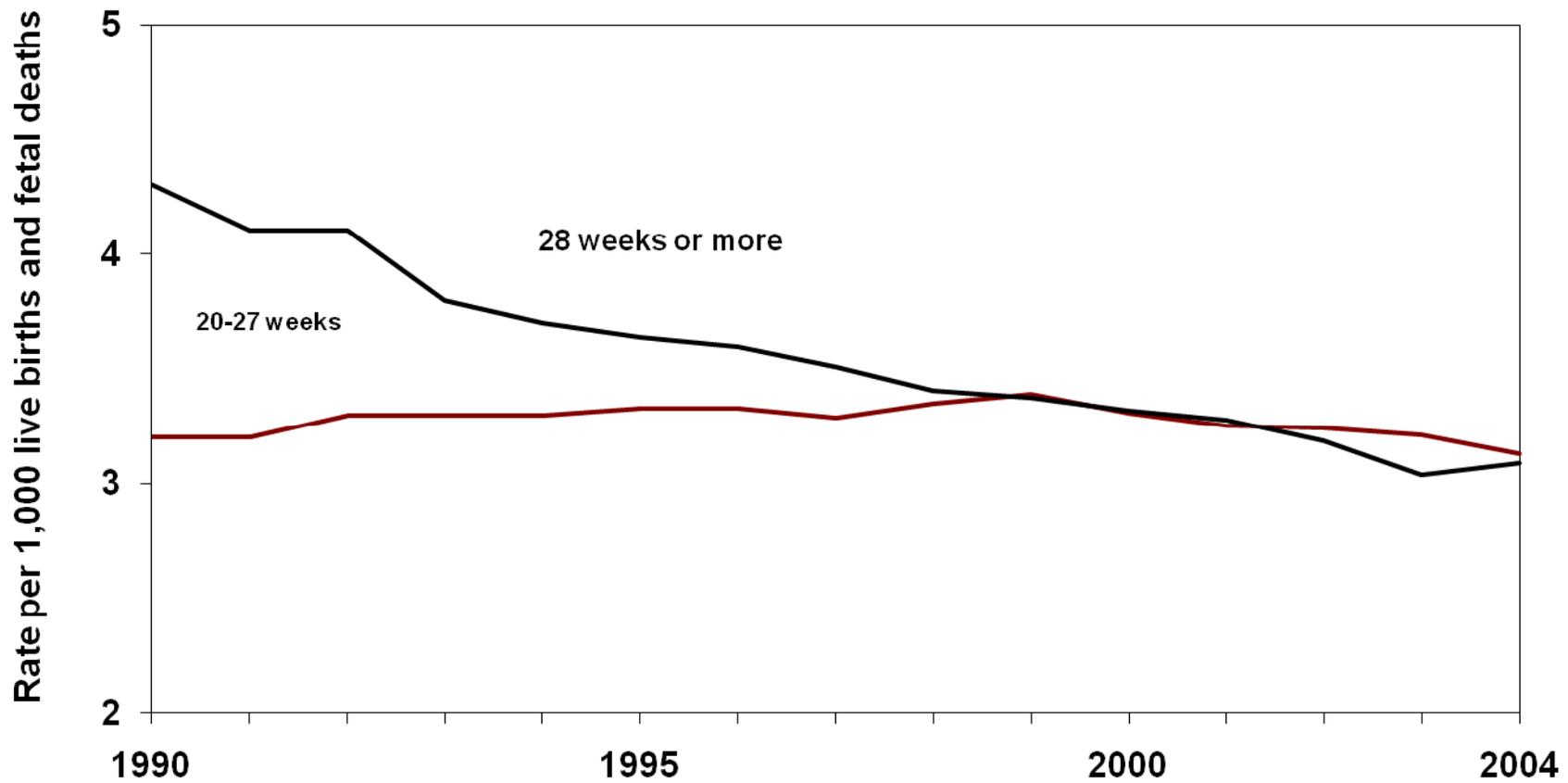
Birth Outcomes for U.S. Pregnancies (n=6.4 million)



} 7% reportable vital events (20+ wks)

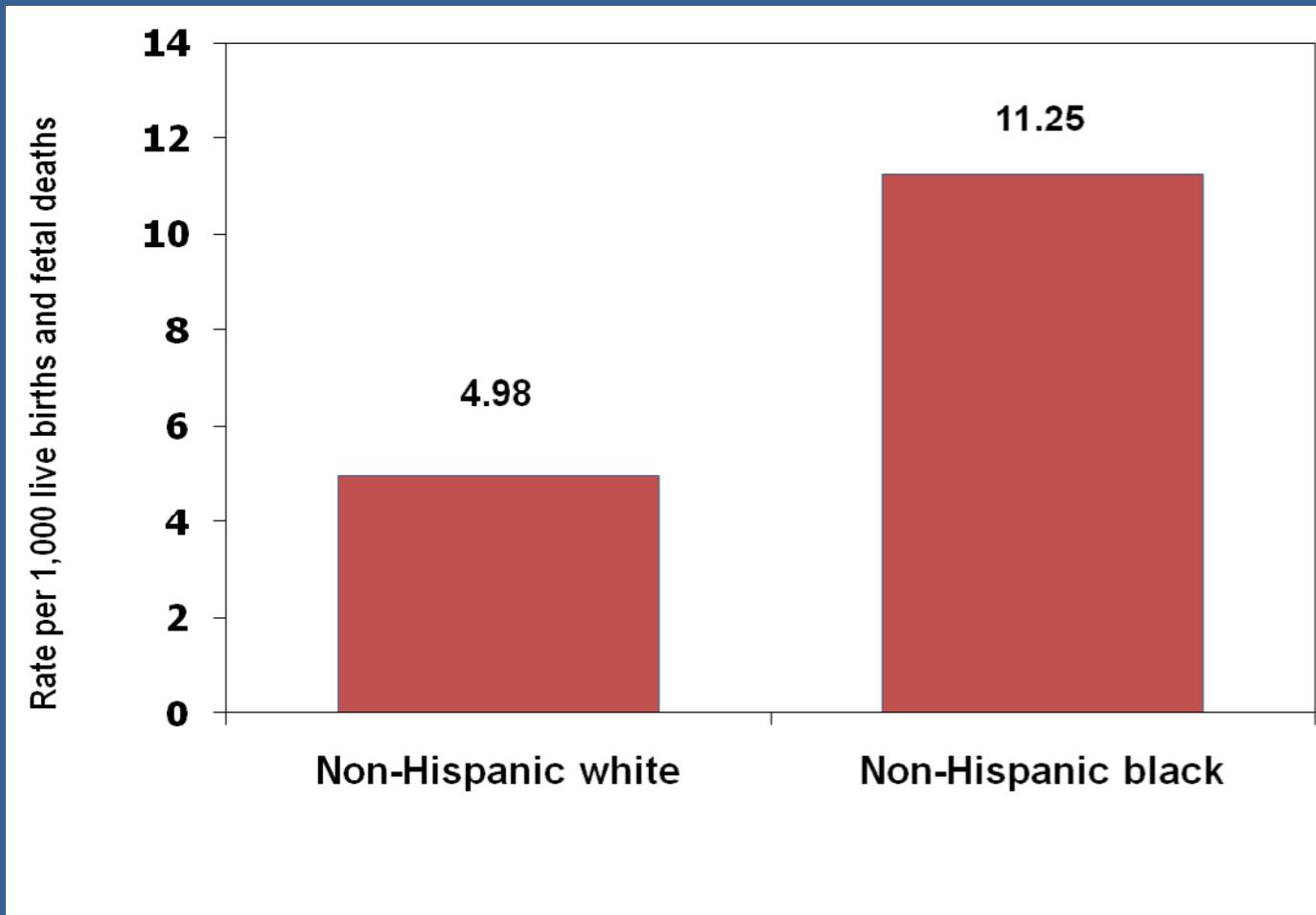
Source: Estimated pregnancy rates for the United States, 1990-2000: An Update. National vital statistics reports vol. 52 no. 23. 2004. and National Survey of Family Growth

Fetal Mortality Rates by Period of Gestation— US, 1990-2004



SOURCE: CDC/NCHS; National Vital Statistics System.

Fetal Mortality Rates by Race and Ethnicity of Mother: US, 2004



SOURCE: National Center for Health Statistics

NOTE: Rates for subtotals do not add exactly to totals due to slight differences in the denominators used for rate computations. Excludes Oklahoma which did not report Hispanic origin for fetal deaths.

Perinatal Periods of Risk: What is PPOR?

Methodology to develop community-based prevention strategies to reduce racial and ethnic disparities in feto-infant mortality

It attempts to do this by:

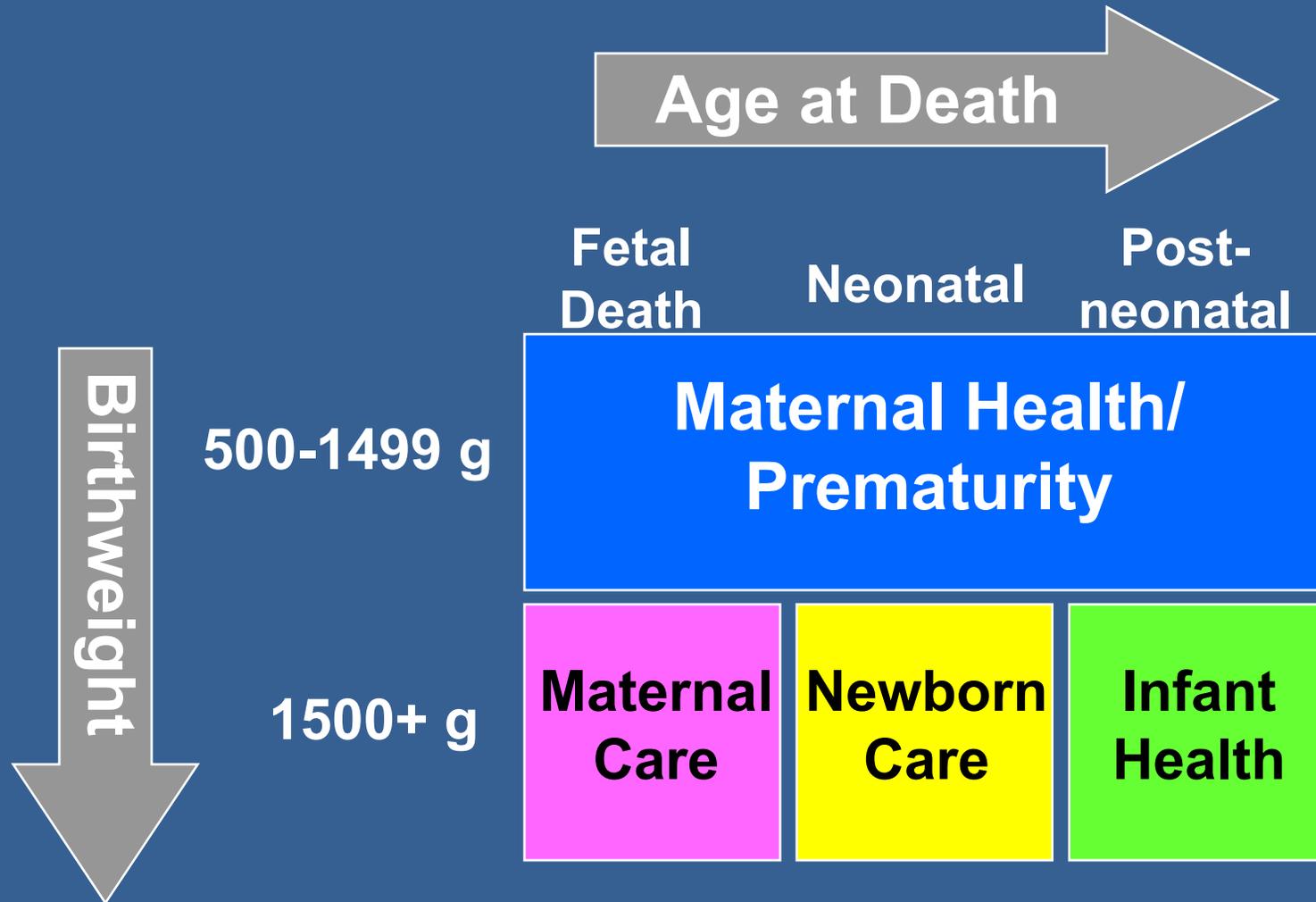
- **Providing a framework to focus interventions to improve outcomes**
- **Identifying excess fetal/infant mortality (Phase I)**
- **Explaining reasons for the excess deaths (Phase II)**
- **Stimulating further analysis of linked birth/death data**

Perinatal Periods of Risk:

What is the “*Gap*”?

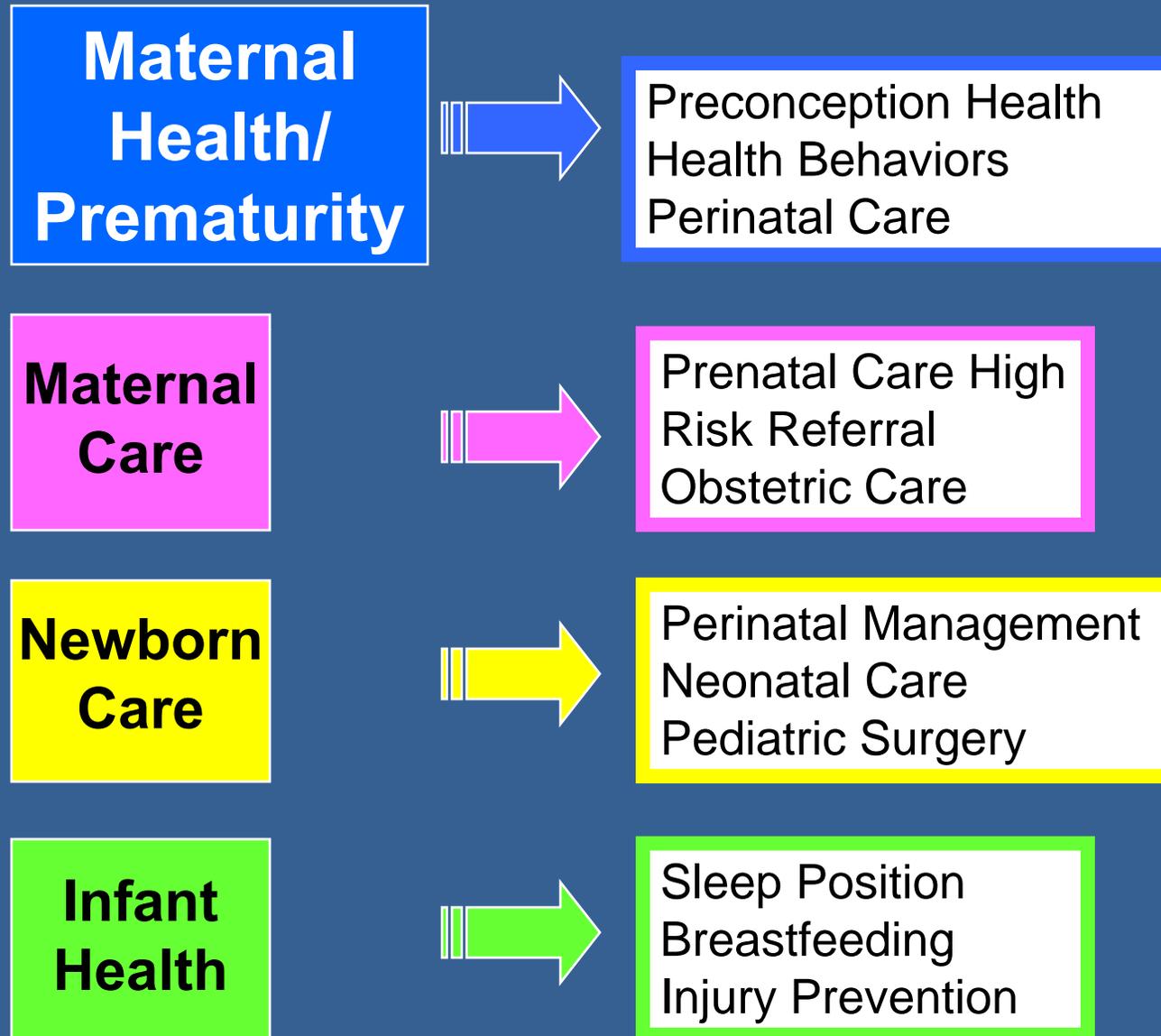
- ✓ **ASK:** Which women/infants have the “**best**” outcomes?
- ✓ **ASSUME:** all infants can have similar “**best**” outcomes
- ✓ **CHOOSE:** a **comparison group**(s) (‘reference group’) who already has achieved “best” outcomes
- ✓ **COMPARE:** fetal-infant mortality rates in your **target** group with those of the comparison group(s)
- ✓ **CALCULATE:** **excess** deaths (= target – comparison groups). This is your community’s “**Opportunity Gap.**”

Perinatal Periods of Risk (PPOR) Feto-Infant Mortality Map



More information: www.citymatch.org

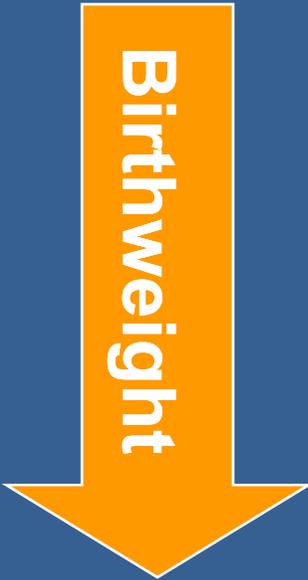
PPOR is about *ACTION*



Feto-Infant Mortality Map

Ohio, 1999-2002

8.9 per 1000



500-
1499 g

1500+ g

	Fetal Deaths	Neonatal	Post neonatal
500-1499 g	715	1042	260
1500+ g	1149	810	1153

Total: 5129

Reference Groups

Choose a group of “best performers.”

U.S. studies have shown that this group consists of women who:

- are Non-Hispanic white
- are 20 years old or older
- have 13 or more years of education

Excess Feto-Infant Mortality Ohio, 1999-2002

Non-reference

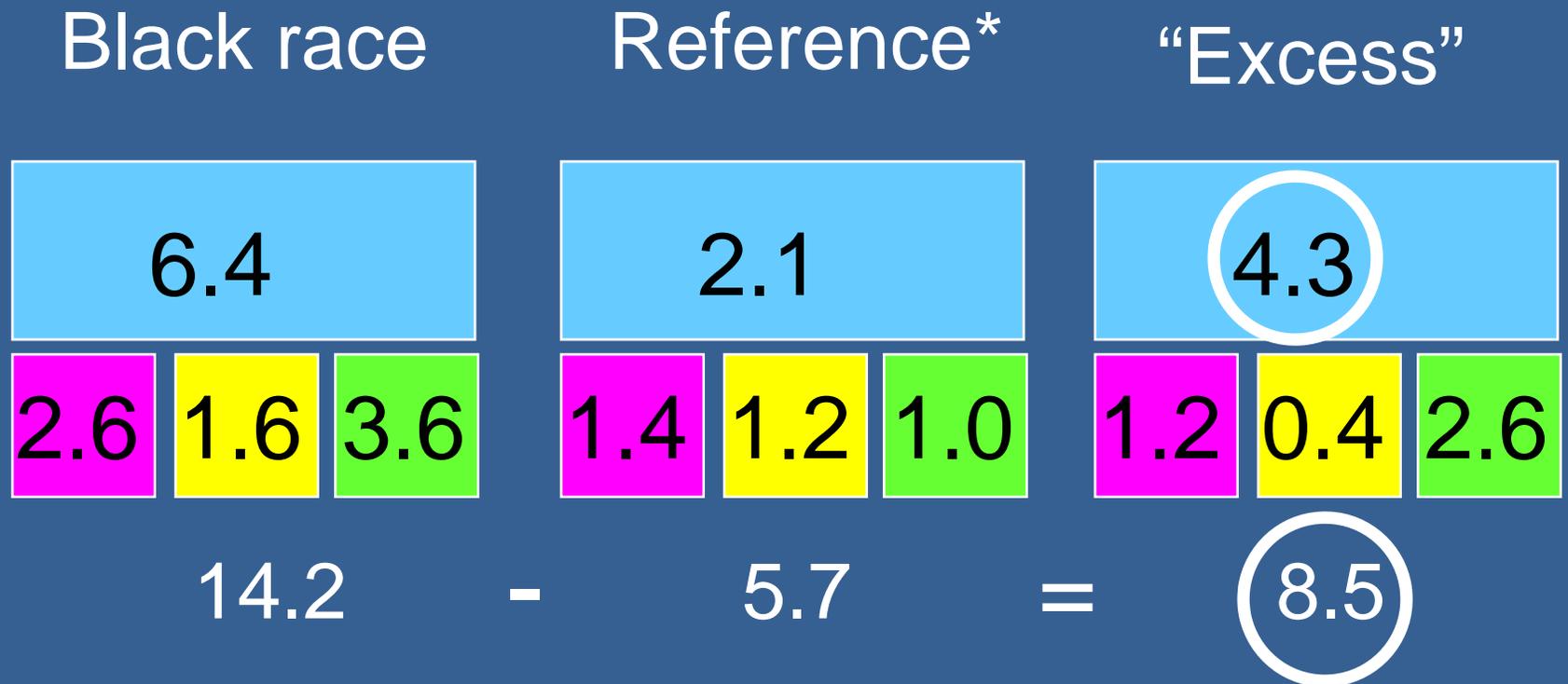
Reference*

“Excess”



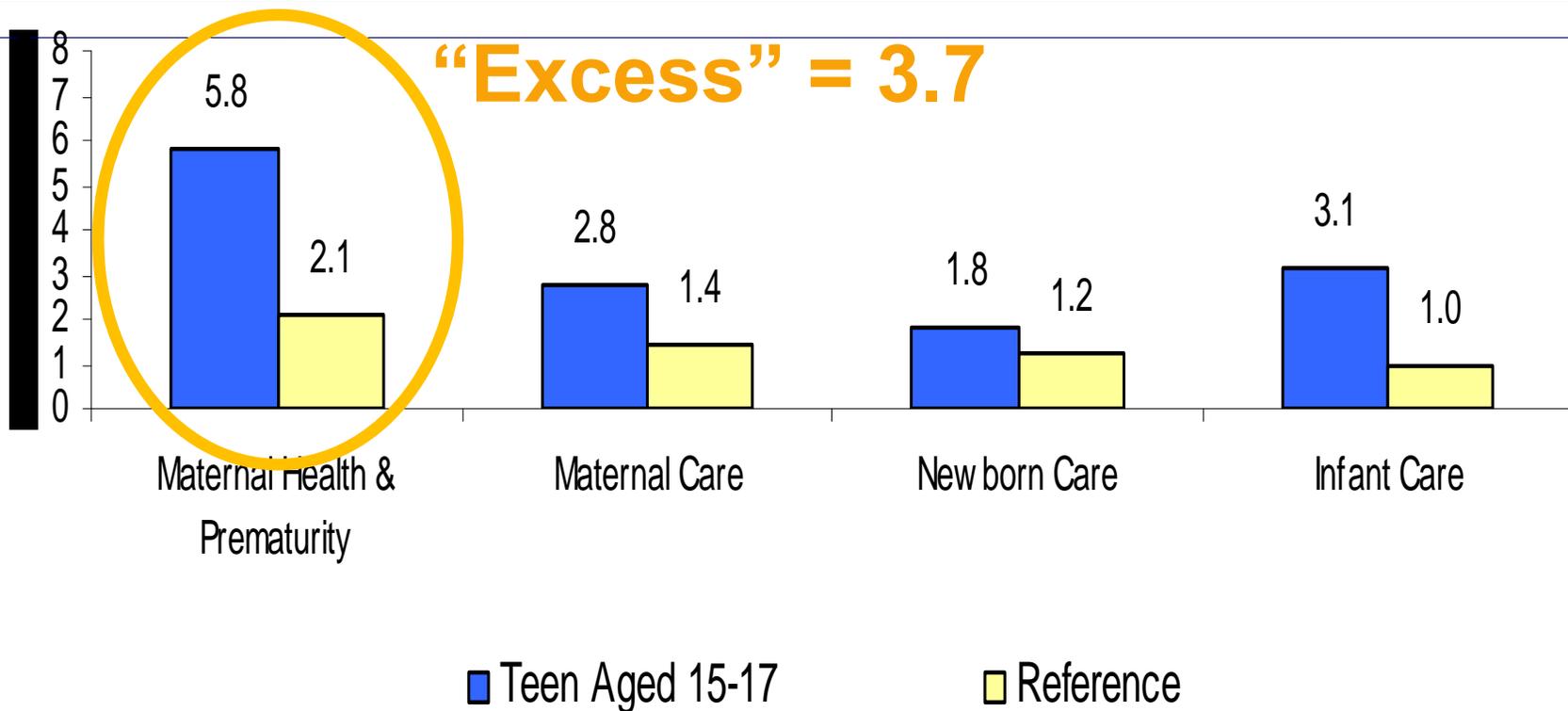
* Reference group: Ohio non-Hispanic white women greater than 19 years of age with more than 12 years of education

Excess Feto-Infant Mortality Ohio, 1999-2002

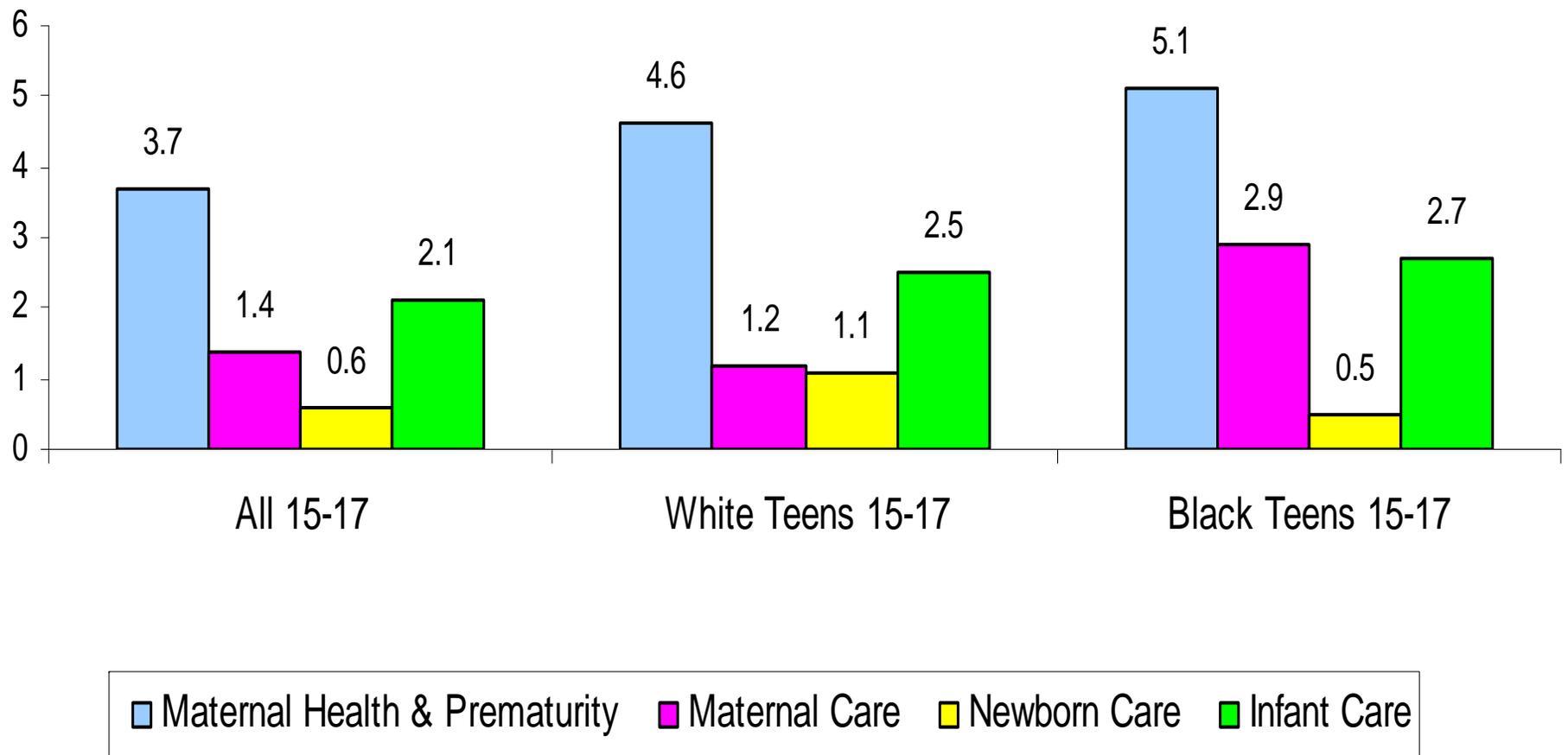


* Reference group: Ohio non-Hispanic white women greater than 19 years of age with more than 12 years of education

Feto-Infant Mortality Rates: teens vs. reference group – Ohio, 1999-2002



“Excess” Feto-Infant Mortality Rates among Teens, by Race—Ohio, 1999-2002



Phase II Analyses: Why does gap exist?

**Maternal Health/
Prematurity**

Birthweight
Distribution

Birthweight-
Specific Mortality

Infant Health

SIDS

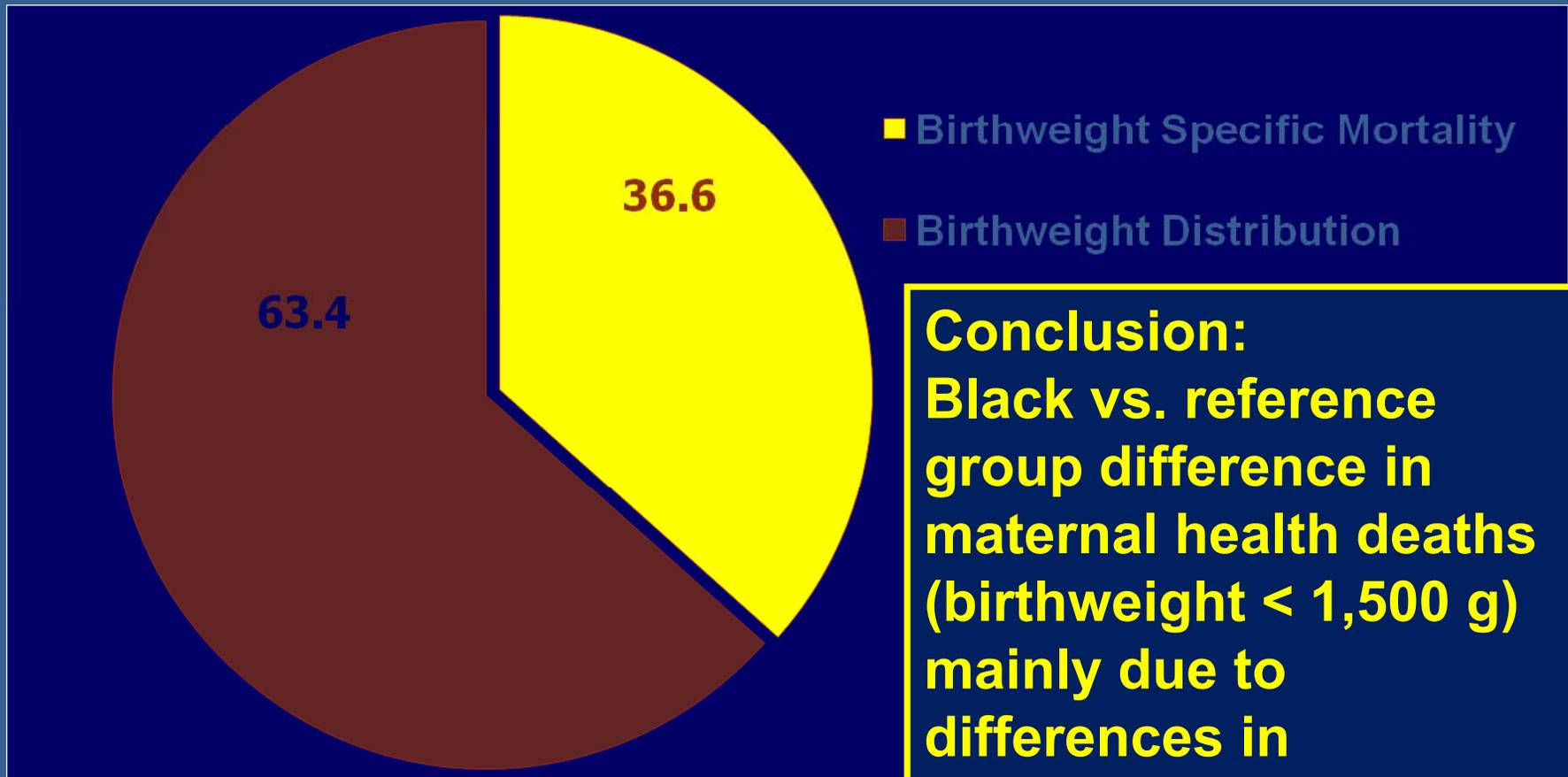
Injury

Infection

Anomalies

Breastfeeding

Percent overall excess mortality rates among Black infants vs. reference group – Ohio, 1999-2002



Conclusion:
Black vs. reference group difference in maternal health deaths (birthweight < 1,500 g) mainly due to differences in birthweight distribution

Time For a Paradigm Shift?

Healthy Women



Healthy Mothers



Healthy Babies

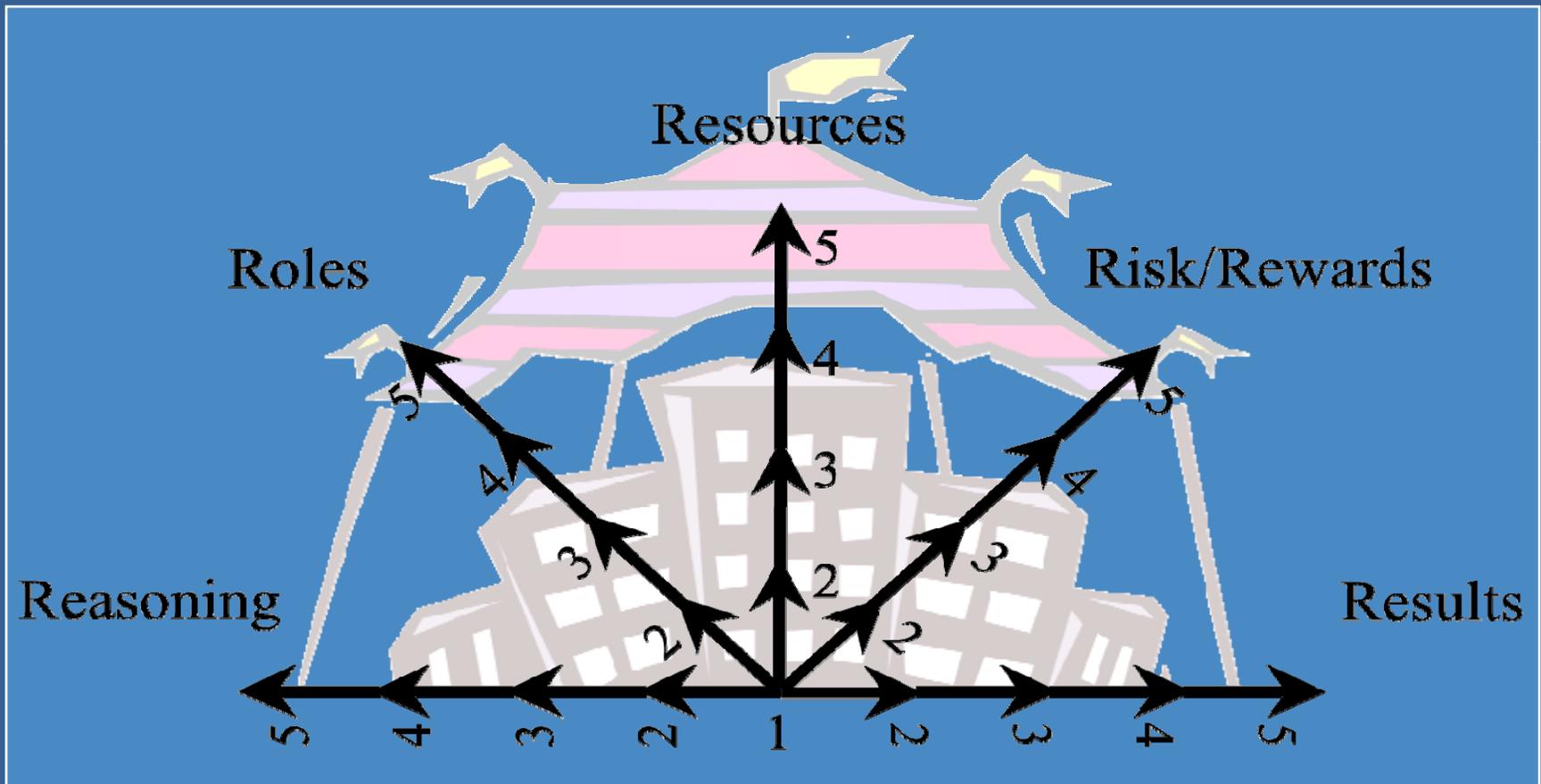
The preconception health of Ohio mothers

- 1 in 4 no health insurance
- 1 in 2 no vitamin
- 1 in 5 obese
- 1 in 2 used alcohol
- 1 in 2 not intending pregnancy
- 1 in 3 smoked

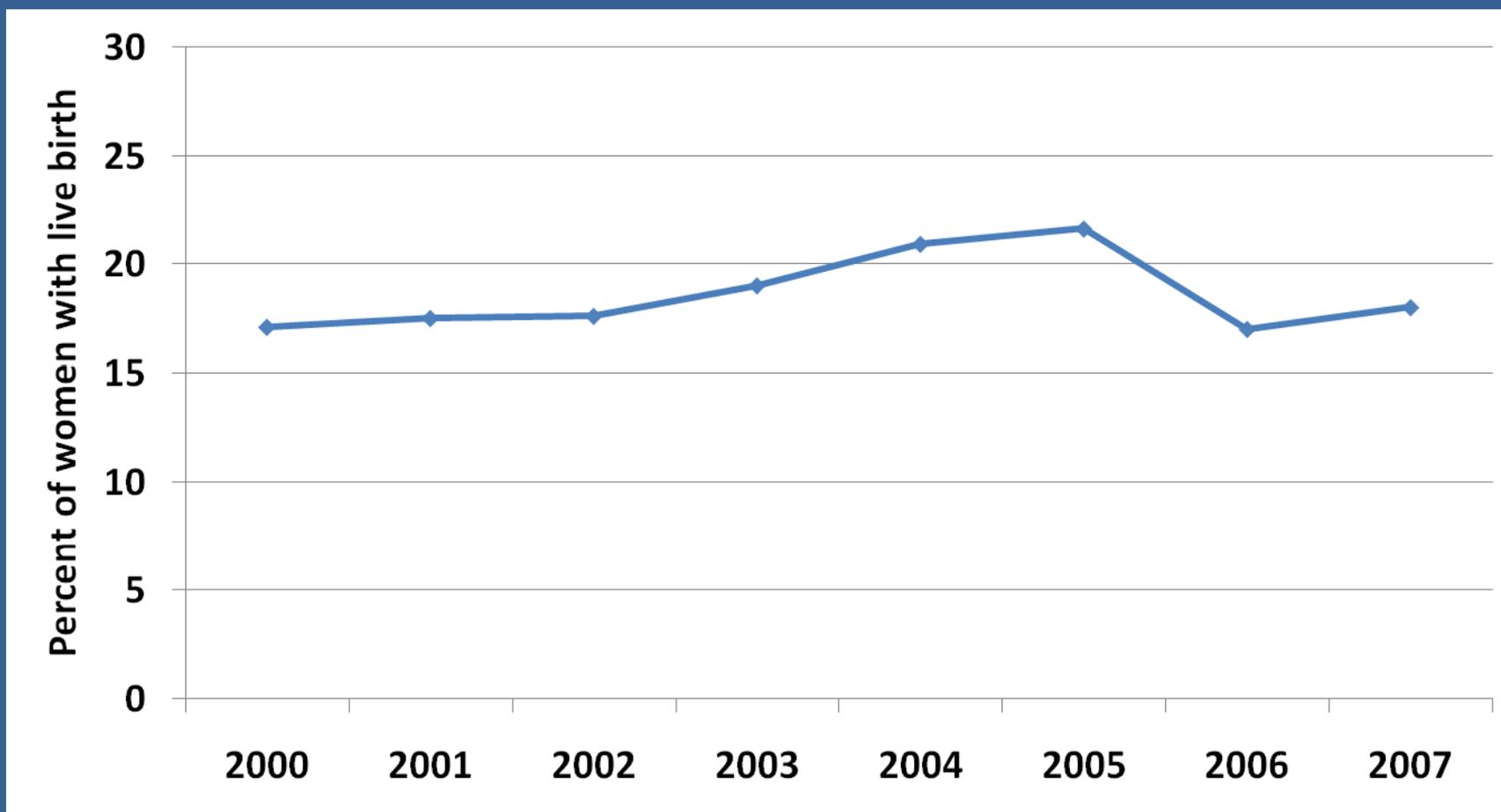
Source: 2007 Ohio PRAMS

<http://www.odh.ohio.gov/ASSETS/1788CE8FAF5B4C10BEA188AC40116E2C/PRAMSDataSummary2004-2007.pdf>

RAISING THE ROOF FOR INFANT MORTALITY: What Shape Is Your Community Tent?



Percent of women who smoked in the 3rd trimester– Ohio, 2000-2007



Source: Ohio PRAMS

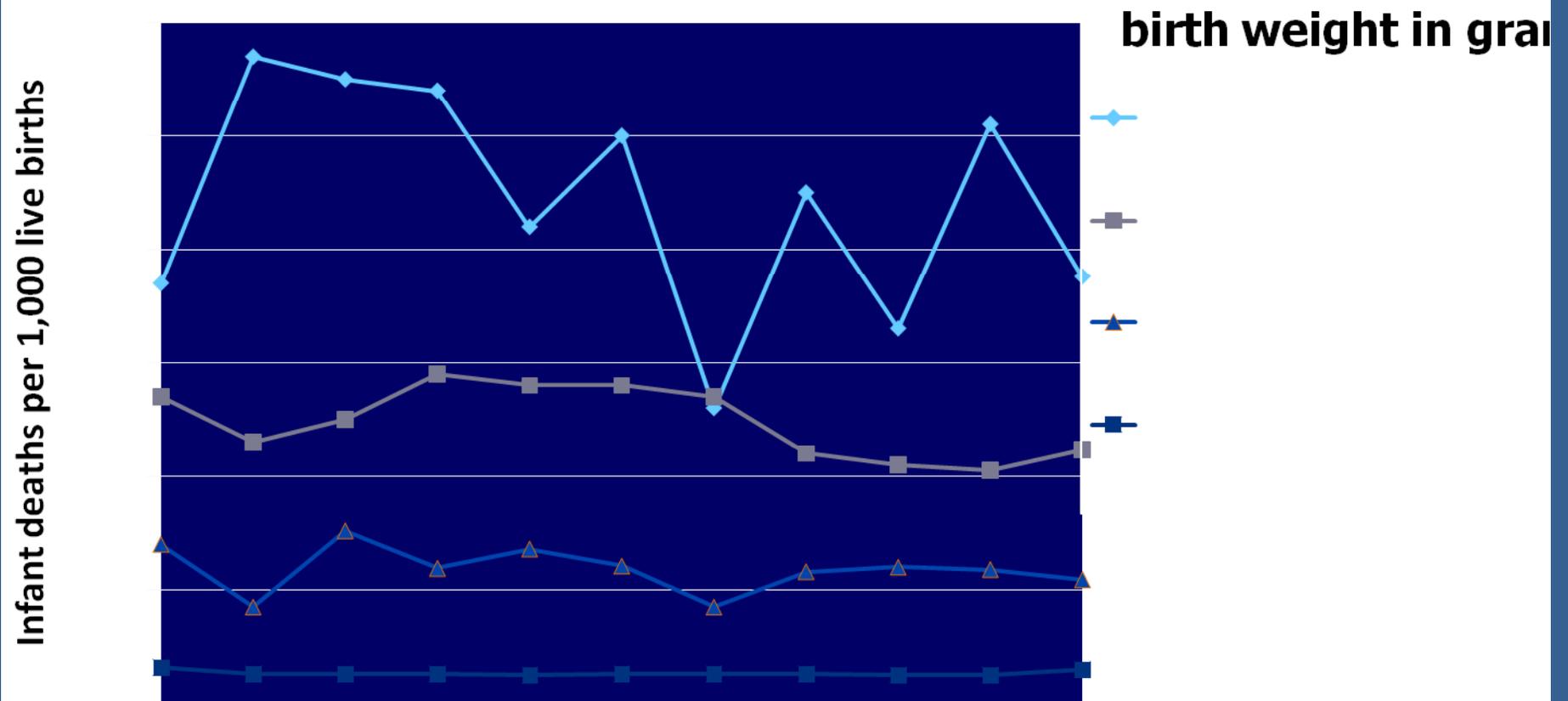


¿¿QUESTIONS??

The Feto-Infant Mortality Map

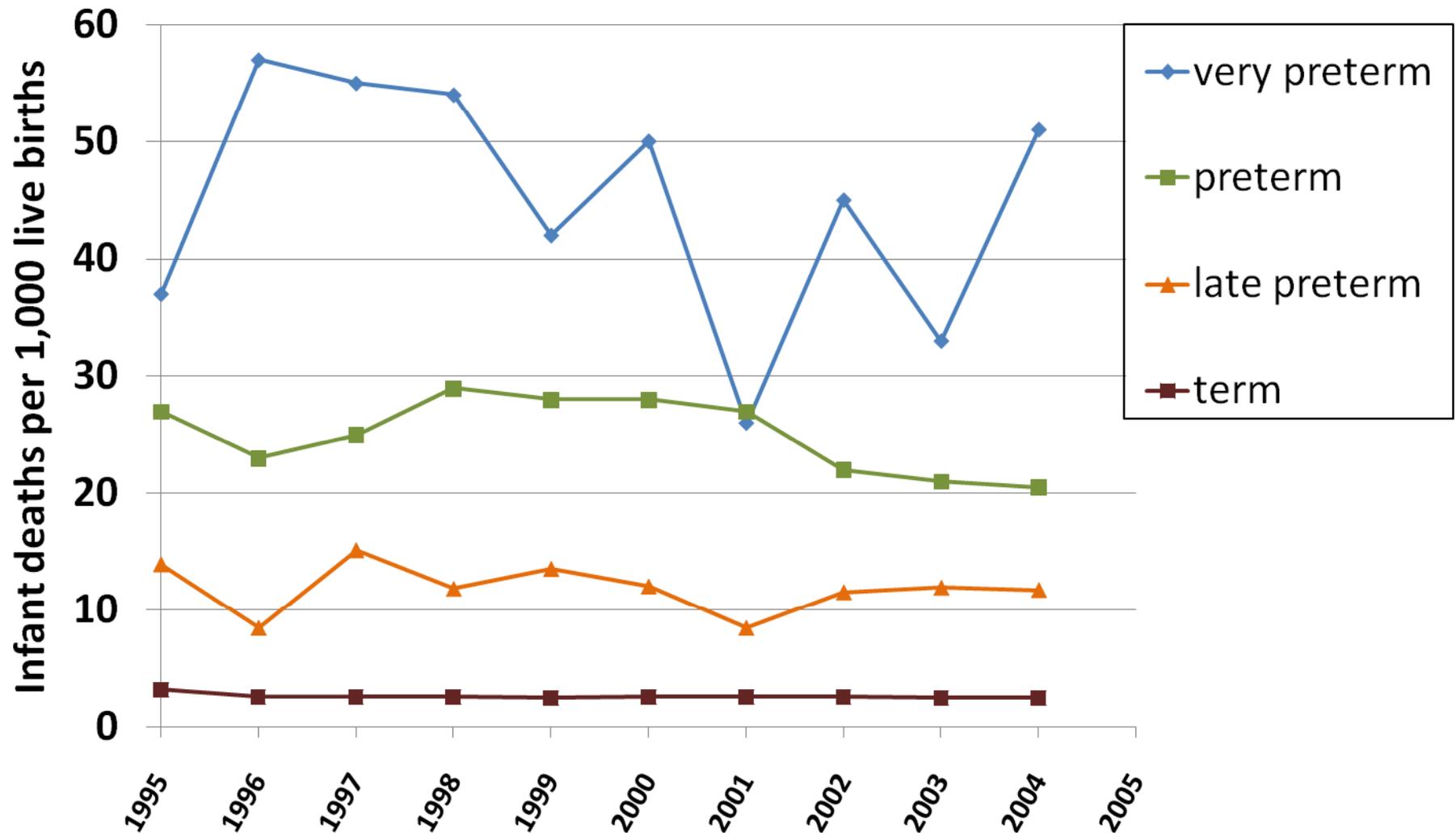
Weight at Birth	Fetal Deaths		Neonatal Deaths (<28 Days)	Postneonatal Deaths (28-364 Days)
	(0-24 Weeks)	(>24 Wks.)		
0-499 g	[Data obscured]			
500-1499 g		124	267	64
1500 g +		187	178	300

Infant Mortality Rates by Birth Weight—Ohio, 1995-2005



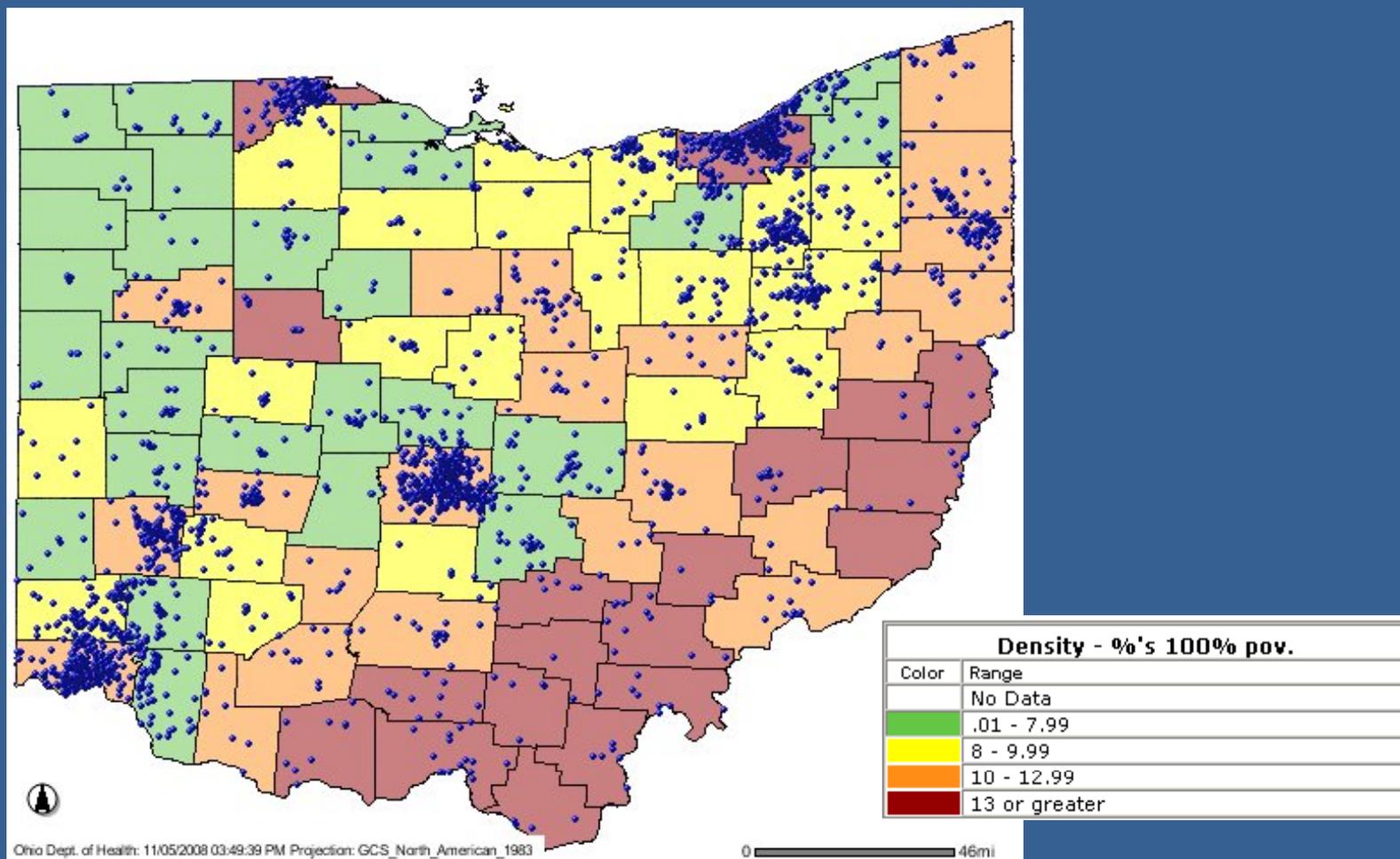
Ohio Vital Statistics linked birth/infant death files: Year is the year of birth

Infant Mortality Rates by Gestational Age Group— Ohio, 1995-2005



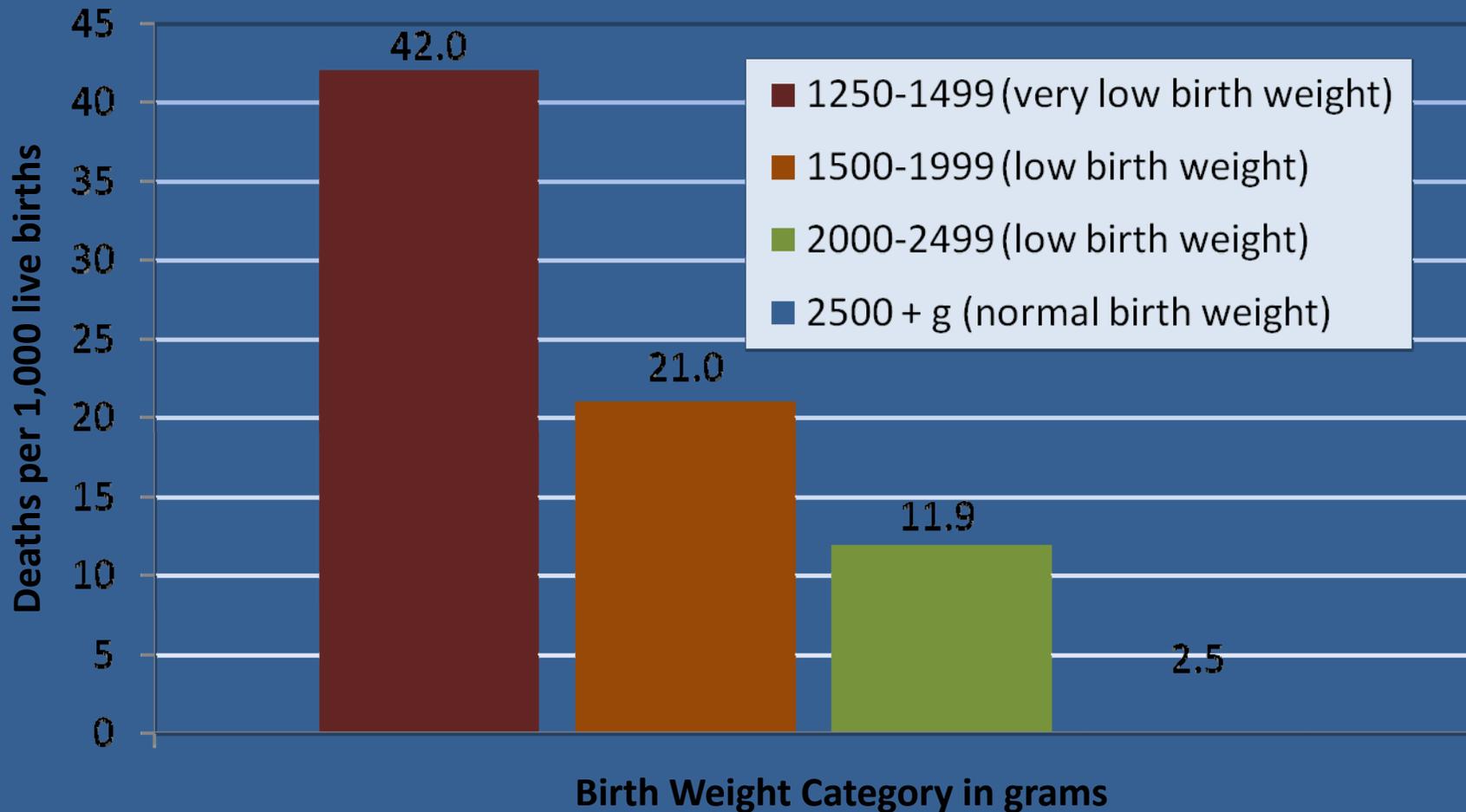
Ohio Vital Statistics linked birth/infant death files: Year is the year of birth

Geographic Location of Infant Deaths and Percent of County Population with <100% Poverty— Ohio, 2004-6



From 2004 through 2006, 3,535 infant deaths occurred in Ohio, however, 346 death certificates were not able to be geocoded beyond the county level and are not included in this illustration

Infant Mortality Rate by Birth Weight— Ohio, 2003-4



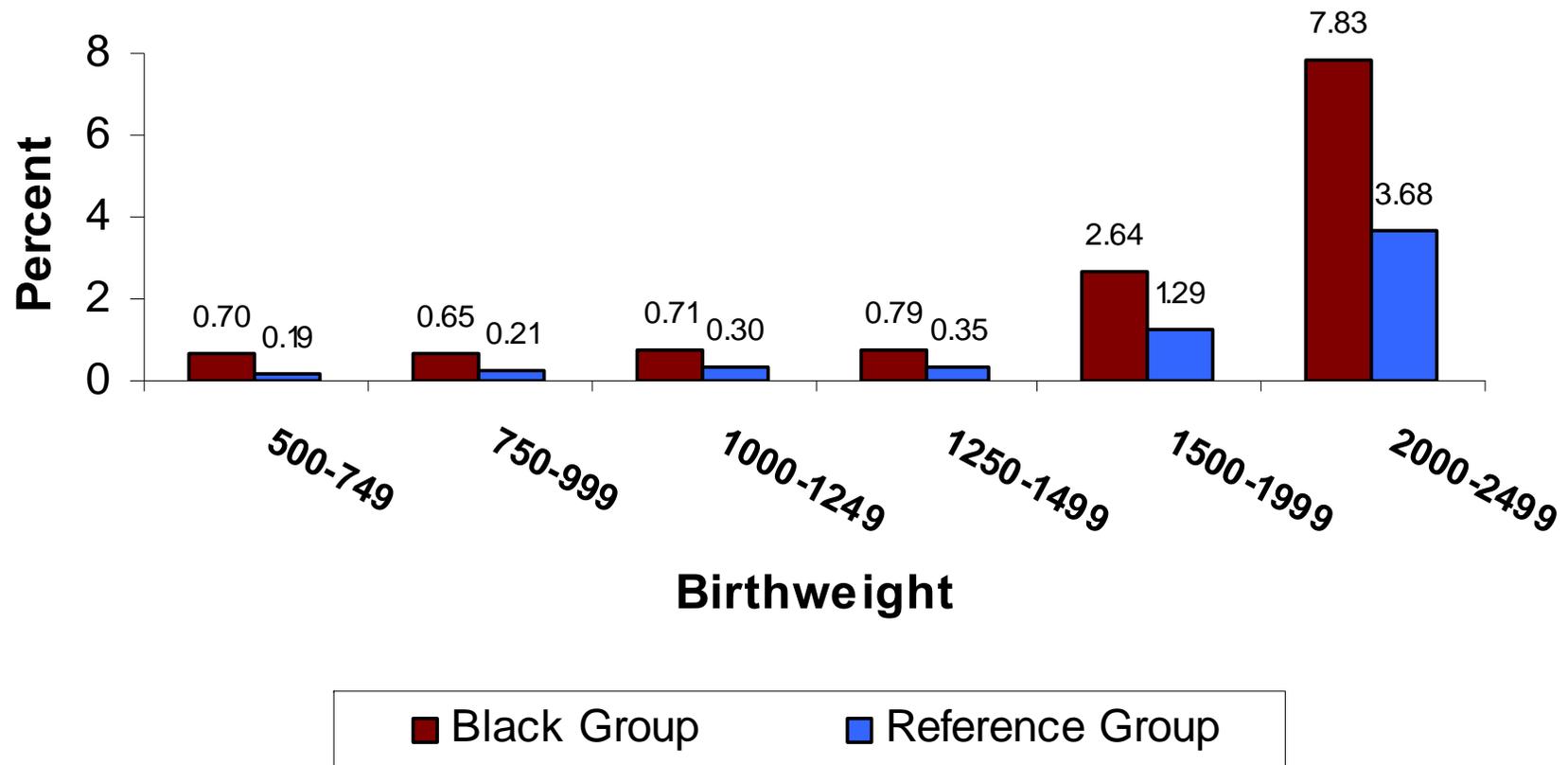
A20

Update with 2004-5
Administrator, 2/24/2009

Kitagawa Analysis

Maternal Health/Prematurity

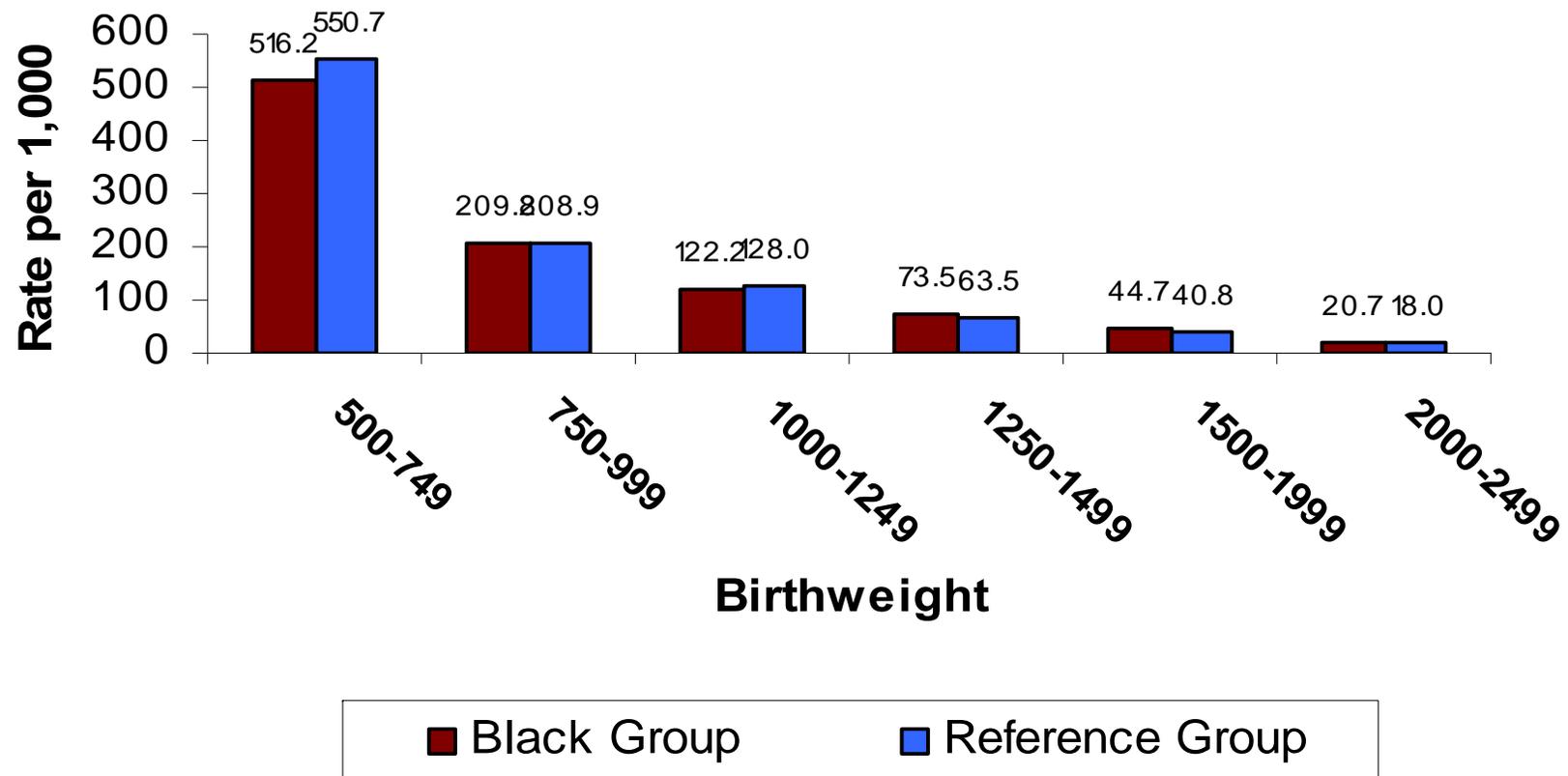
Percent of Birthweight Distribution (< 2,500 g) between Black and Reference Groups



Kitagawa Analysis

Maternal Health/Prematurity

Birthweight (< 2,500 g) Specific Mortality between Black and Reference Groups, Ohio, 1999-2002



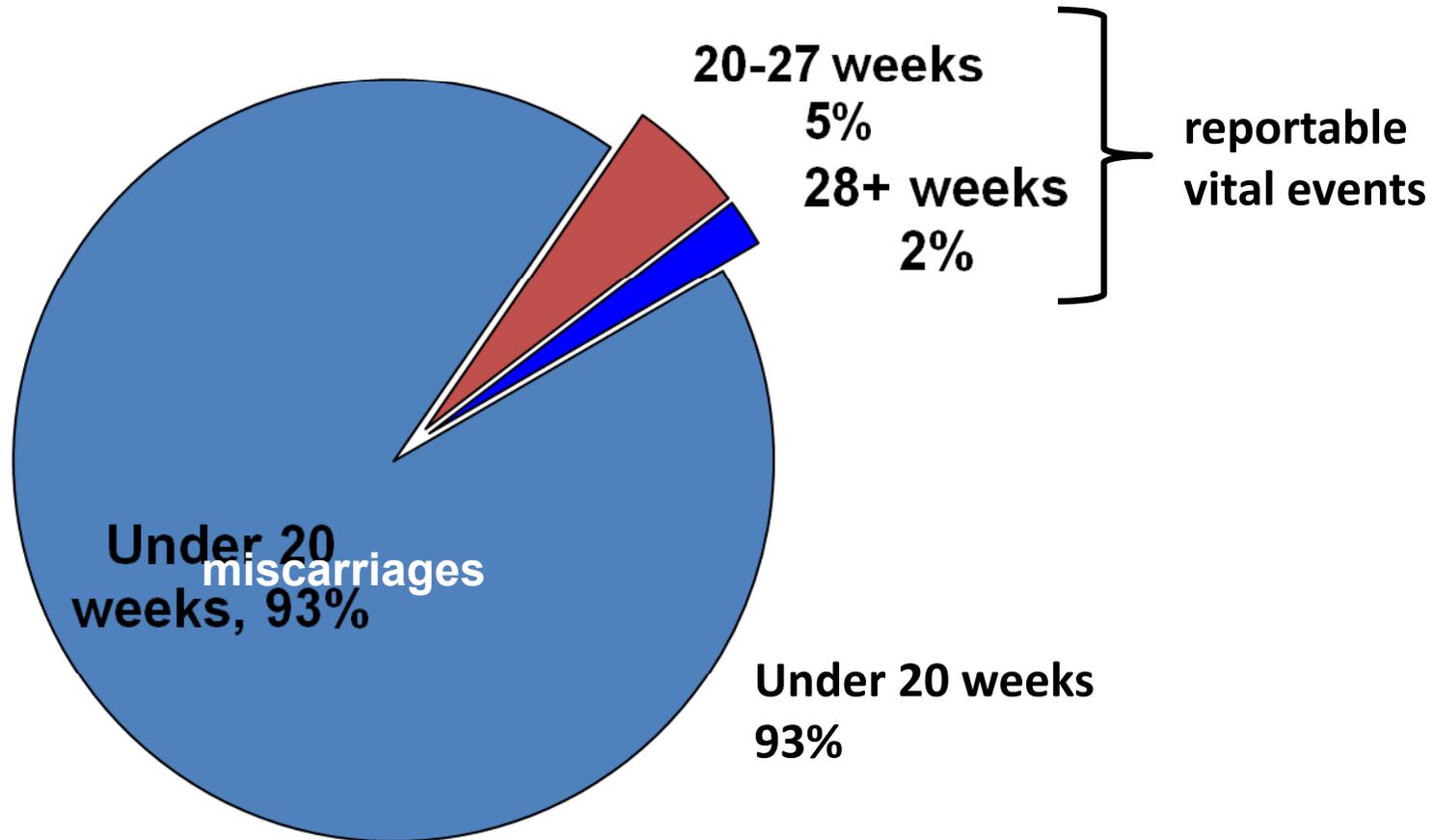
Kitagawa Analysis

Avg pop proportn	Mort Rate Diffrence	Avg Specific Mort	Pop proportio n Differenc e	SMR contribution to excess (SM)	BW Dist contribution to excess (BD)	Total
$(p+P)/2$	c-C	$(c+C)/2$	p-P	$(p+P)/2(c-C)$	$(c+C)/2(p-P)$	SM+B D
0.0044	-34.43	533.45	0.0051	-0.15	2.72	2.56
0.0043	0.89	209.34	0.0043	0.00	0.91	0.91
0.0051	-5.73	125.09	0.0042	-0.03	0.52	0.49
0.0057	9.96	68.51	0.0043	0.06	0.30	0.35
0.0196	3.92	42.72	0.0134	0.08	0.57	0.65
0.0575	0.00	10.05	0.0415	0.15	0.80	0.96
			-0.0729	3.07	-0.30	2.77
Actual				3.18	5.52	8.70
Percent				36.57%	63.43%	
VLBW Actual				-0.12	4.44	4.32
VLBW Percent				-1.39%	51.06%	49.67%

Conclusion:
**Black vs. reference
 group difference in
 maternal health deaths
 (birthweight < 1,500 g)
 mainly due to
 differences in
 birthweight distribution**

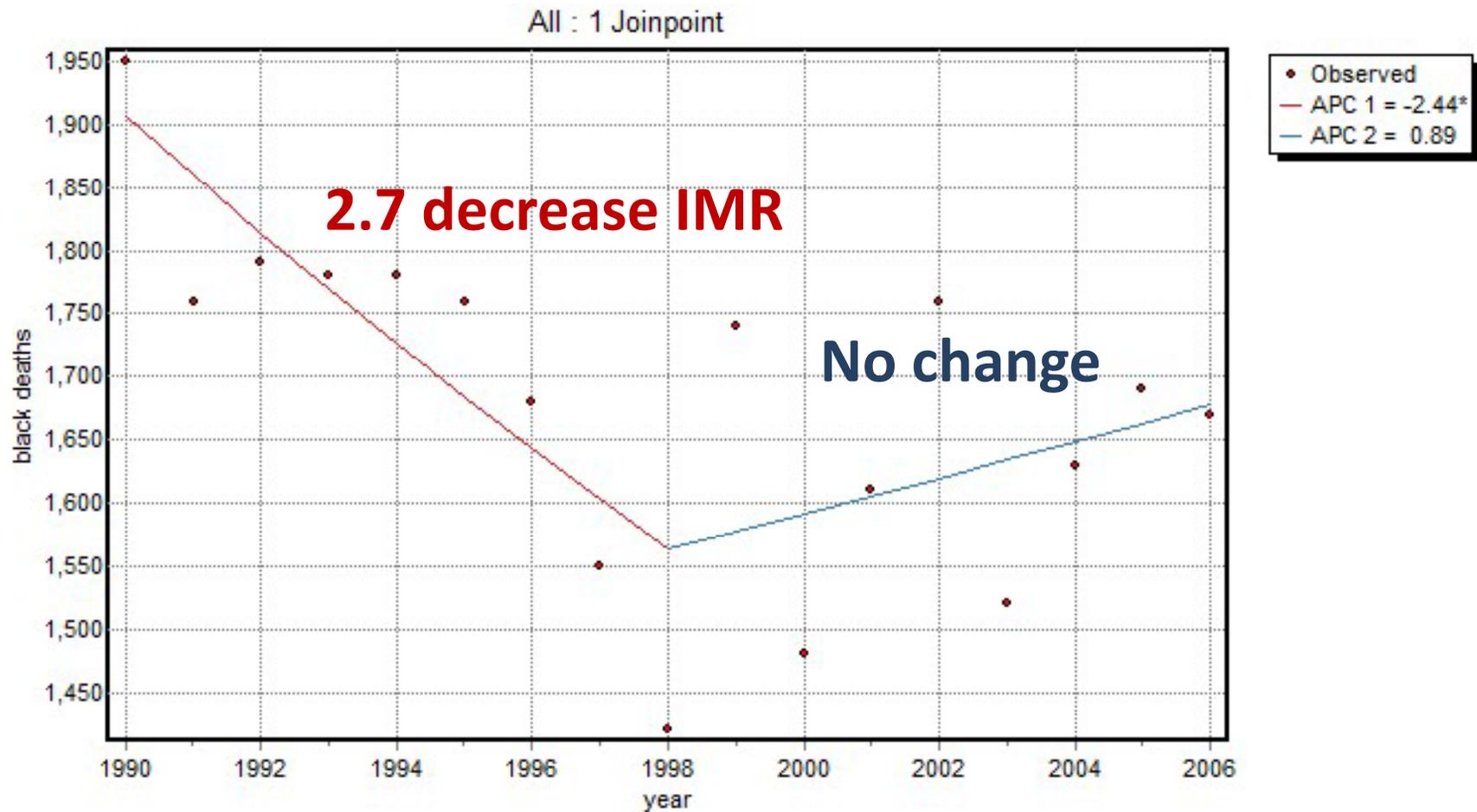
All Fetal Deaths

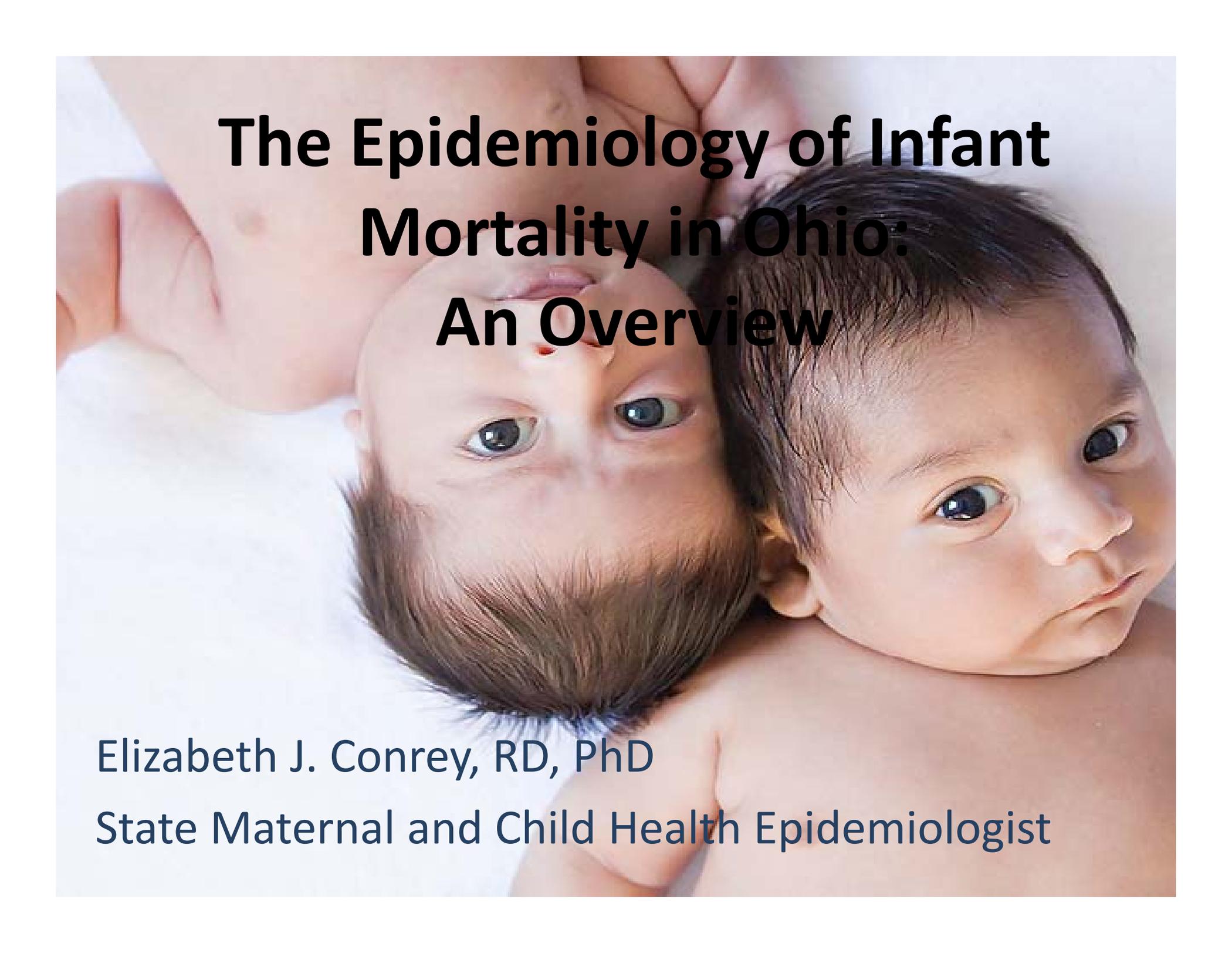
(n=980,000)



Source: 1995 National Survey of Family Growth

Black Infant Mortality– Ohio, 1990-2006





The Epidemiology of Infant Mortality in Ohio: An Overview

Elizabeth J. Conrey, RD, PhD

State Maternal and Child Health Epidemiologist