

Opportunities for Reducing Infant Mortality Rates: Perinatal Period of Risk (PPOR) Findings for Maryland Counties

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Prevention and Health Promotion Administration

Maternal and Child Health Bureau



MARYLAND
Department of Health



Prevention and Health Promotion Administration

MISSION AND VISION

MISSION

The mission of the Prevention and Health Promotion Administration is to protect, promote and improve the health and well-being of all Marylanders and their families through provision of public health leadership and through community-based public health efforts in partnership with local health departments, providers, community based organizations, and public and private sector agencies, giving special attention to at-risk and vulnerable populations.

VISION

The Prevention and Health Promotion Administration envisions a future in which all Marylanders and their families enjoy optimal health and well-being.

Overview

- Study Objectives
- Background on Maryland Infant Mortality Rates (IMR)
 - Statewide
 - By Counties and Types
- Strategies for reducing disparities
 - Perinatal Periods of Risk (PPOR)
 - Decomposition Analysis of Racial Disparities
 - Results
 - Target risk factors
 - Maps
- Conclusions
 - Recommendations
 - Limitations

Study Objectives

- Identify target Counties and populations for greatest infant mortality reductions
- Identify specific risk factors to target for prevention efforts

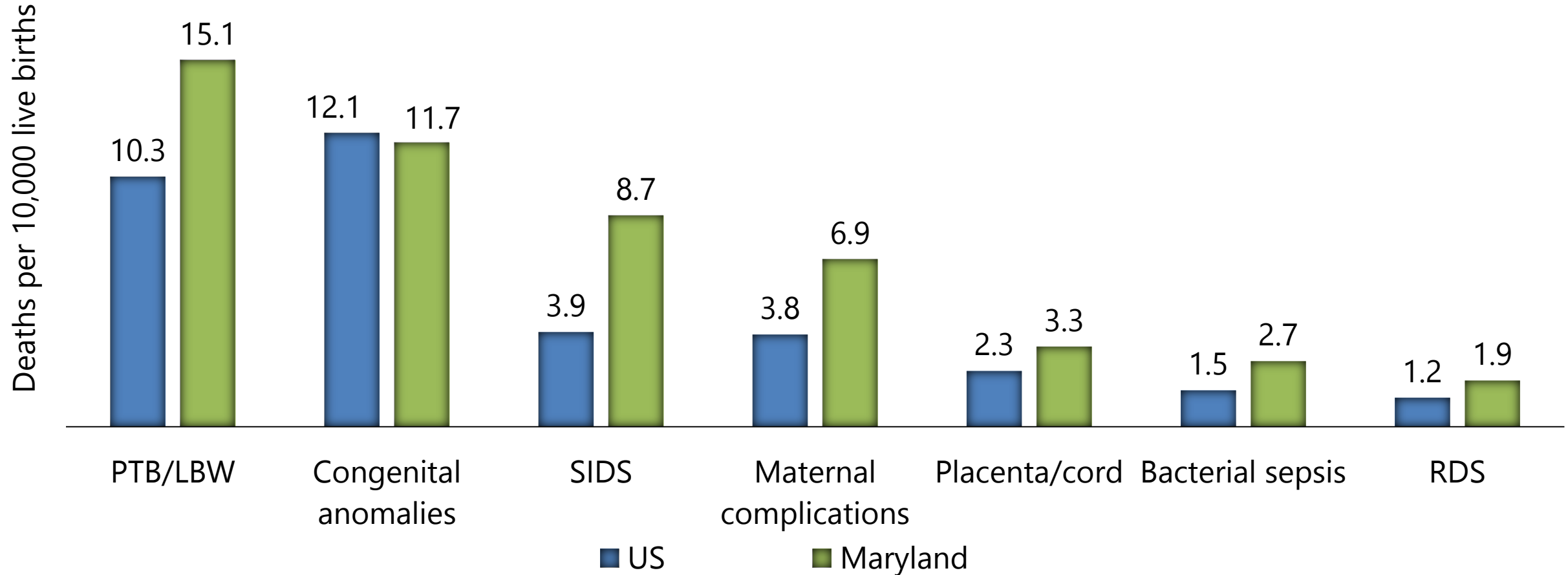
Statewide Infant Mortality Rates

Background

- Approximately 74,000 live births annually
- An average of 525 infant deaths per year (478 deaths in 2016).
 - About 7 deaths for every 1,000 live births (Ranked 16th highest in 2016).
- About three-quarters (72%) of infant deaths are neonatal.
- Most occur in urban Counties (78%).
- Leading causes of death (2011-2015)
 - Neonatal (<28 days old): preterm/low birth weight, maternal complications, congenital anomalies, placenta/cord complications
 - Postneonatal (28-364 days old): SIDS, congenital anomalies, accidents, infectious diseases

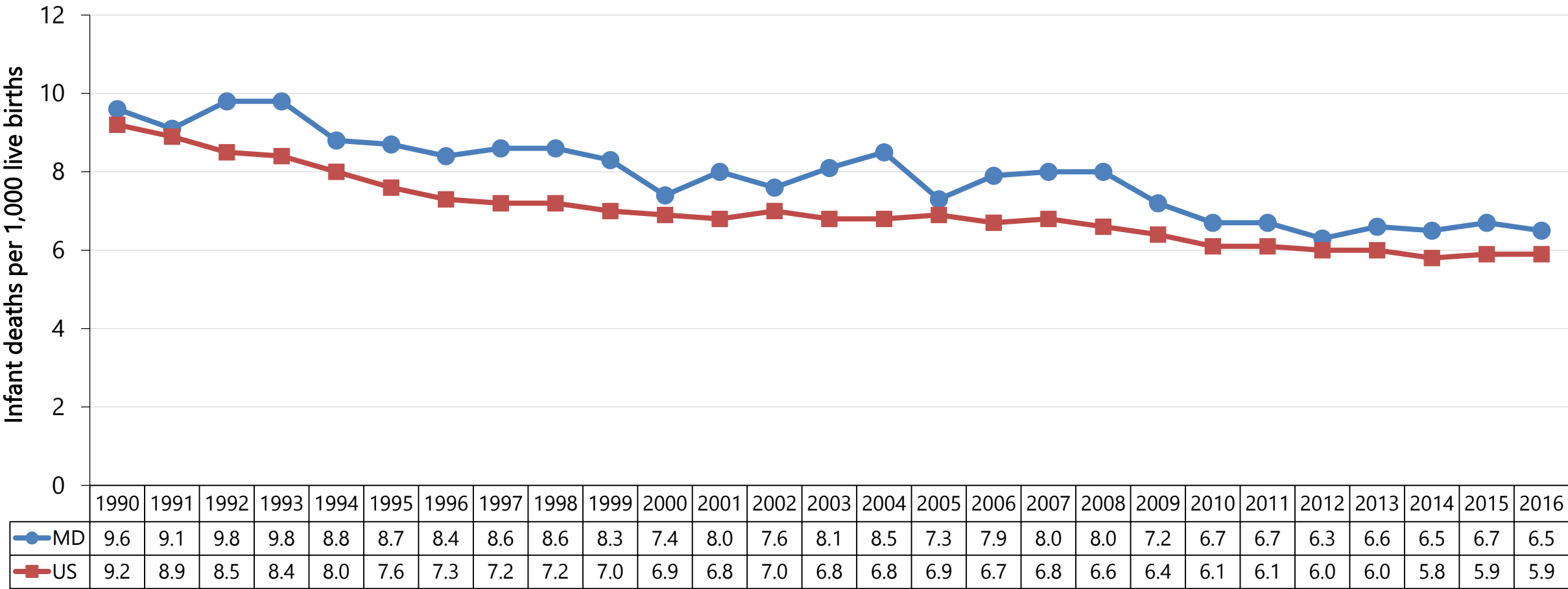
Background

Infant mortality rates by cause of death, United States and Maryland, 2015



Background

Infant Mortality Rates, Maryland & US, 1990 - 2016

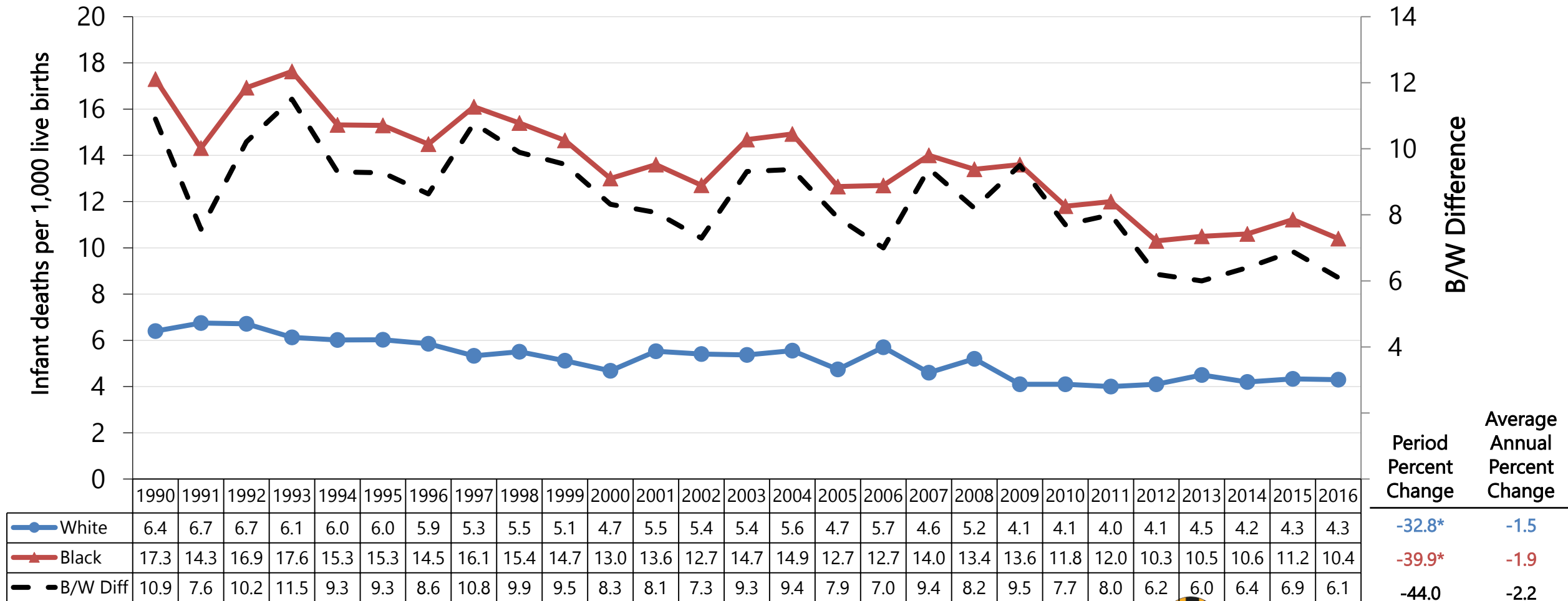


Maryland IMR's have decreased 32% since 1990



Background

Infant Mortality Rates by Race, Maryland, 1990 - 2016

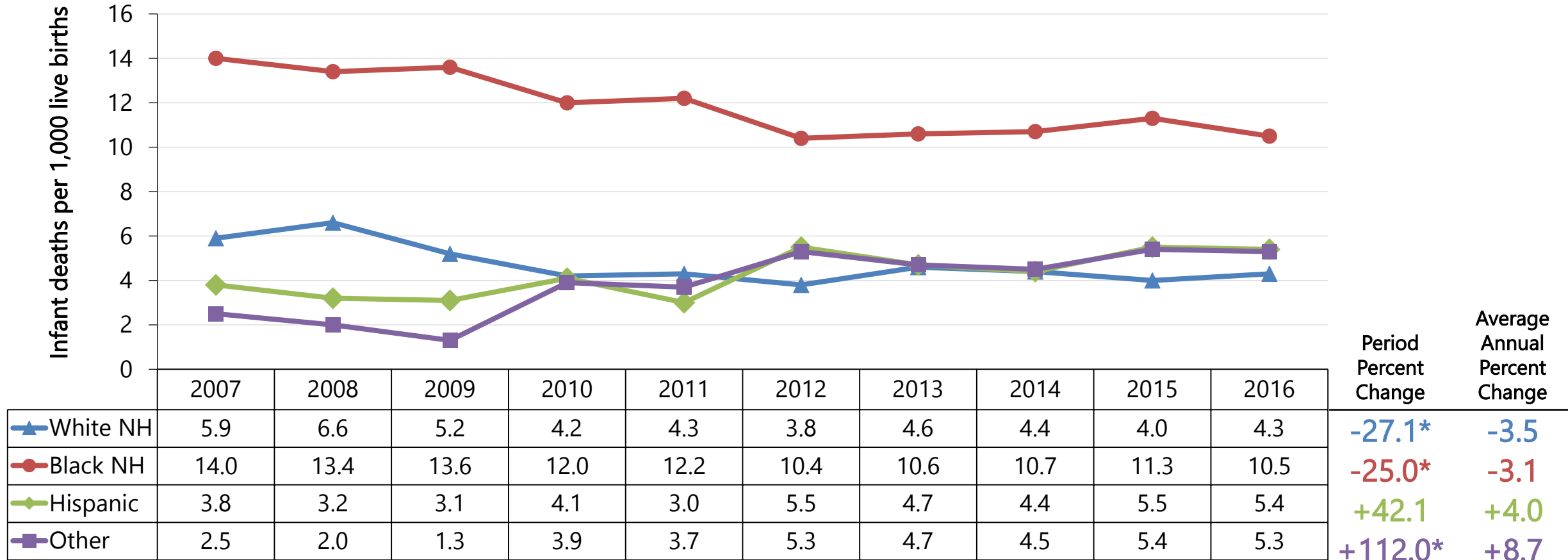


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Source: Maryland Vital Statistics Administration. * 2016 rate differs significantly from 1990 rate ($p < 0.05$).

Background

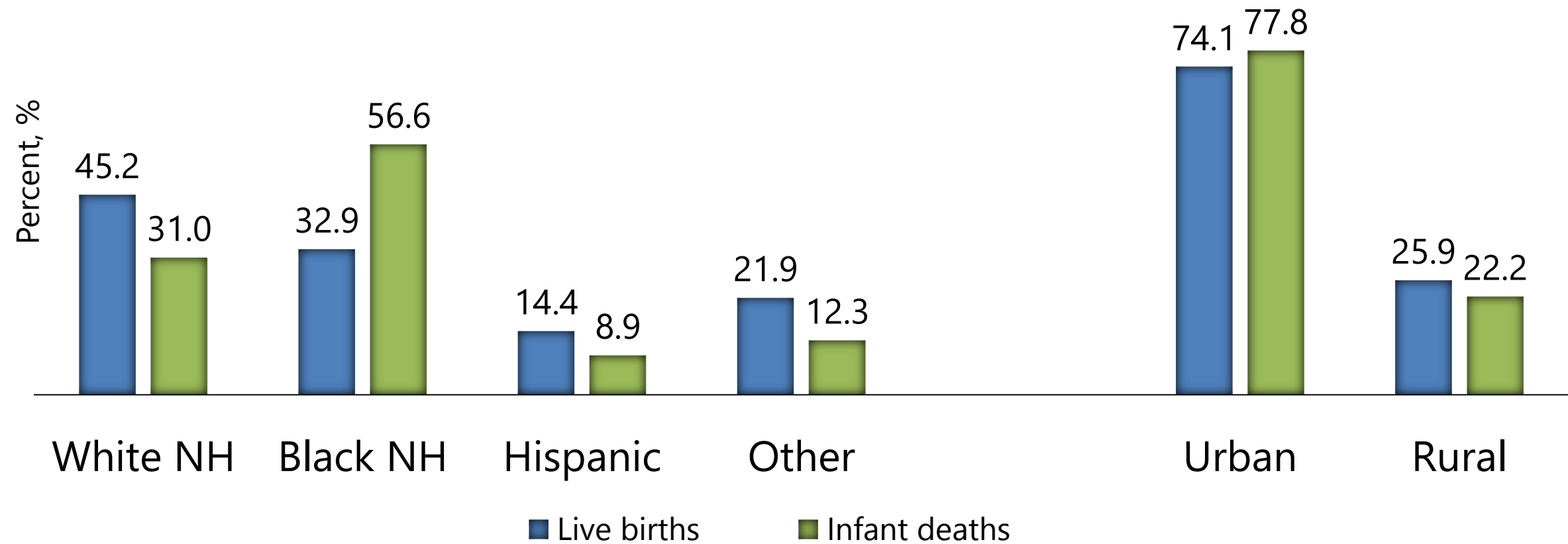
Infant Mortality Rates by Race/Ethnicity, Maryland, 2007 - 2016



¹⁰ Source: Maryland Vital Statistics Administration. NH: non-Hispanic years 2010 and on. * denotes 2016 rate differs significantly from 2007 rate (p<0.05).

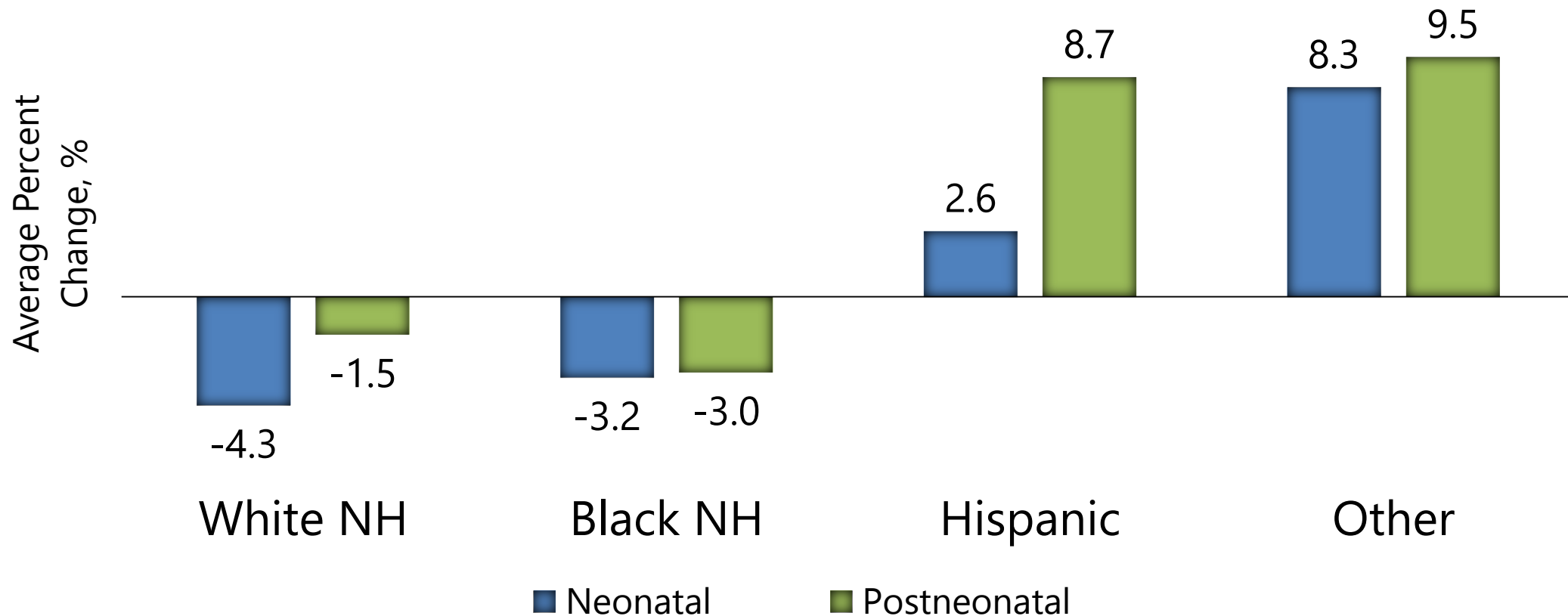
Background

Distribution of Live Births and Infant Deaths by Race/Ethnicity, Maryland, 2007 - 2016



Background

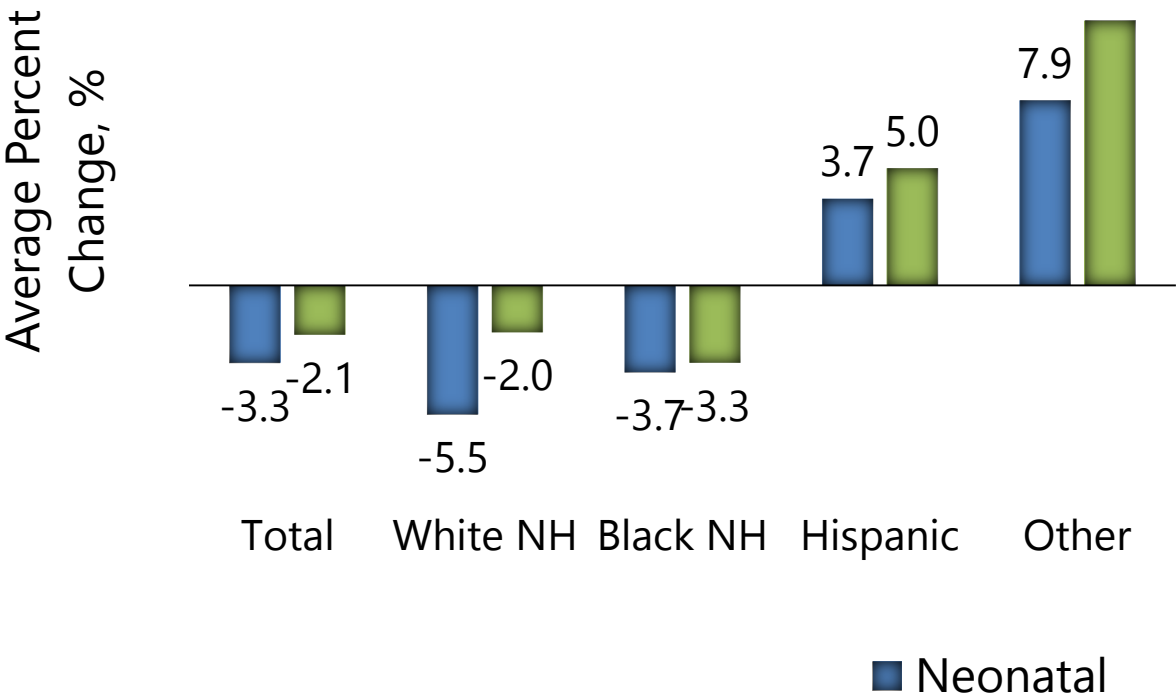
**Average Annual Infant Mortality Rate Percentage Change
by Race/Ethnicity and Age at Death, Maryland, 2007 - 2016**



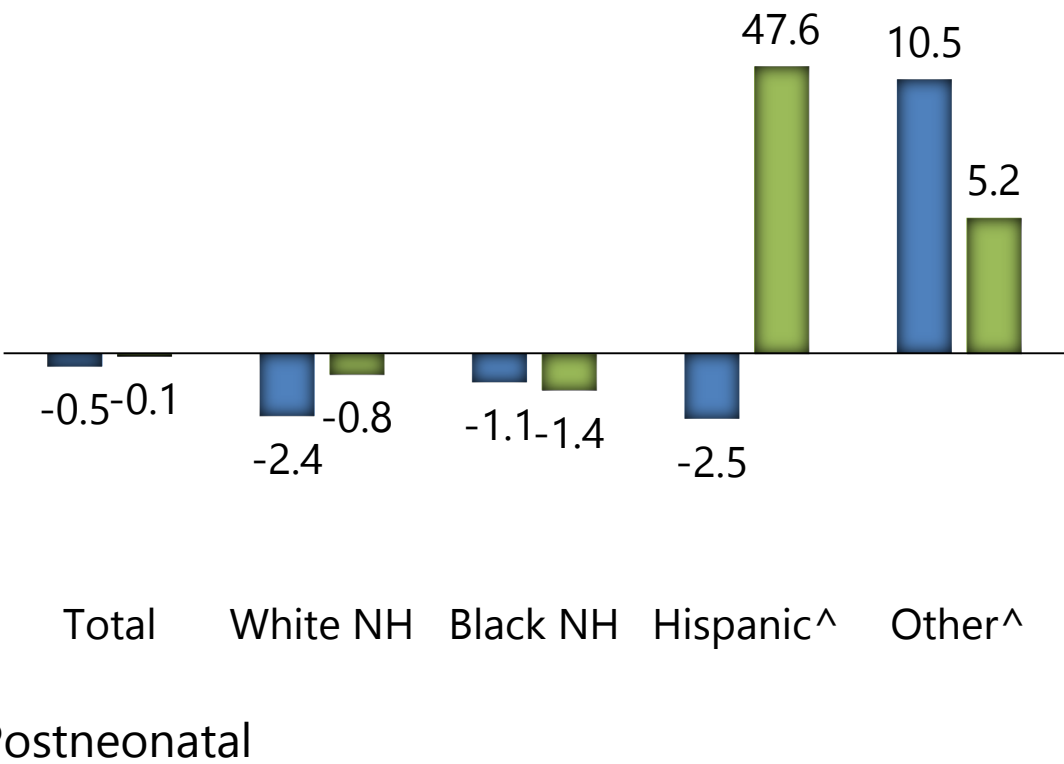
Background

**Average Annual Infant Mortality Rate Percentage Change
by Race/Ethnicity, Age at Death, and Rural/Urban Residence, Maryland, 2007 - 2016**

Urban



Rural



Infant Mortality Trends by Rural/Urban Residence

Urban Counties

Anne Arundel
Baltimore City
Baltimore County
Howard
Montgomery
Prince George's

Rural Counties

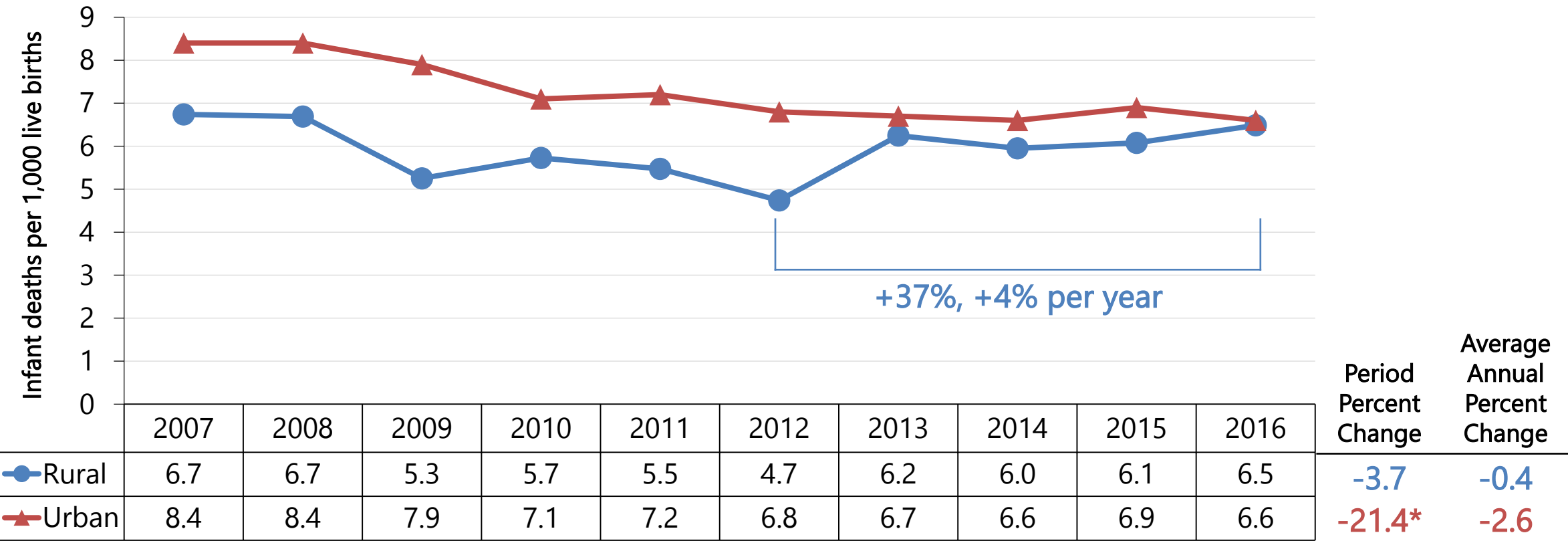
County	Region
Allegany	Northwest
Garrett	
Washington	
Caroline	Eastern Shore
Cecil	
Dorchester	
Kent	
Queen Anne's	
Somerset	
Talbot	
Wicomico	
Worcester	Central Maryland
Calvert	
Carroll	
Charles	
Frederick	
Harford	
St. Mary's	

Background

- Most of the decrease in infant mortality rates (IMR) observed in urban Counties
- IMR's in rural areas increase 37% in last five years
 - Small increase in postneonatal deaths.

Background

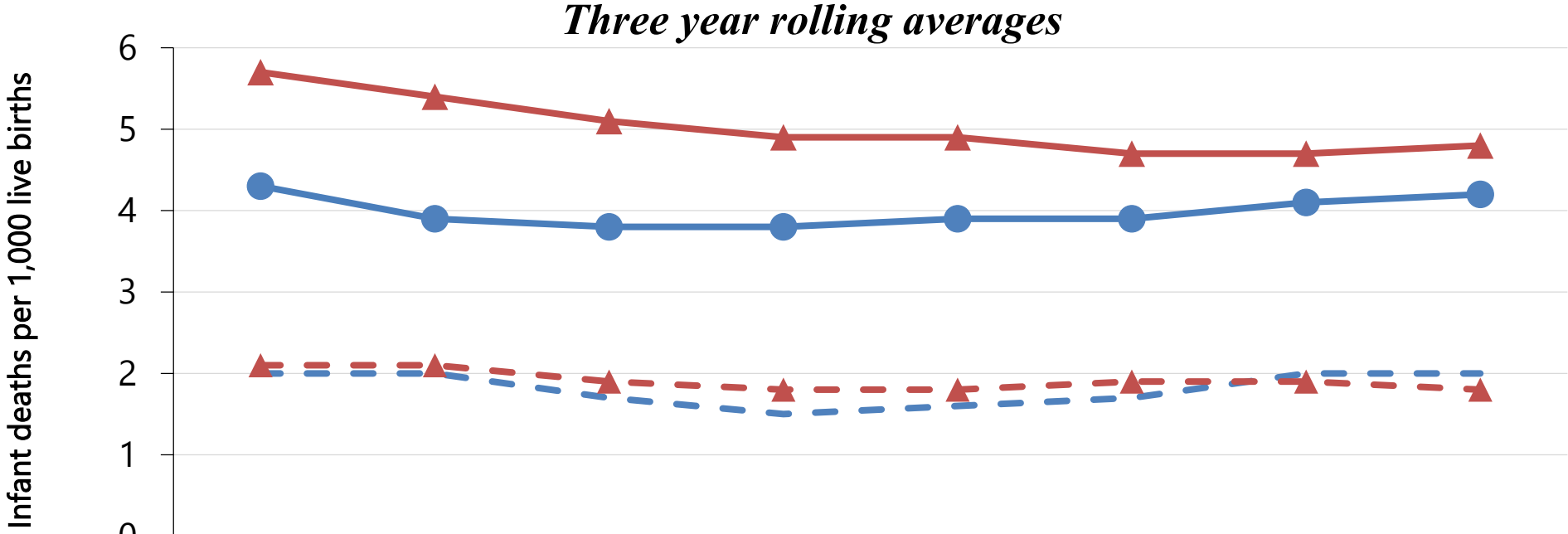
Infant Mortality Rates by Rural/Urban Counties, Maryland, 2007 - 2016



Source: Maryland Vital Statistics Administration. * denotes 2016 rate differs significantly from 2005 rate ($p < 0.05$).

Rural includes Allegany, Calvert, Caroline, Carroll, Cecil, Charles, Dorchester, Frederick, Garrett, Harford, Kent, Queen Anne's, Somerset, Saint Mary's, Talbot, Washington, Wicomico, and Worcester counties. Urban includes Baltimore County and City, Anne Arundel, Howard, Montgomery, and Prince George's Counties.

Infant Mortality Rates by Age at Death and Rural/Urban Counties, Maryland, 2007 - 2016



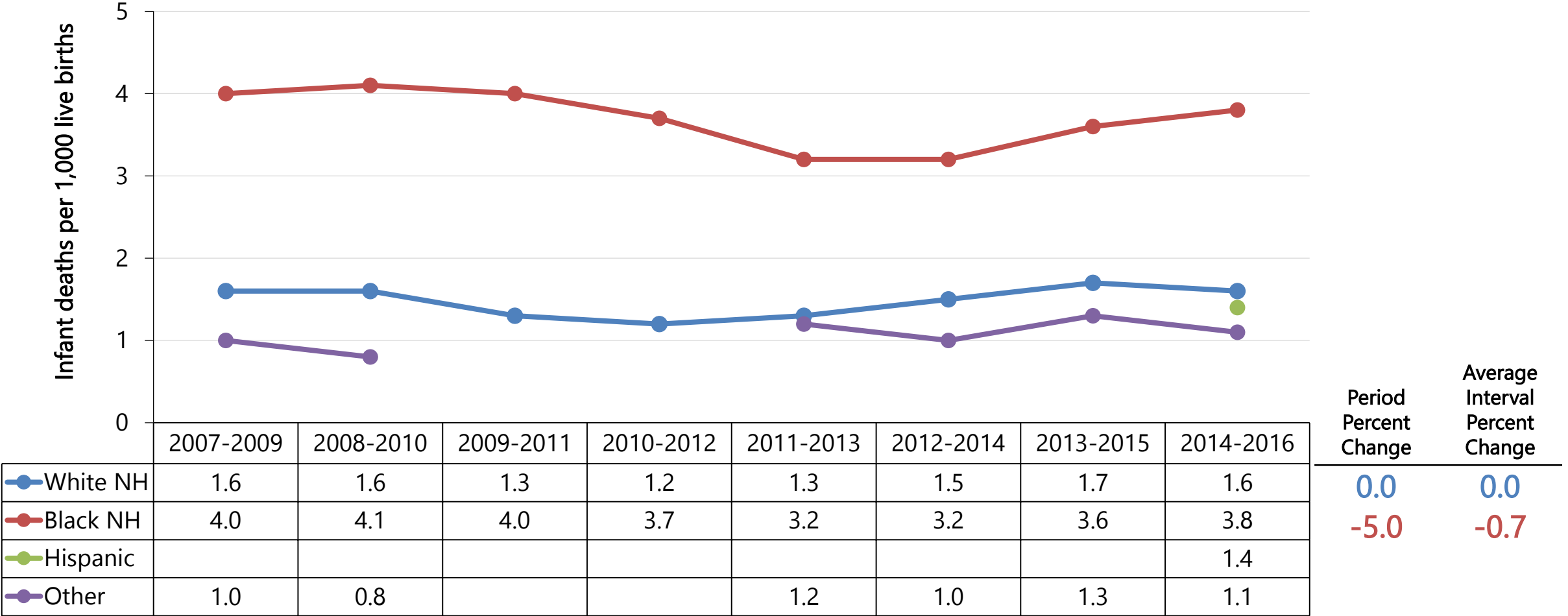
	2007-2009	2008-2010	2009-2011	2010-2012	2011-2013	2012-2014	2013-2015	2014-2016	Period Percent Change	Average Interval Percent Change
Rural - Neonatal	4.3	3.9	3.8	3.8	3.9	3.9	4.1	4.2	-2.3	-0.3
Rural - Postneonatal	2.0	2.0	1.7	1.5	1.6	1.7	2.0	2.0	0.0	0.0
Urban - Neonatal	5.7	5.4	5.1	4.9	4.9	4.7	4.7	4.8	-15.8	-2.4
Urban - Postneonatal	2.1	2.1	1.9	1.8	1.8	1.9	1.9	1.8	-14.3	-2.2

18 Source: Maryland Vital Statistics Administration. NH: non-Hispanic years 2010 and on.
Rural includes Allegany, Calvert, Caroline, Carroll, Cecil, Charles, Dorchester, Frederick, Garrett, Harford, Kent, Queen Anne's, Somerset, Saint Mary's, Talbot, Washington, Wicomico, and Worcester counties.



Rural Postneonatal (28-364 days old) Infant Mortality Rates by Race, Maryland, 2007 - 2016

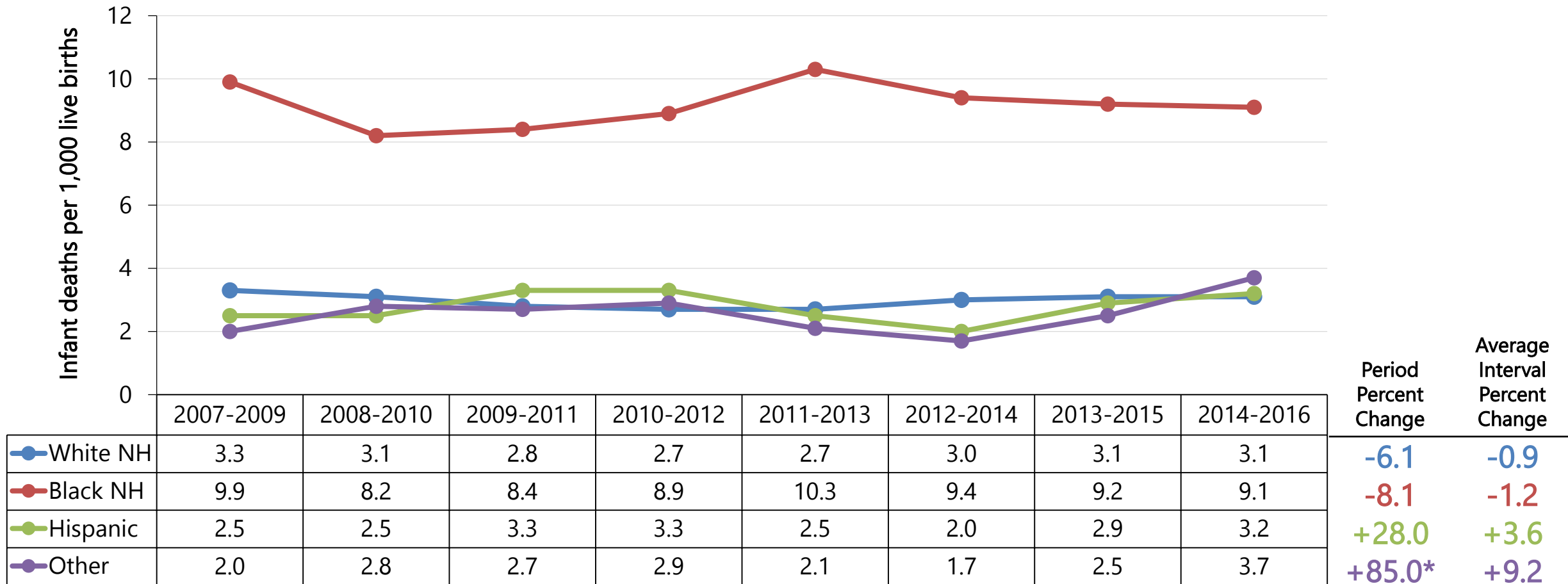
Three year rolling averages



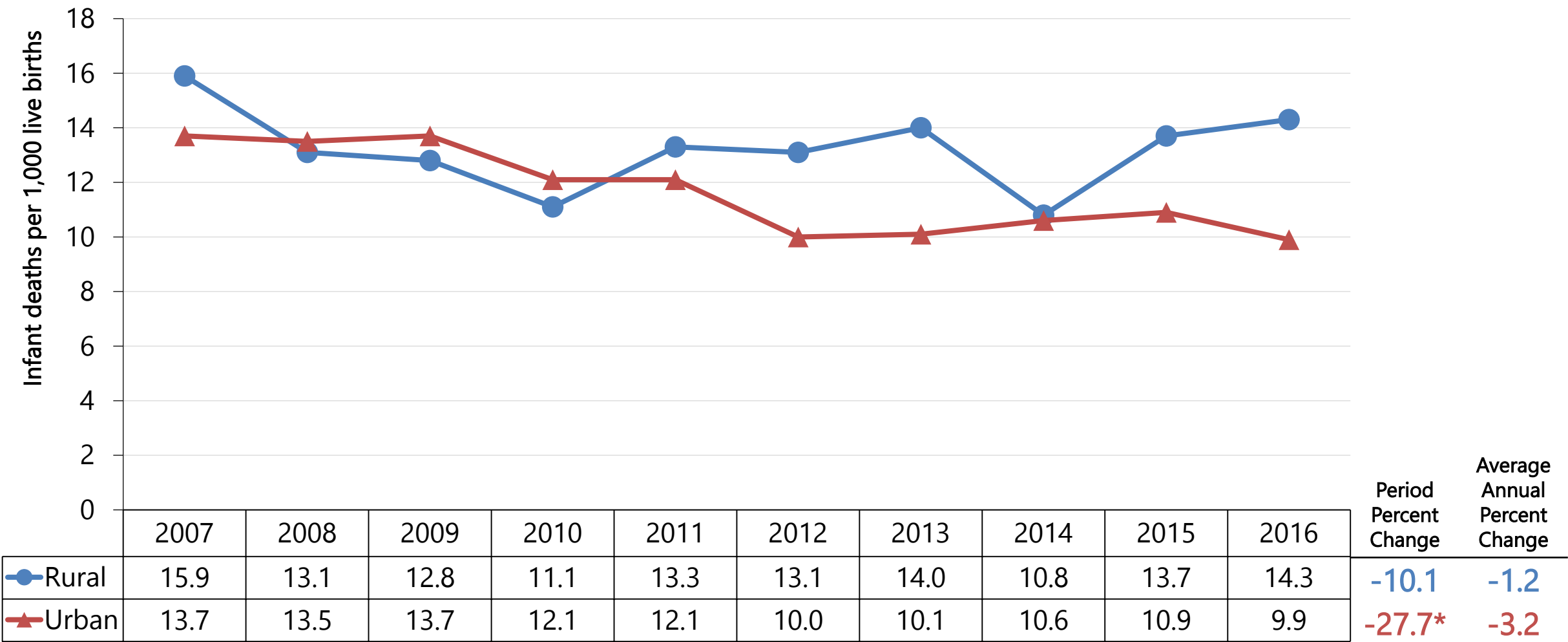
Source: Maryland Vital Statistics Administration. NH: non-Hispanic years 2010 and on.
19 Rural includes Allegany, Calvert, Caroline, Carroll, Cecil, Charles, Dorchester, Frederick, Garrett, Harford, Kent, Queen Anne's, Somerset, Saint Mary's, Talbot, Washington, Wicomico, and Worcester counties.

Rural Neonatal (<28 days old) Infant Mortality Rates by Race, Maryland, 2005 - 2016

Three year rolling averages

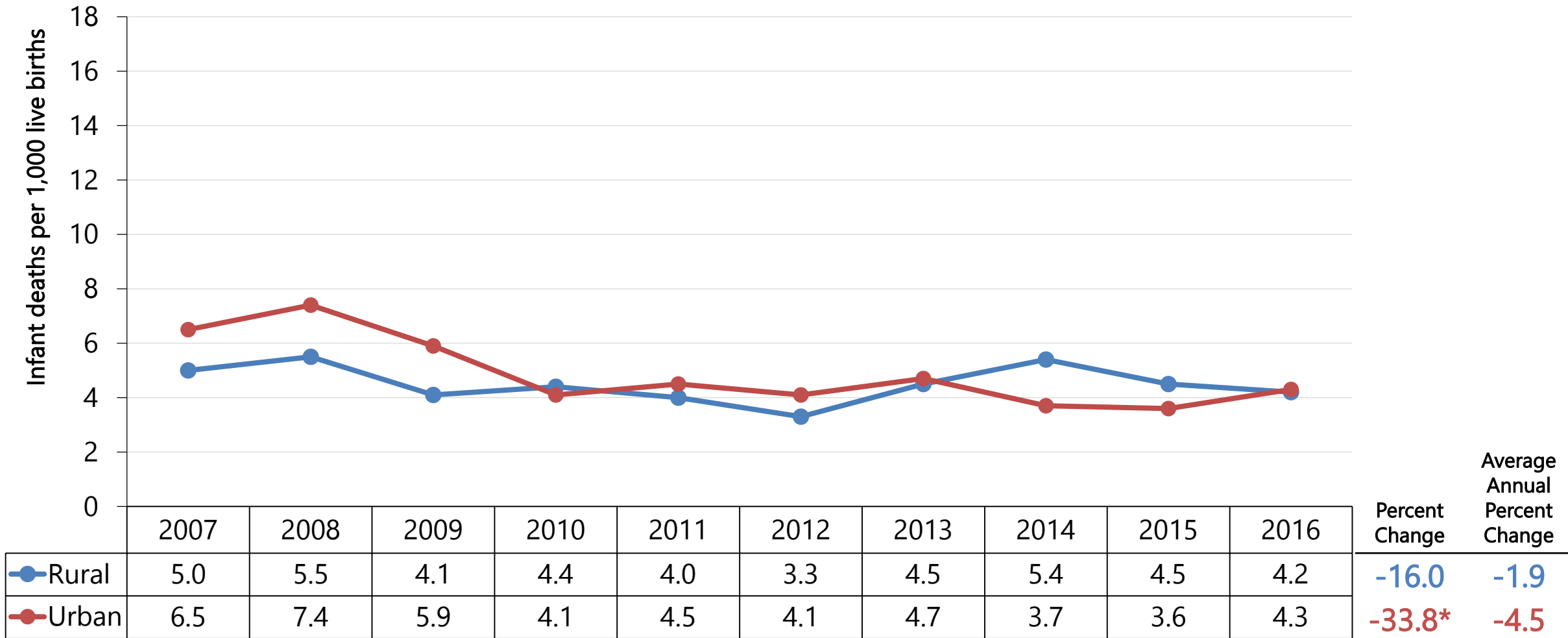


Black NH Infant Mortality Rates by Rural/Urban Counties, Maryland, 2005 - 2016



21 Source: Maryland Vital Statistics Administration. NH: non-Hispanic years 2010 and on. * denotes 2016 rate differs significantly from 2005 rate (p<0.05). Rural includes Allegany, Calvert, Caroline, Carroll, Cecil, Charles, Dorchester, Frederick, Garrett, Harford, Kent, Queen Anne's, Somerset, Saint Mary's, Talbot, Washington, Wicomico, and Worcester counties.

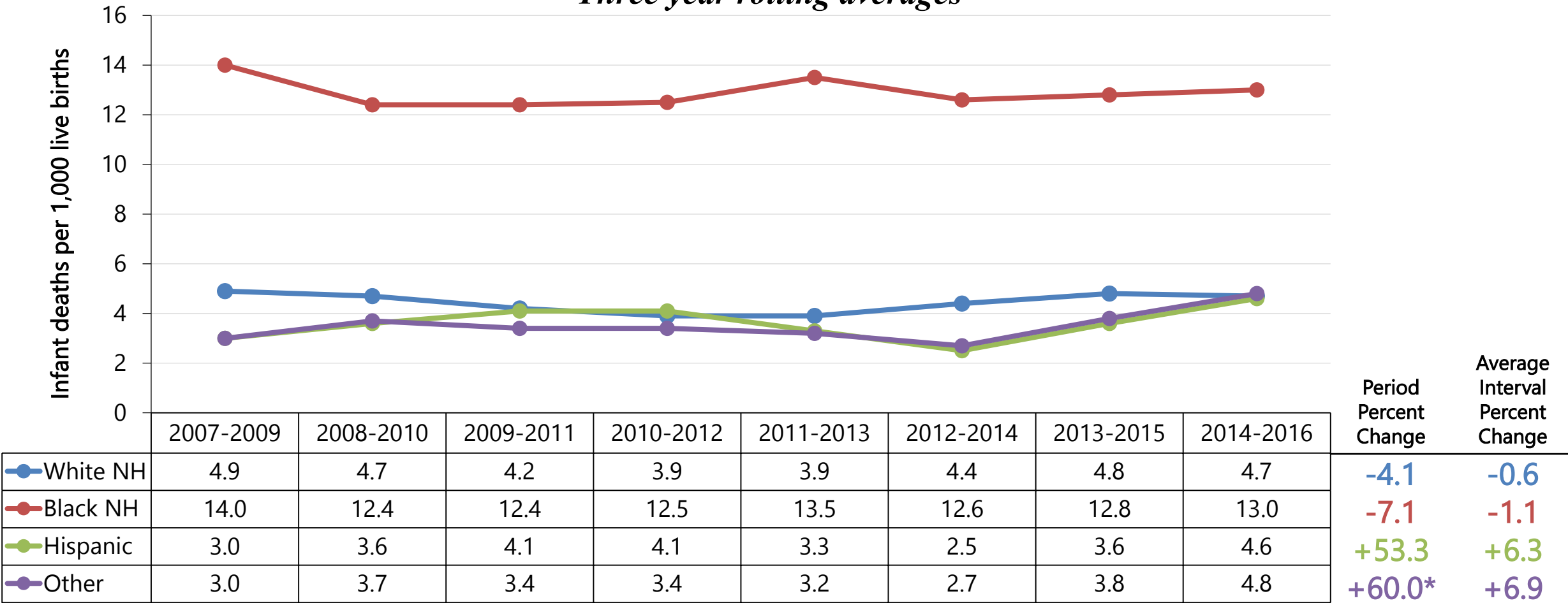
White NH Infant Mortality Rates by Rural/Urban Counties, Maryland, 2007 - 2016



22 Source: Maryland Vital Statistics Administration. NH: non-Hispanic years 2010 and on. * denotes 2016 rate differs significantly from 2005 rate ($p < 0.05$). Rural includes Allegany, Calvert, Caroline, Carroll, Cecil, Charles, Dorchester, Frederick, Garrett, Harford, Kent, Queen Anne's, Somerset, Saint Mary's, Talbot, Washington, Wicomico, and Worcester counties.

Rural Infant Mortality Rates by Race, Maryland, 2007 - 2016

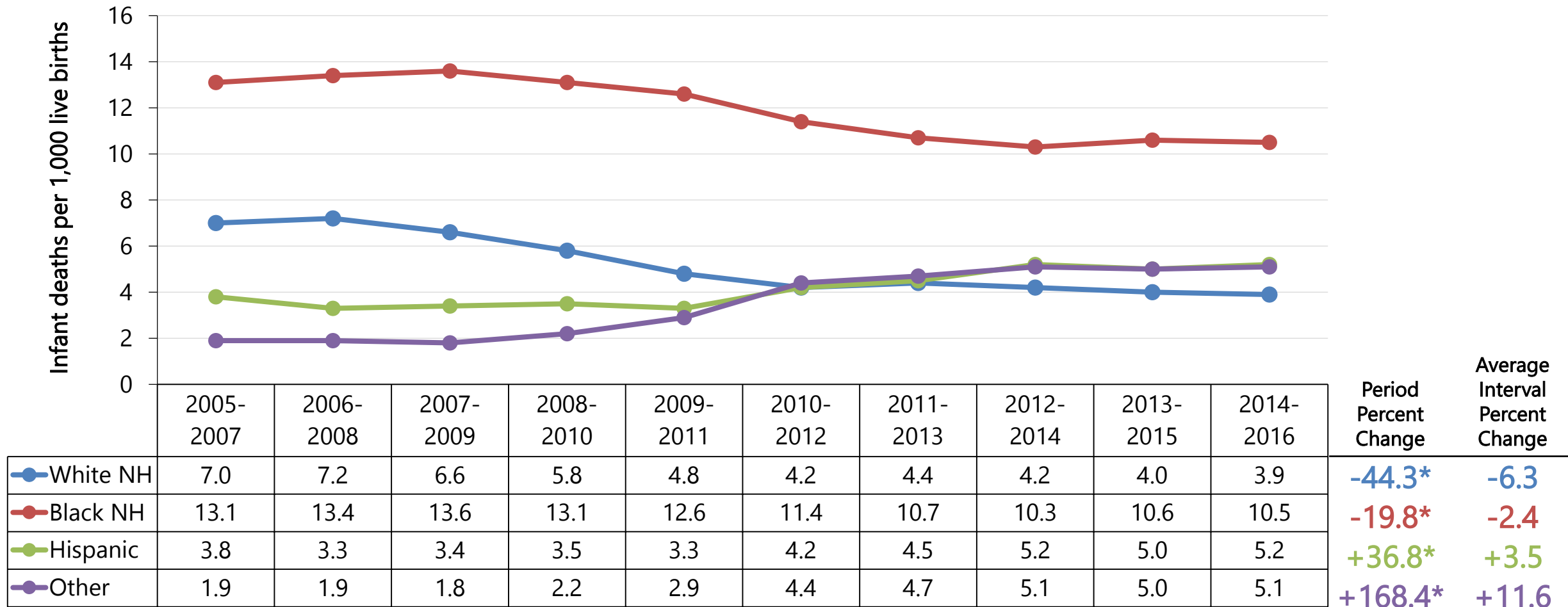
Three year rolling averages



23 Source: Maryland Vital Statistics Administration. NH: non-Hispanic years 2010 and on. * denotes 2014-2016 rate differs significantly from 2005-2007 rate (p<0.05). Rural includes Allegany, Calvert, Caroline, Carroll, Cecil, Charles, Dorchester, Frederick, Garrett, Harford, Kent, Queen Anne's, Somerset, Saint Mary's, Talbot, Washington, Wicomico, and Worcester counties.

Urban Infant Mortality Rates by Race, Maryland, 2005 - 2016

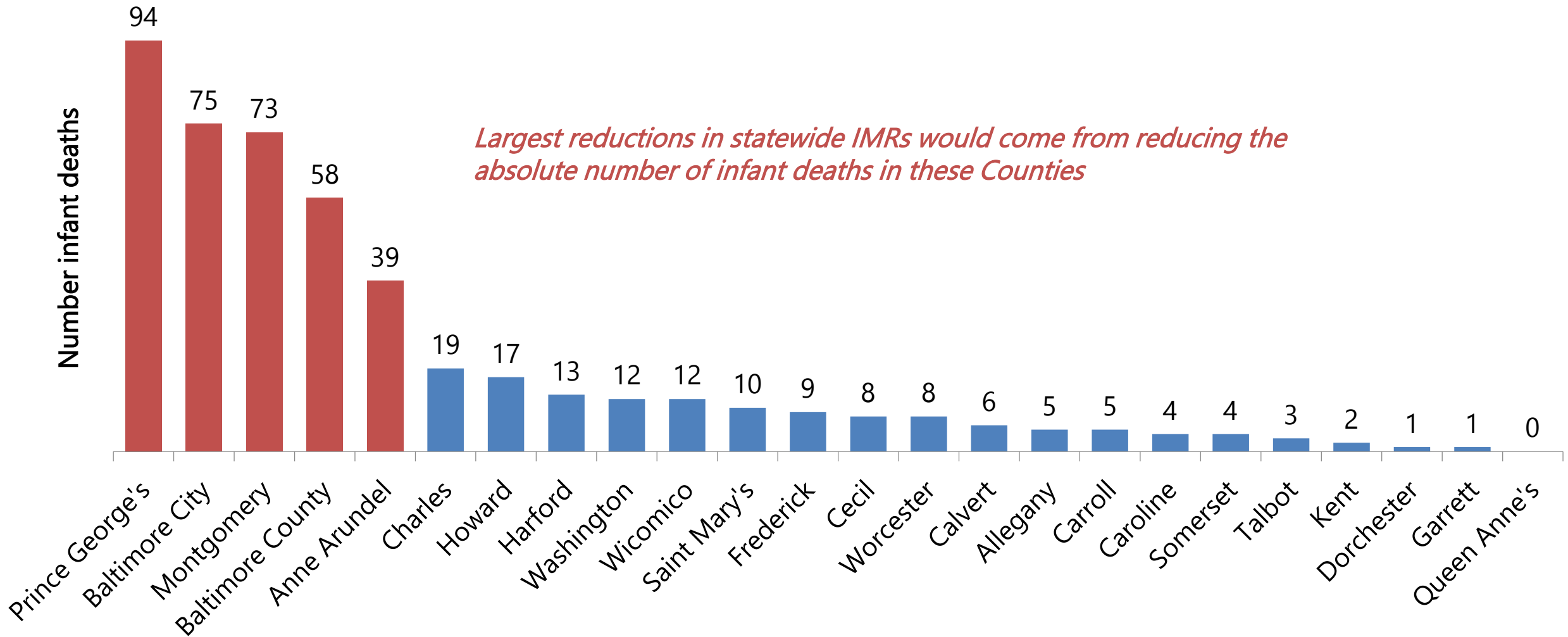
Three year rolling averages



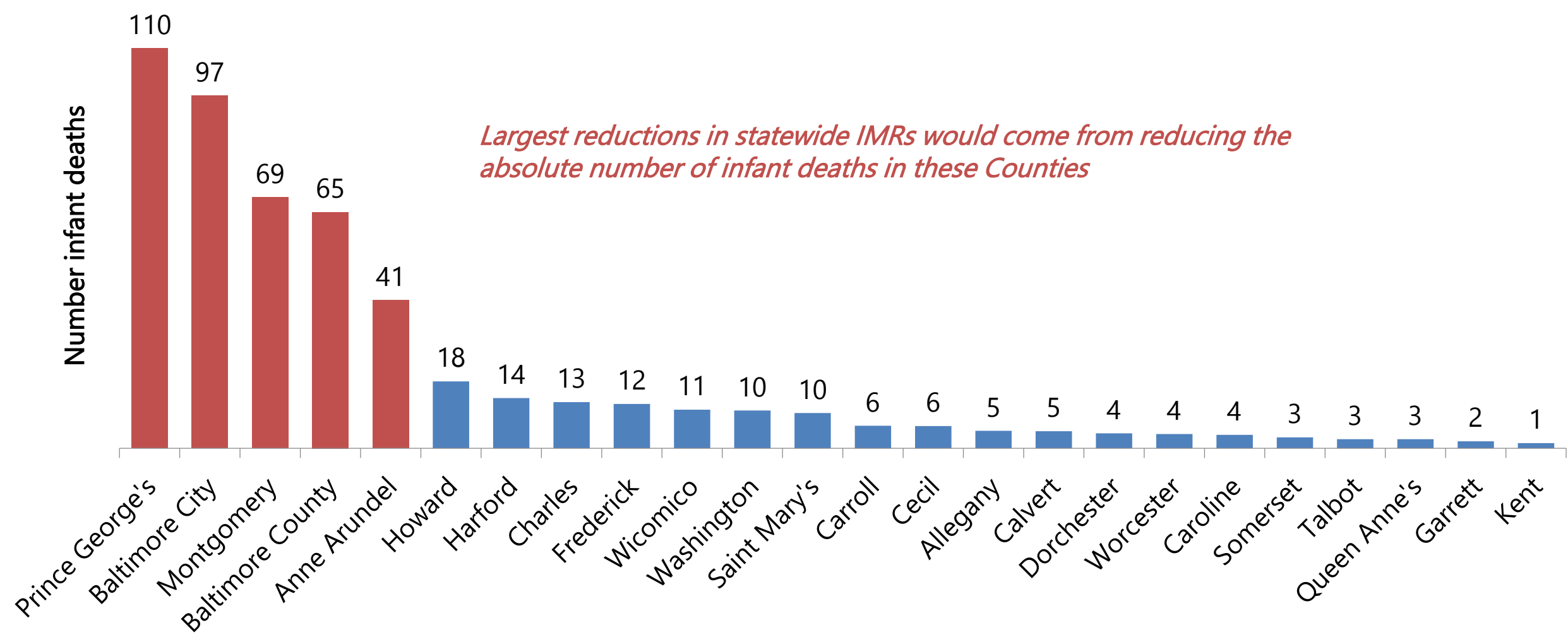
24 Source: Maryland Vital Statistics Administration. NH: non-Hispanic years 2010 and on.
 * denotes 2015-2016 rate differs significantly from 2005-2006 rate ($p < 0.05$).
 Urban includes Baltimore County and City, Anne Arundel, Howard, Montgomery, and Prince George's Counties.

Infant Mortality Rates by Residence Jurisdiction

Number of Infant Deaths, 2016

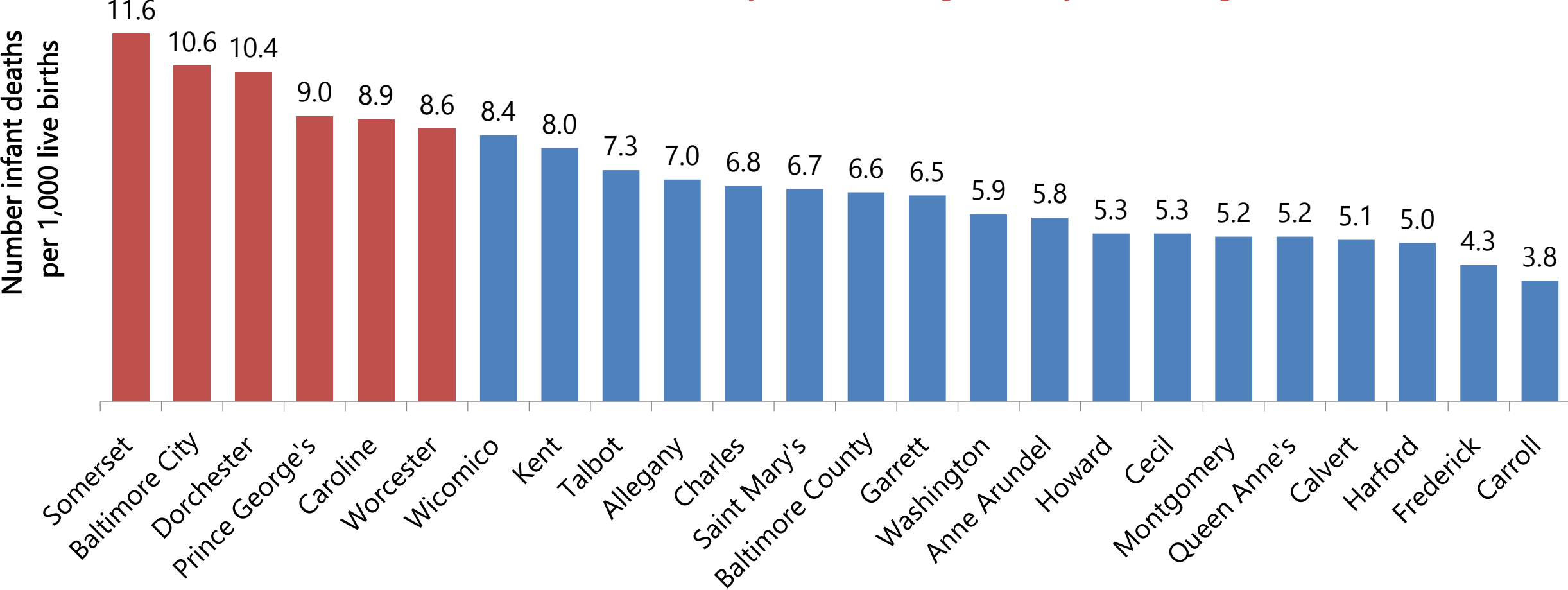


Average Annual Number of Infant Deaths, 2007-2016

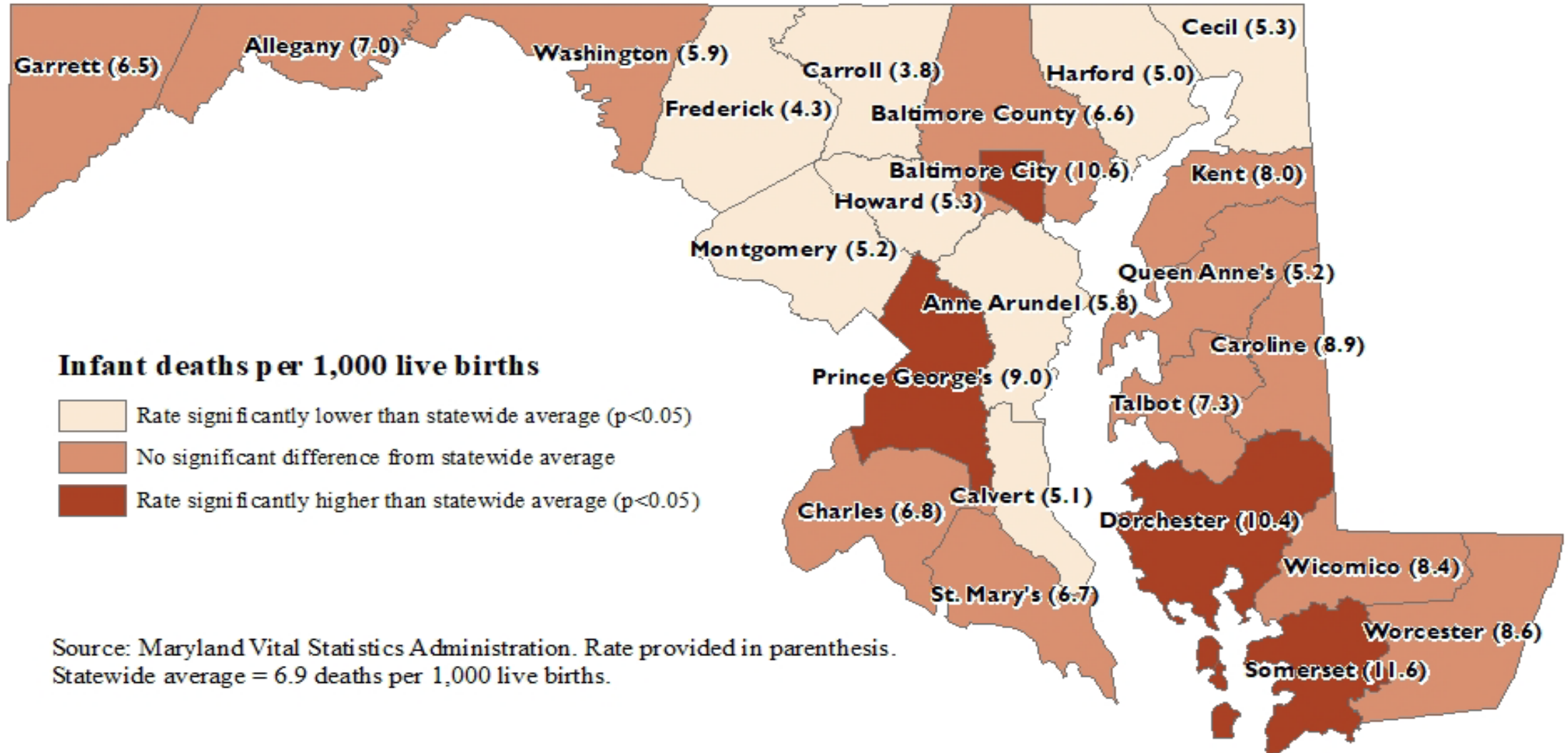


Ten-Year Infant Mortality Rates by Jurisdiction, Maryland, 2007-2016

Eastern Shore areas, Baltimore City & Prince George's county have the highest rates

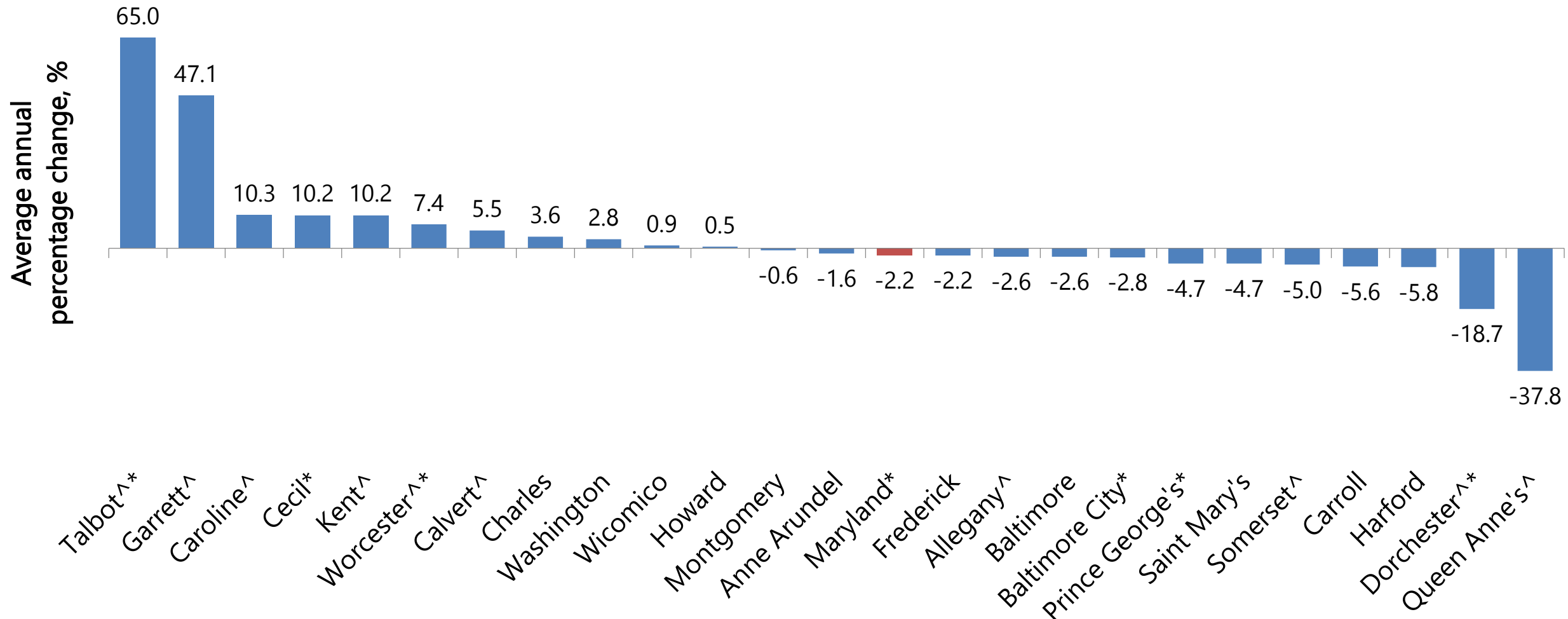


Infant Mortality Rate by County, Maryland, 2007-2016



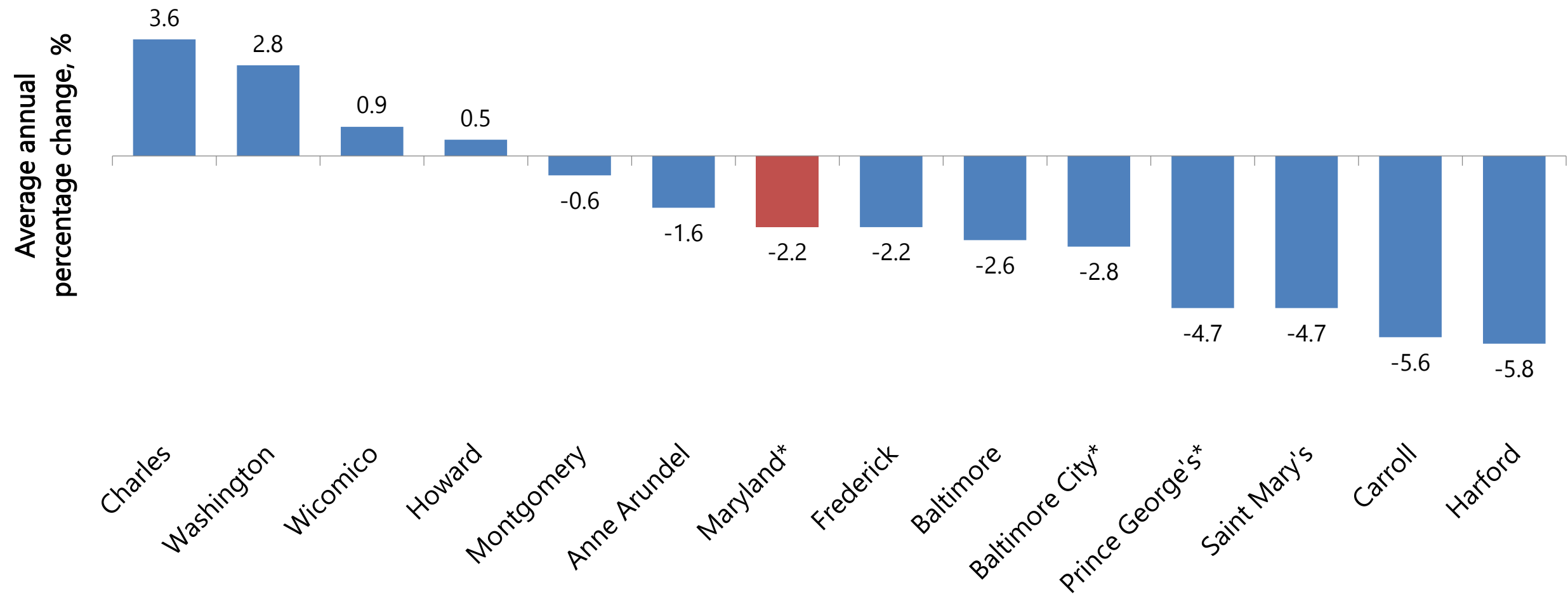
Infant Mortality Rate Trends by Residence Jurisdiction & Race

Infant Mortality Rates Average Percentage Change by Jurisdiction, Maryland, 2007-2016

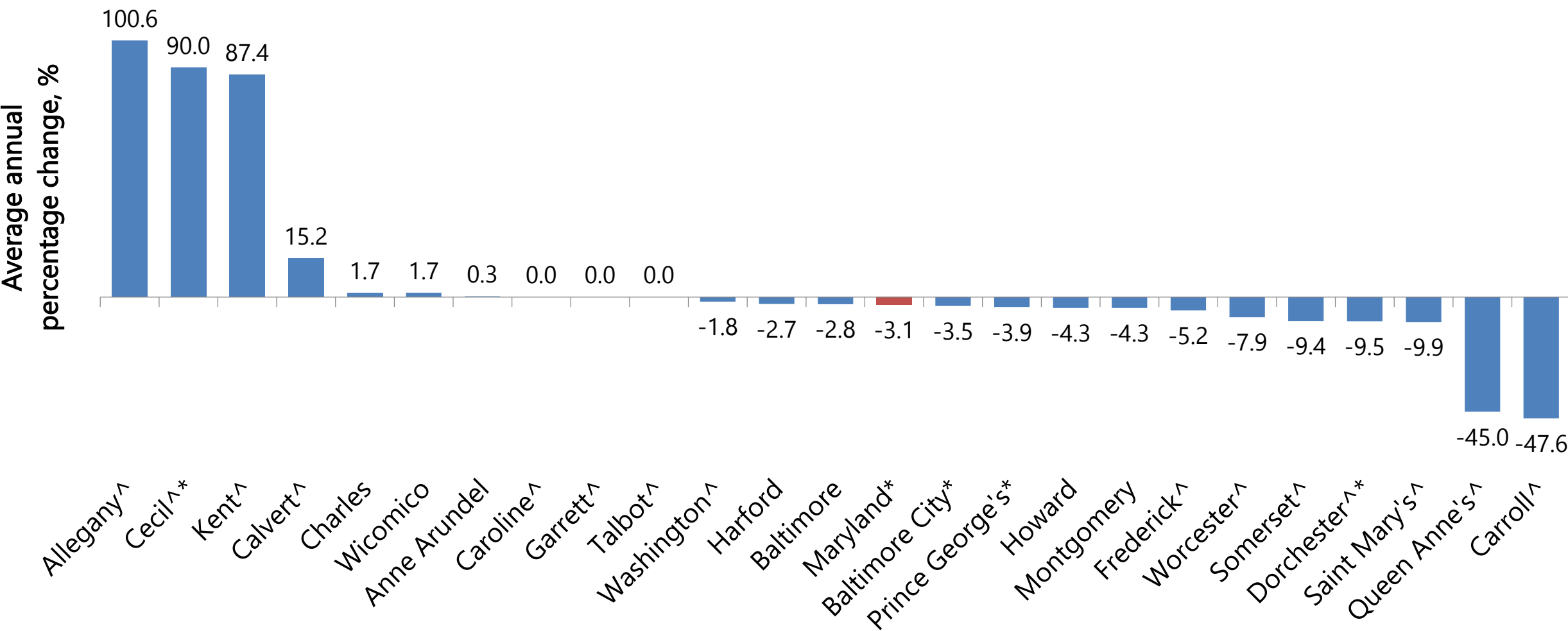


Infant Mortality Rates Average Percentage Change by Jurisdiction, Maryland, 2007-2016

Minimum 5 deaths annually, on average

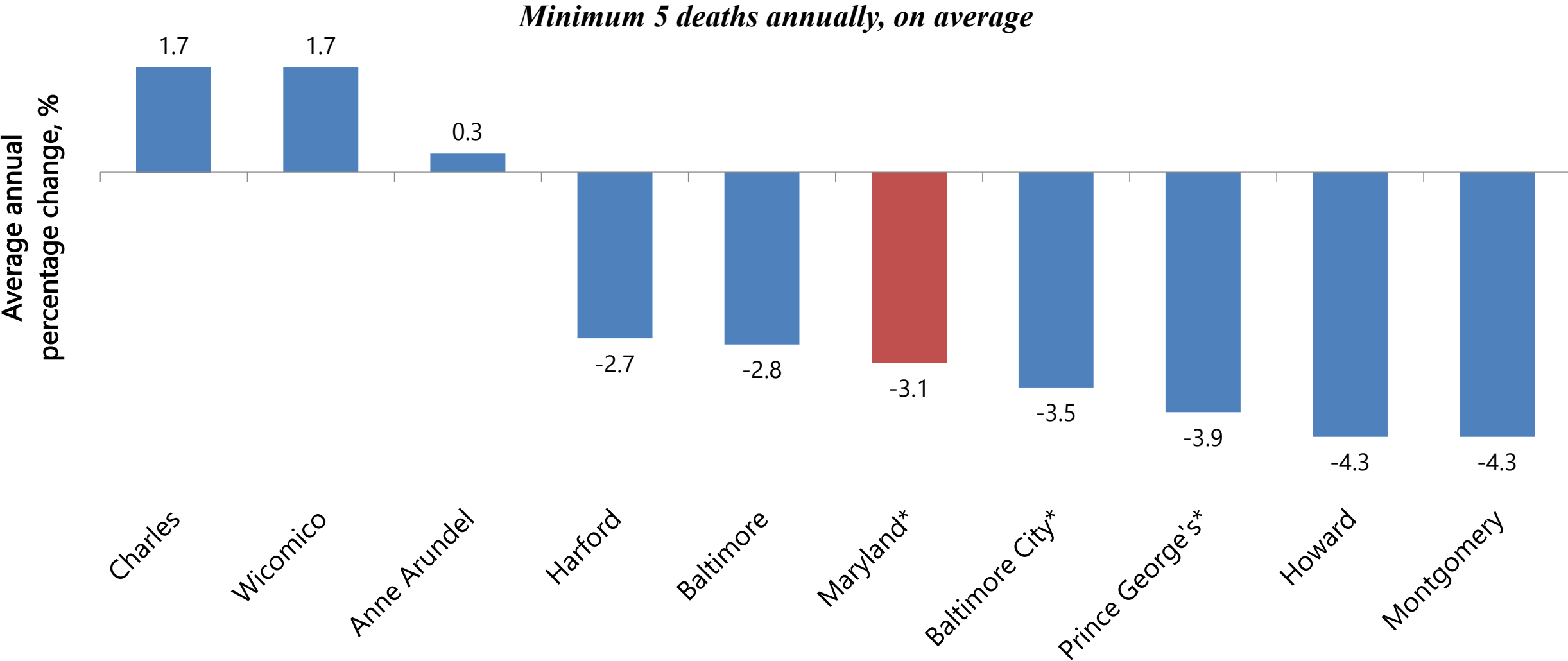


Black NH Infant Mortality Rates Average Percentage Change by Jurisdiction, Maryland, 2007-2016

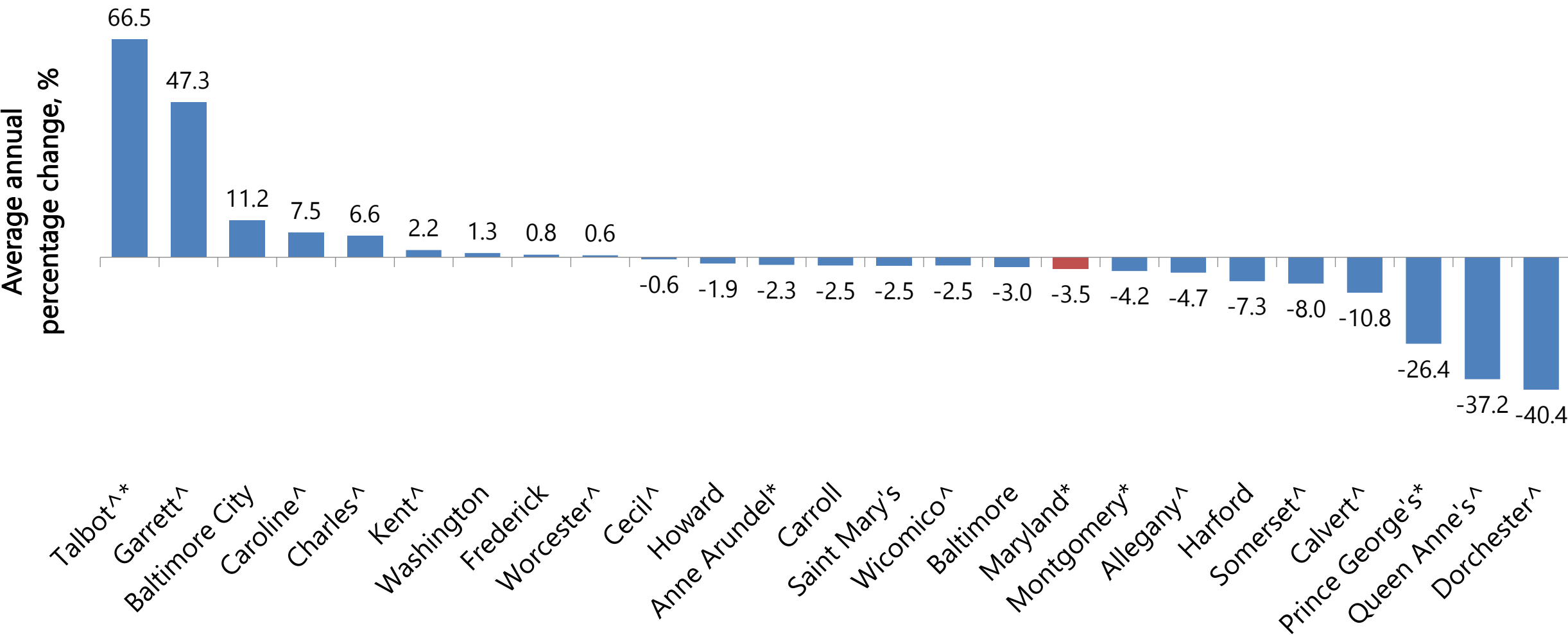


33 Source: Maryland Vital Statistics Administration. ^ jurisdiction with less than 5 infant deaths per year on average.
* 2014-16 IMR differs significantly from 2007-09 rate ($p < 0.05$)

Black NH Infant Mortality Rates Average Percentage Change by Jurisdiction, Maryland, 2007-2016



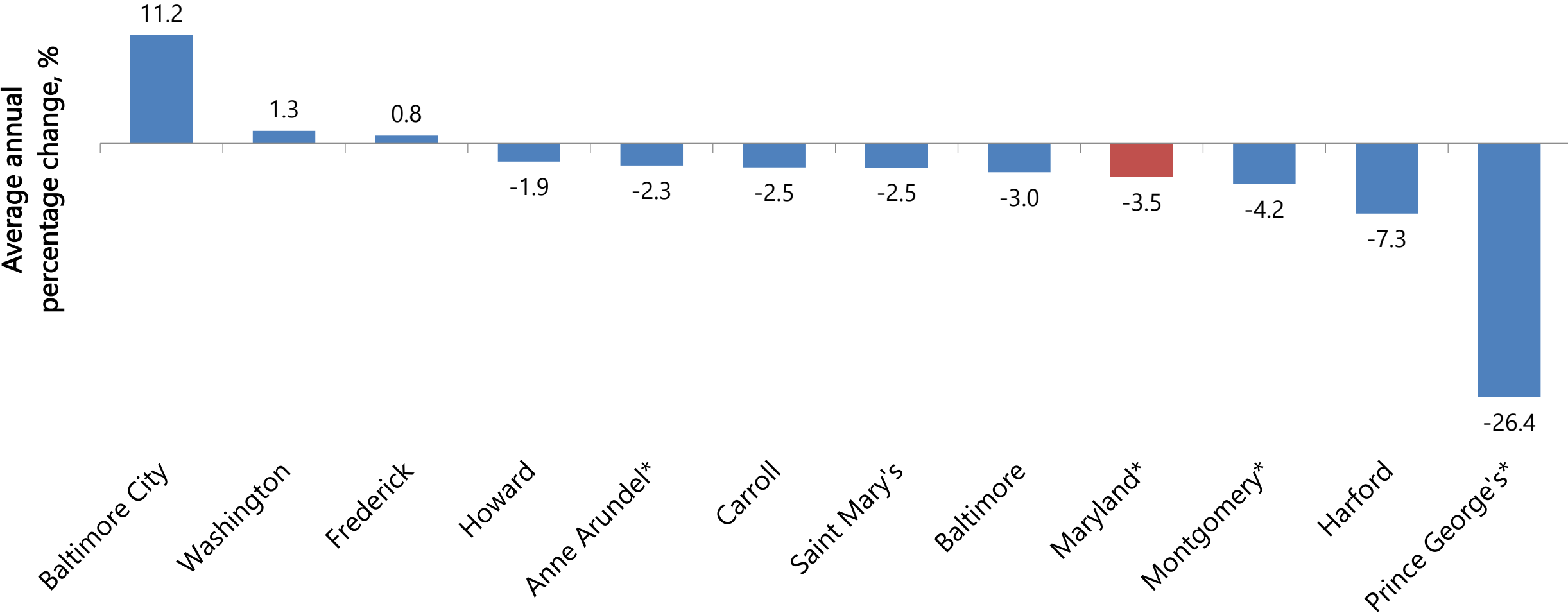
White NH Infant Mortality Rates Average Percentage Change by Jurisdiction, Maryland, 2007-2016



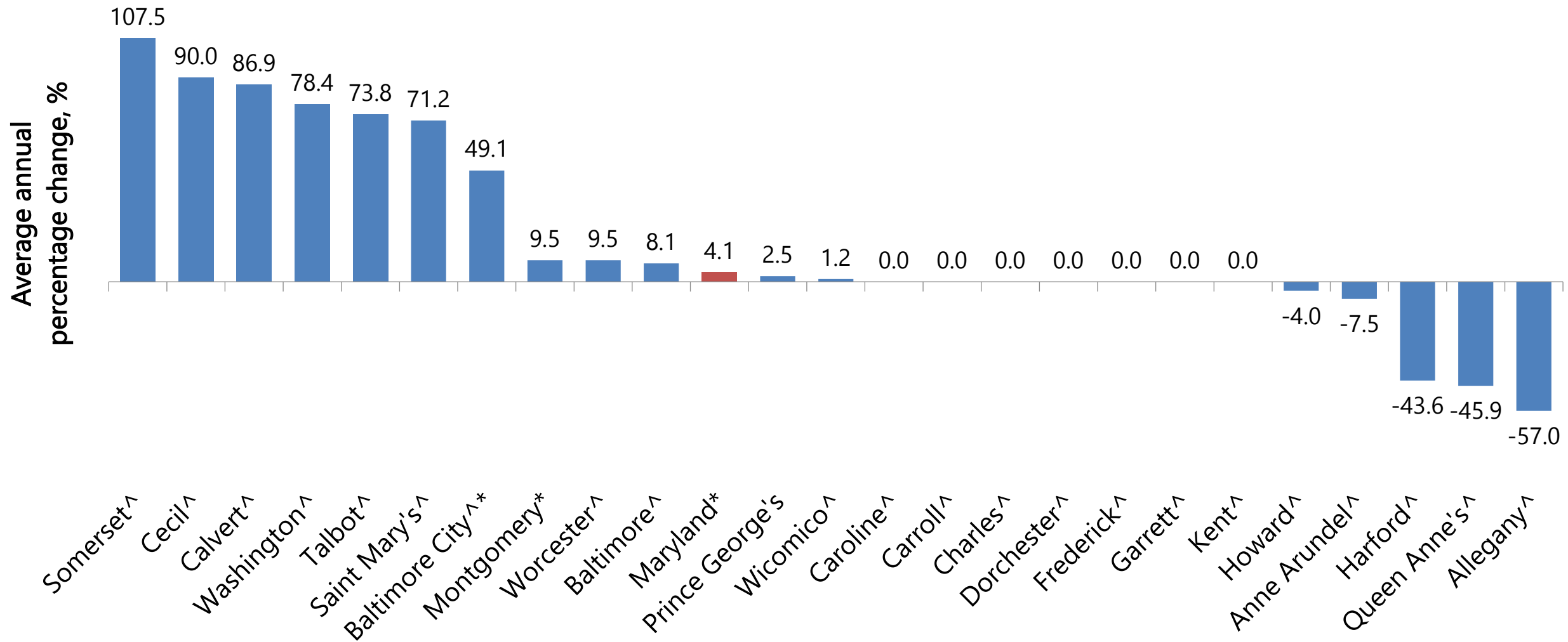
35 Source: Maryland Vital Statistics Administration. ^ jurisdiction with less than 5 infant deaths per year on average.
* 2014-16 IMR differs significantly from 2007-09 rate ($p < 0.05$)

White NH Infant Mortality Rates Average Percentage Change by Jurisdiction, Maryland, 2007-2016

Minimum 5 deaths annually, on average

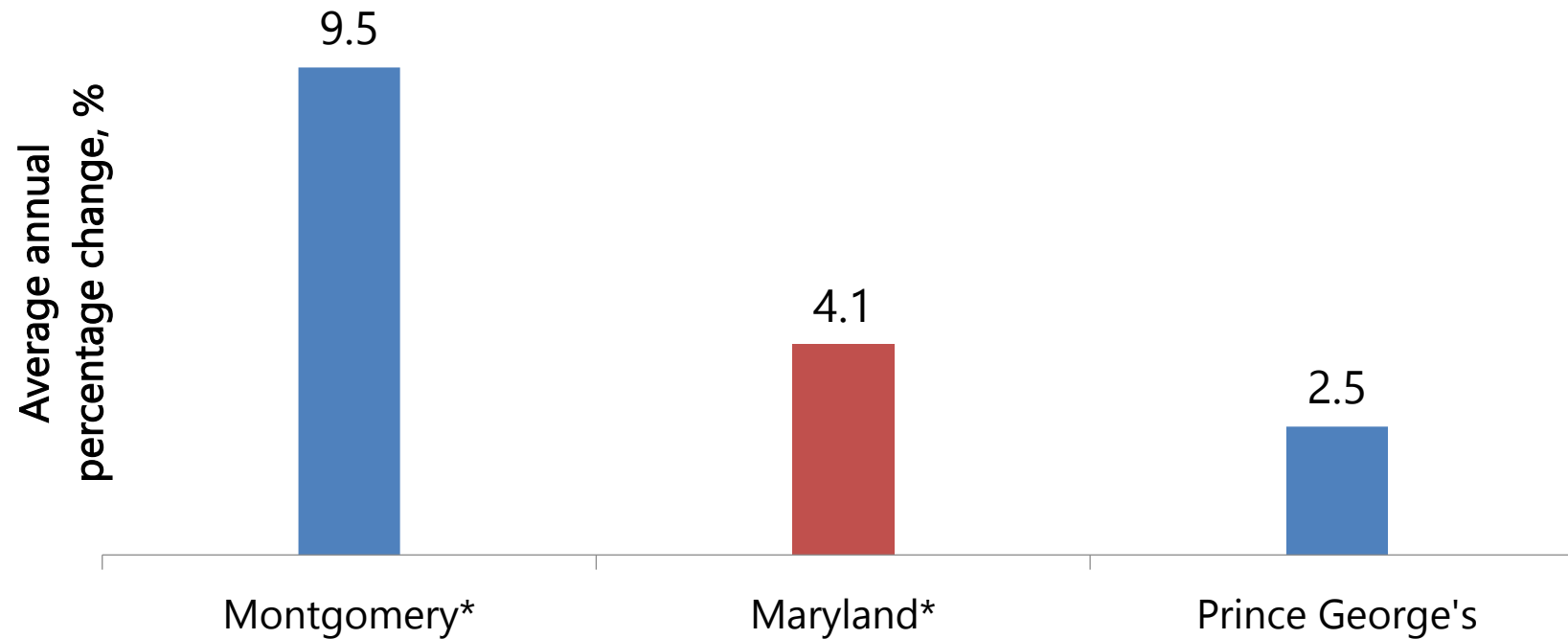


Hispanic Infant Mortality Rates Average Percentage Change by Jurisdiction, Maryland, 2007-2016

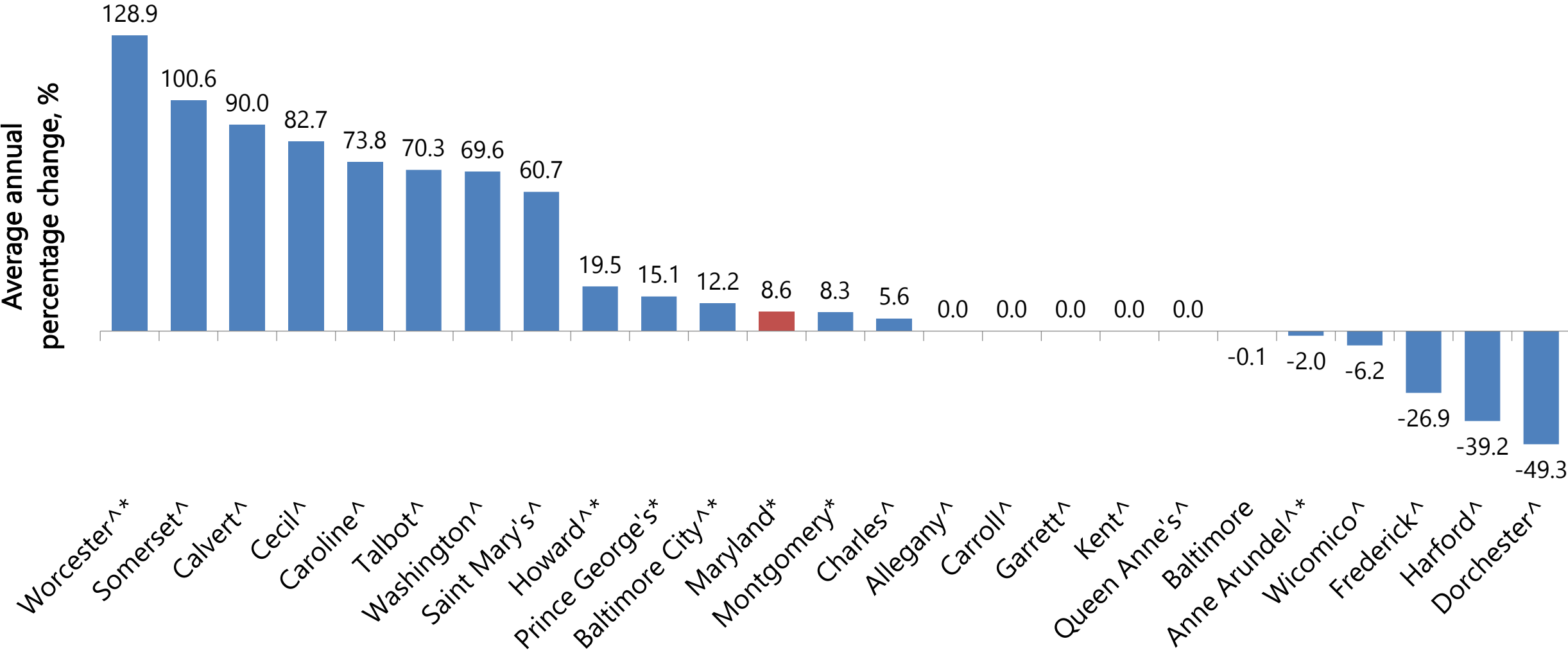


Hispanic Infant Mortality Rates Average Percentage Change by Jurisdiction, Maryland, 2007-2016

Minimum 5 deaths annually, on average



Other NH Infant Mortality Rates Average Percentage Change by Jurisdiction, Maryland, 2007-2016

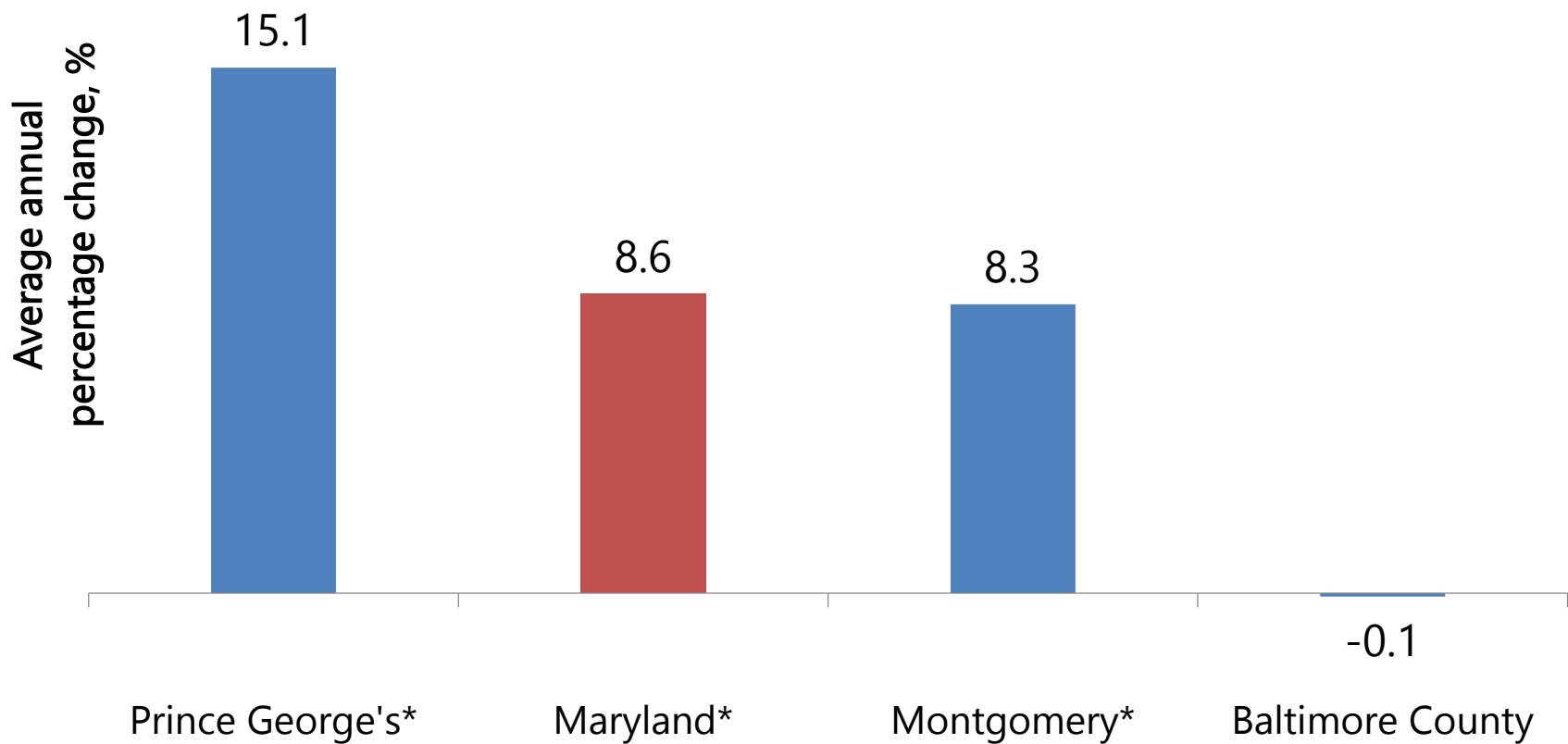


39 Source: Maryland Vital Statistics Administration. ^ jurisdiction with less than 5 infant deaths per year on average.

* 2014-16 IMR differs significantly from 2007-09 rate ($p < 0.05$). Other includes Asian/Pacific Islander & American Native/Indian American

Other NH Infant Mortality Rates Average Percentage Change by Jurisdiction, Maryland, 2007-2016

Minimum 5 deaths annually, on average



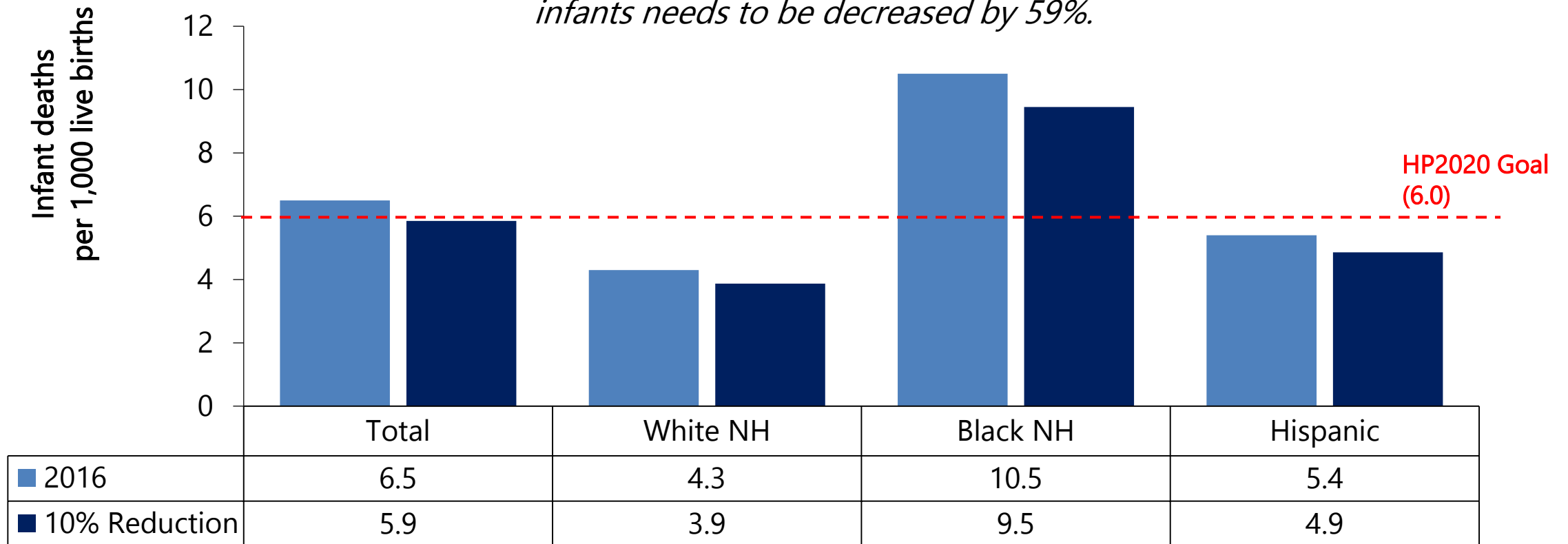
40 Source: Maryland Vital Statistics Administration. ^ jurisdiction with less than 5 infant deaths per year on average.

* 2014-16 IMR differs significantly from 2007-09 rate (p<0.05). Other includes Asian/Pacific Islander & American Native/Indian American

How to achieve HP2020 Infant Mortality Goal?

HP2020 Goal of 6 deaths per 1,000 live births can be achieved with a 10% reduction in 2016 rates.

To eliminate the Black-White disparity, IMR among Black NH infants needs to be decreased by 59%.



What gaps should be targeted to continue progress toward infant mortality reduction?

Timely Legislation

Maryland HB 716 & SB 266 (April 2018)

- Requires a study regarding the mortality rates of African American infants and infants in rural areas
- Examine factors, beyond the known factors of low birth weight, teen pregnancy, poor nutrition, and lack of prenatal care, affecting the mortality of African American infants and infants in rural areas in the United States and in the State.

Make recommendations

- On methods to reduce the mortality rate of African American infants and infants in rural areas.
- On ways to use pregnancy navigators or community health workers to assist pregnant women with the goal of reducing the infant mortality rate.

Perinatal Periods of Risk (PPOR)



Using PPOR to Identify Targets

PPOR Objectives

- Use all available data to better understand the underlying causes of perinatal mortality to develop a plan for reducing perinatal mortality at the state and community levels.

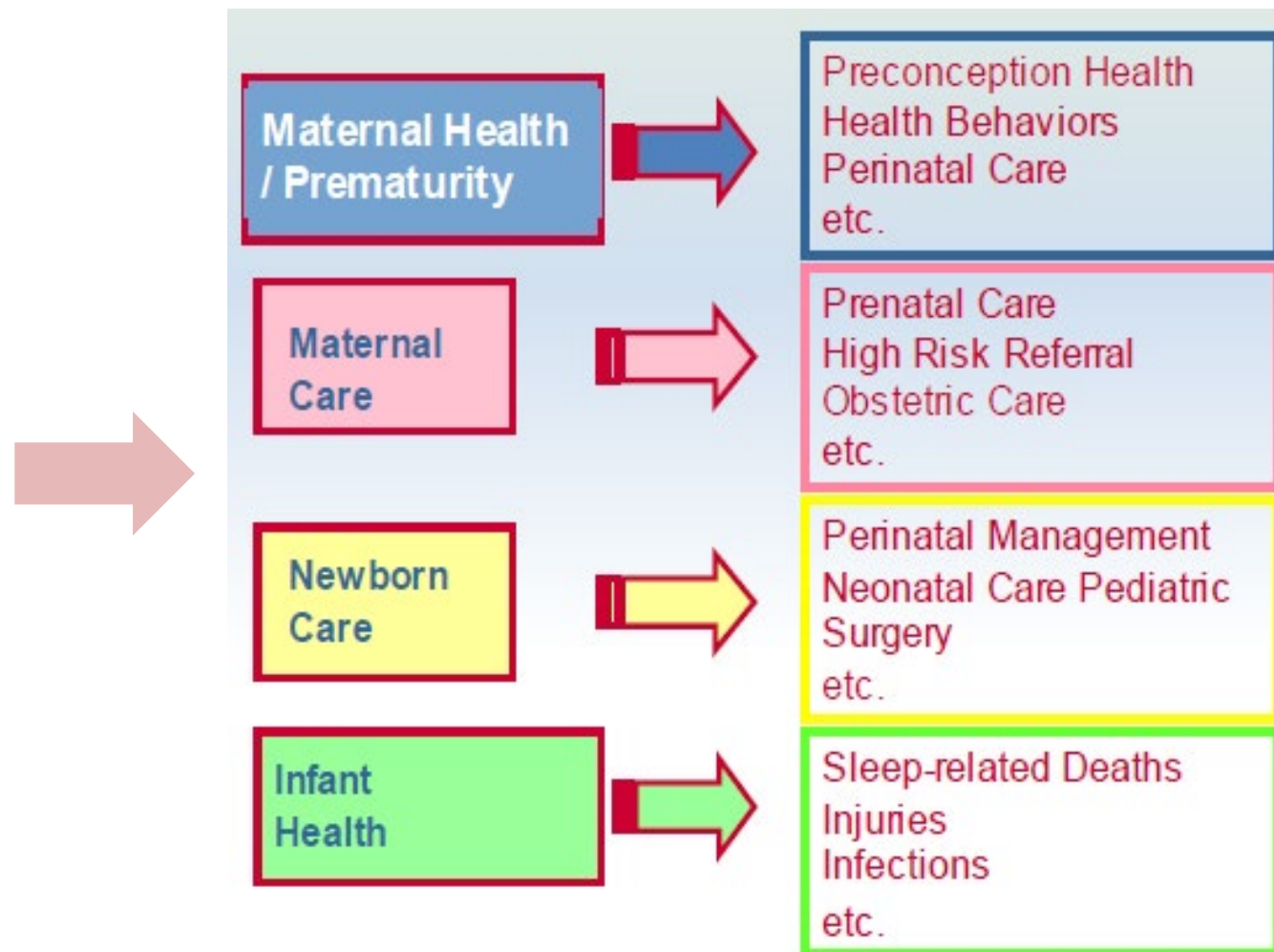
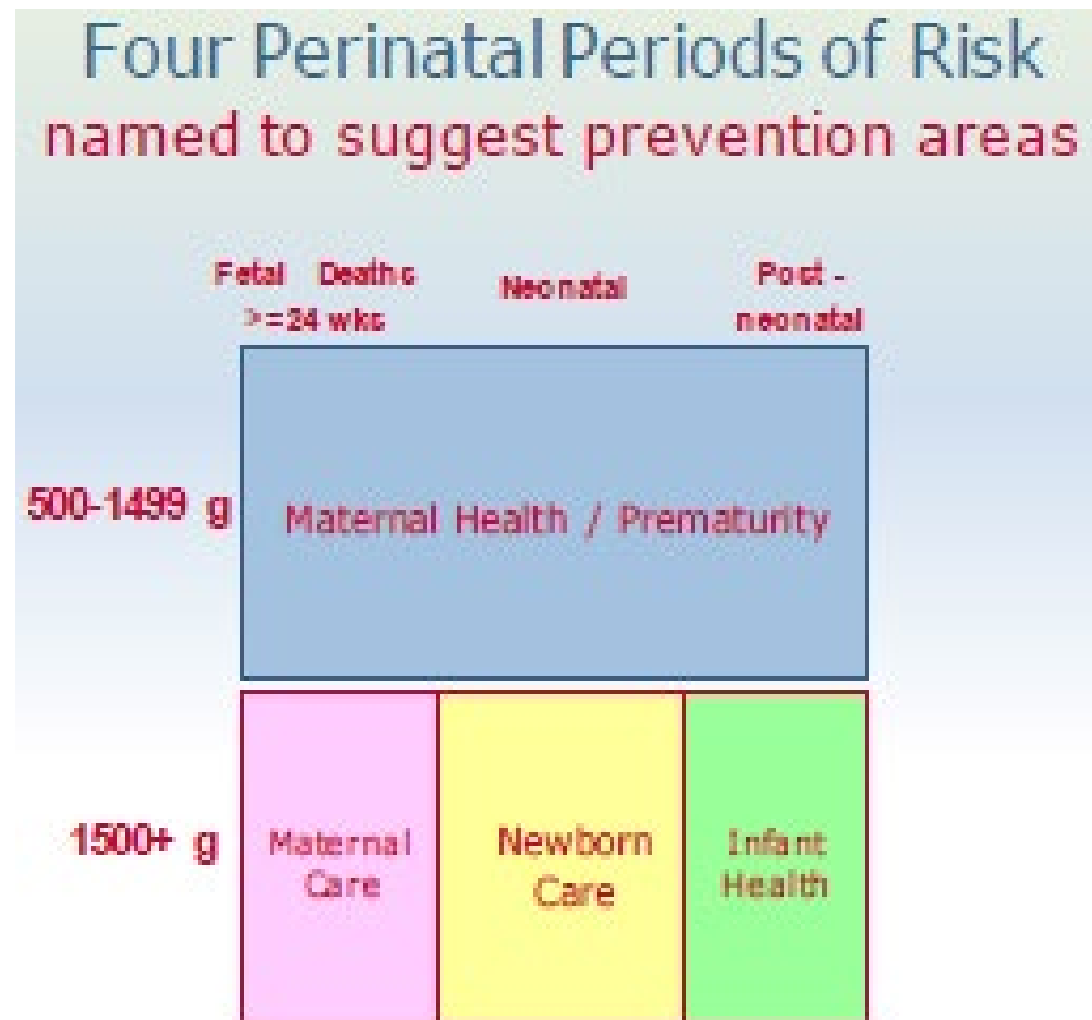
Phase 1: Identify period of risk with greatest perinatal mortality burden

- Maternal health/prematurity, Maternal care, Newborn Care, or Infant Health
- Data sources: Vital Statistics birth and death certificates

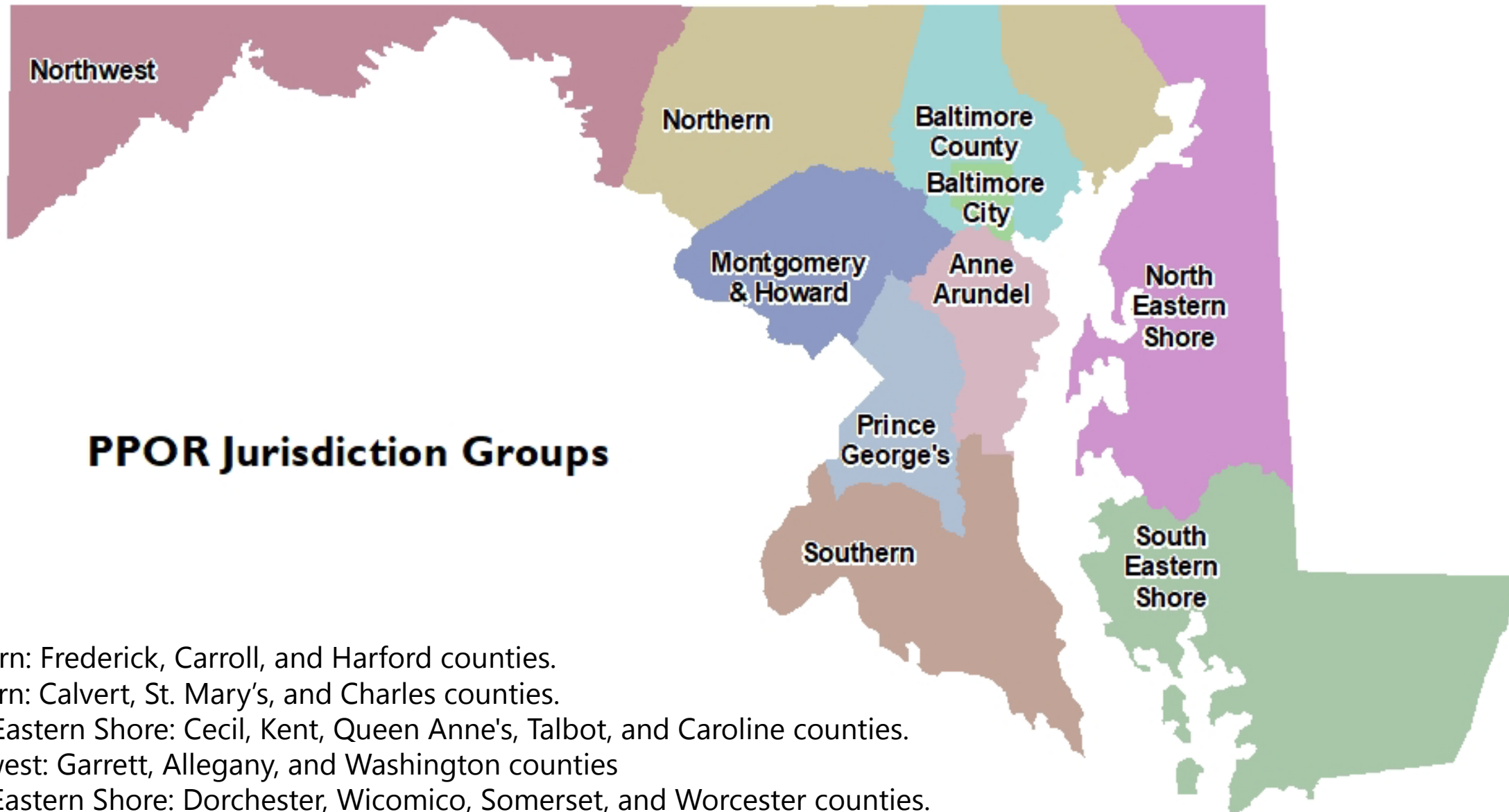
Phase 2: Period of risk specific analysis

- Identify characteristics associated with increased risk of perinatal mortality for period of risk identified in Phase 1 for the selected community.
- Characteristics should pose significant increased risks relevant to the reference group and have a substantial impact on the perinatal mortality if intervened on.
- Develop recommendations based on findings.
- Data sources: Vital statistics, US Census, PRAMS

PPOR Methods: Phase 1

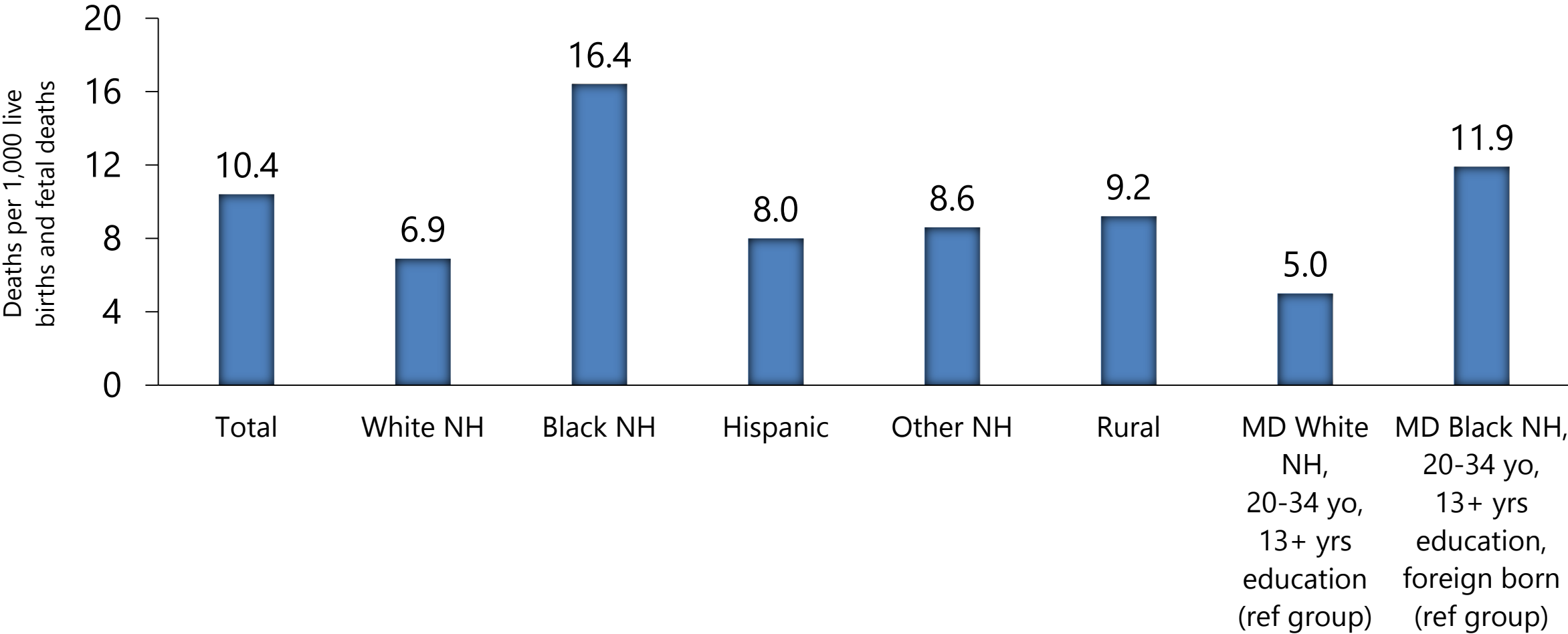


PPOR Methods: Phase 1



PPOR Methods: Phase 1

Maryland fetal-infant mortality rates by race, 2010-2016



PPOR Phase 1 Results

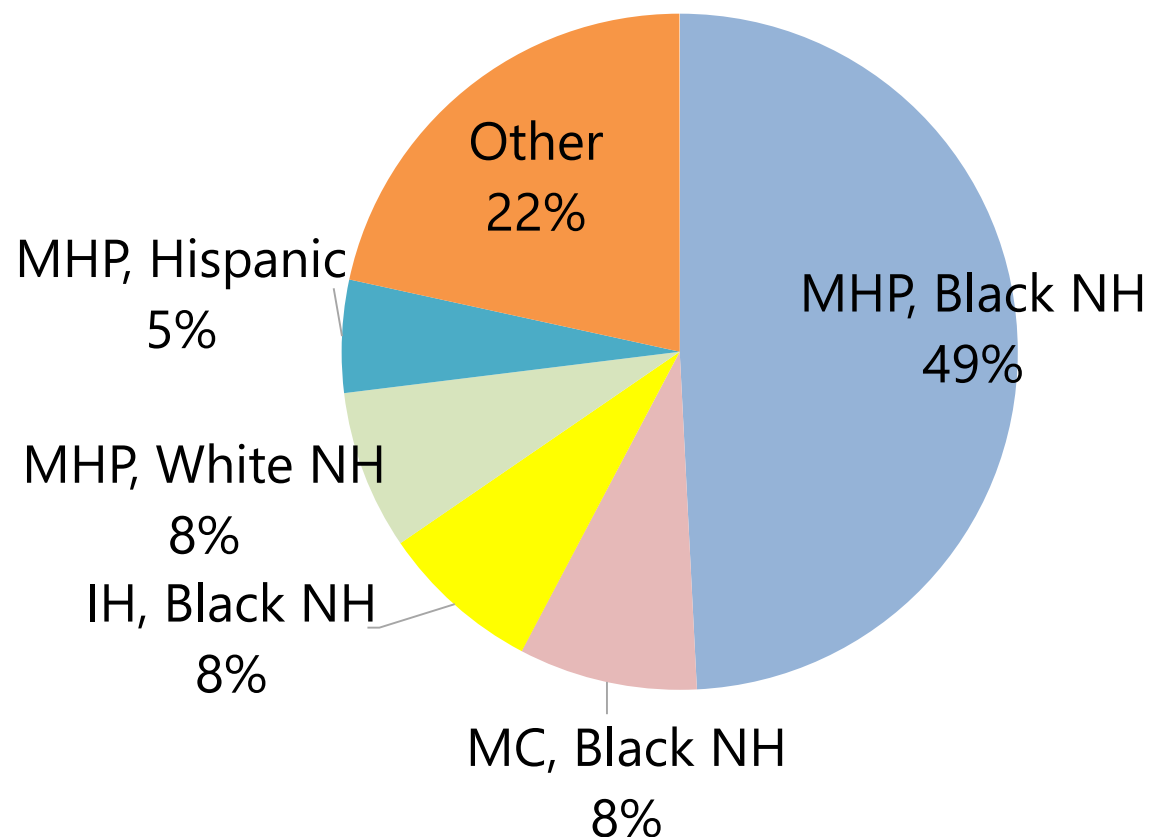
	Maternal health/ Prematurity	Maternal care	Newborn care	Infant health	Fetal-Infant Mortality Rate
Maryland	6.0	2.1	1.0	1.3	10.4
Reference Group	2.5	1.3	0.6	0.7	5.0
Excess rates	3.5	0.8	0.4	0.6	5.4
Relative risk (95% CI)	2.4 (2.2, 2.7)	1.7 (1.4, 2.0)	1.8 (1.4, 2.3)	1.9 (1.5, 2.4)	2.1 (1.9, 2.3)

PPOR Phase 1 Results

	Maternal health/ Prematurity	Maternal care	Newborn care	Infant health	Fetal-Infant Mortality Rate
Rural Counties	5.0	1.9	1.0	1.3	9.2
Reference Group	2.5	1.3	0.6	0.7	5.0
Excess rates	2.5	0.6	0.4	0.6	4.2
Relative risk (95% CI)	2.0 (1.8, 2.3)	1.5 (1.2, 1.8)	1.7 (1.4, 2.5)	1.9 (1.5, 2.5)	1.8 (1.7, 2.0)



PPOR Phase 1 Results



There were an estimated **2,749** excess (preventable) fetal/infant deaths in Maryland during 2010-2016. Half (**49%**) of these deaths were attributed to the Maternal health/Prematurity (MHP) period of risk in non-Hispanic (NH) Black mothers.

This suggests that approximately **1,352** fetal/infant deaths, or **193** deaths per year, could have been prevented if the preconception and maternal health status of NH Black mothers was similar to the reference group.

MHP: Maternal Health/Prematurity MC: Maternal Care IH: Infant Health

PPOR Phase 1 Results among Black NH

US born – Foreign born reference group

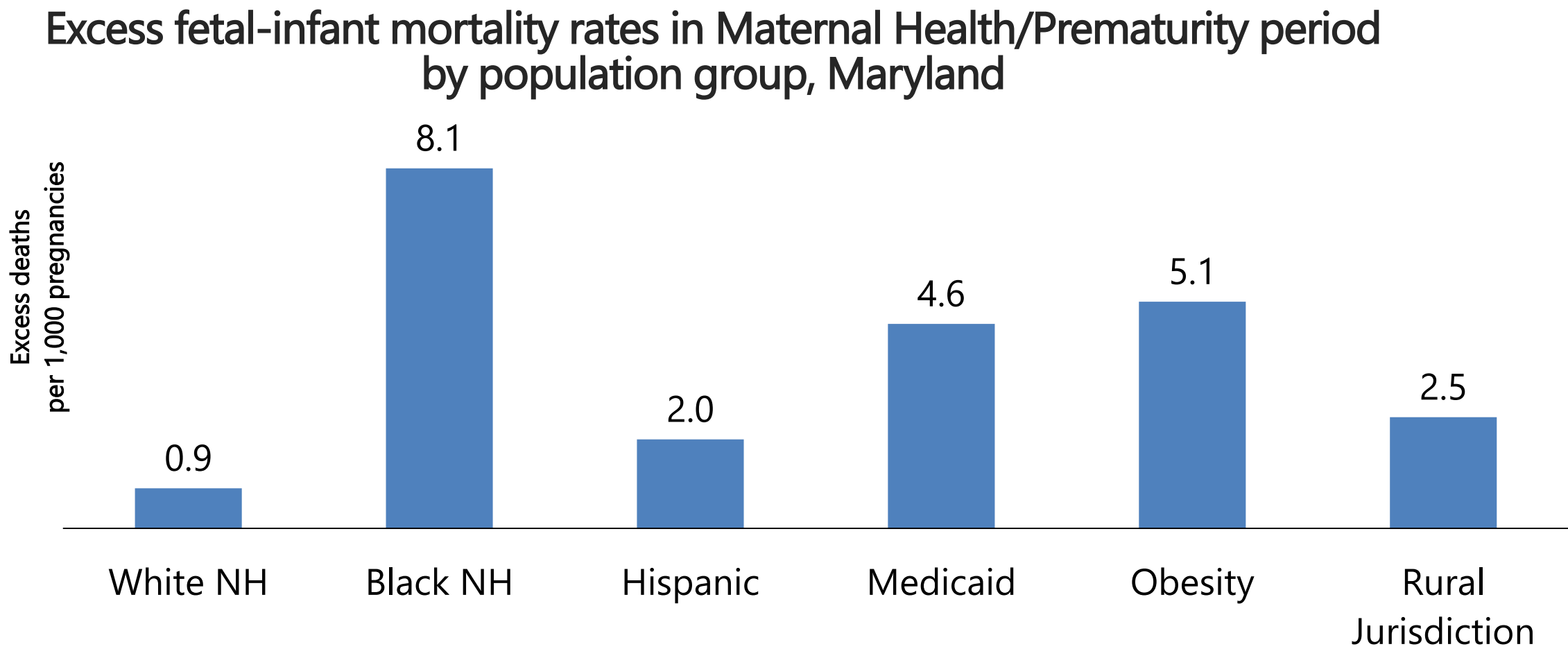
	Maternal health/ Prematurity	Maternal care	Newborn care	Infant health	Fetal-Infant Mortality Rate
US born Black NH	10.5	2.5	1.1	2.2	16.3
Reference Group	7.0	2.1	1.3	1.3	11.7
Excess rates	3.5	0.4	-0.2	0.9	4.6
Relative risk (95% CI)	1.5 (1.3, 1.8)	1.3 (1.0, 1.7)	0.9 (0.6, 1.4)	1.6 (1.1, 2.3)	1.4 (1.3, 1.6)

There were an estimated **604** excess (preventable) fetal/infant deaths in Maryland during 2010-2016. Three-quarters (**75%**) of these deaths were attributed to the Maternal health/Prematurity (MHP) period of risk in US-born Black NH mothers.

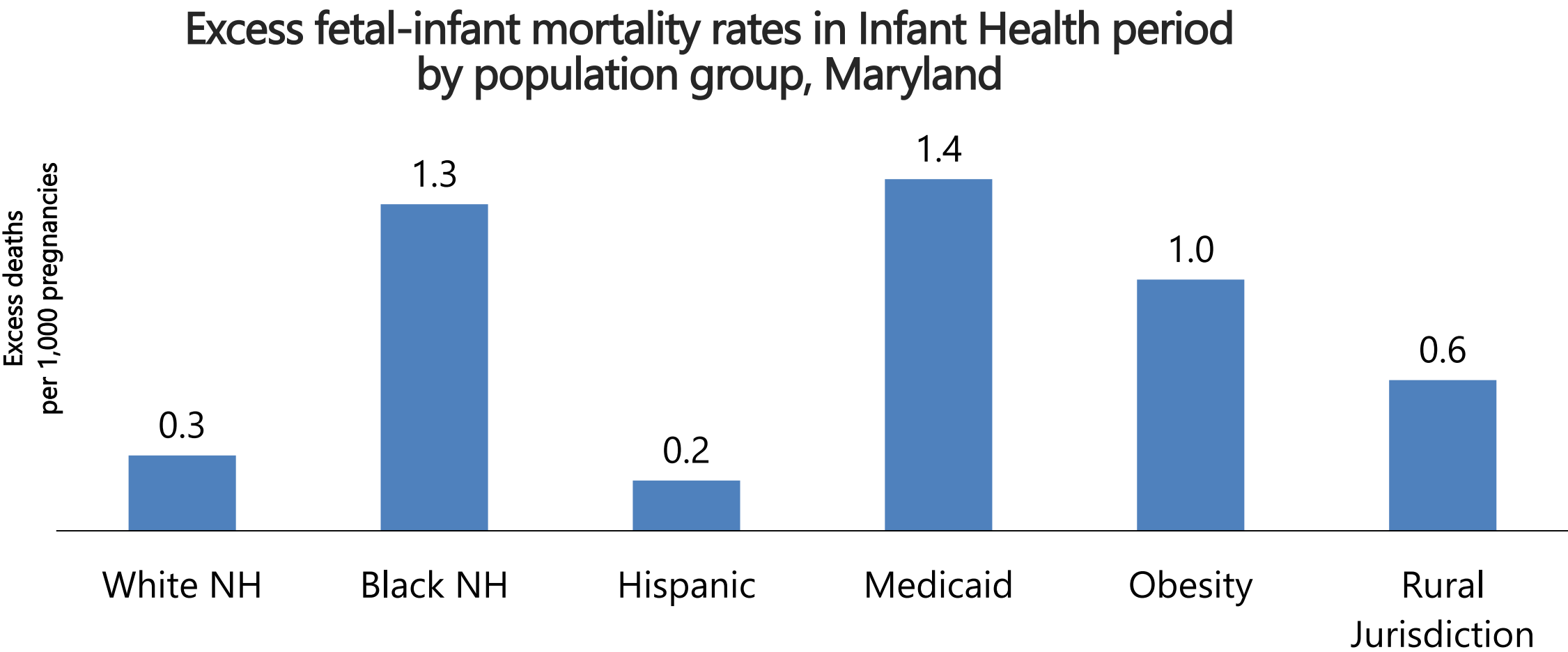
This suggests that approximately **457** fetal/infant deaths, or **65** deaths per year, could have been prevented if the preconception and maternal health status of US-born Black NH mothers was similar to the **reference group**.



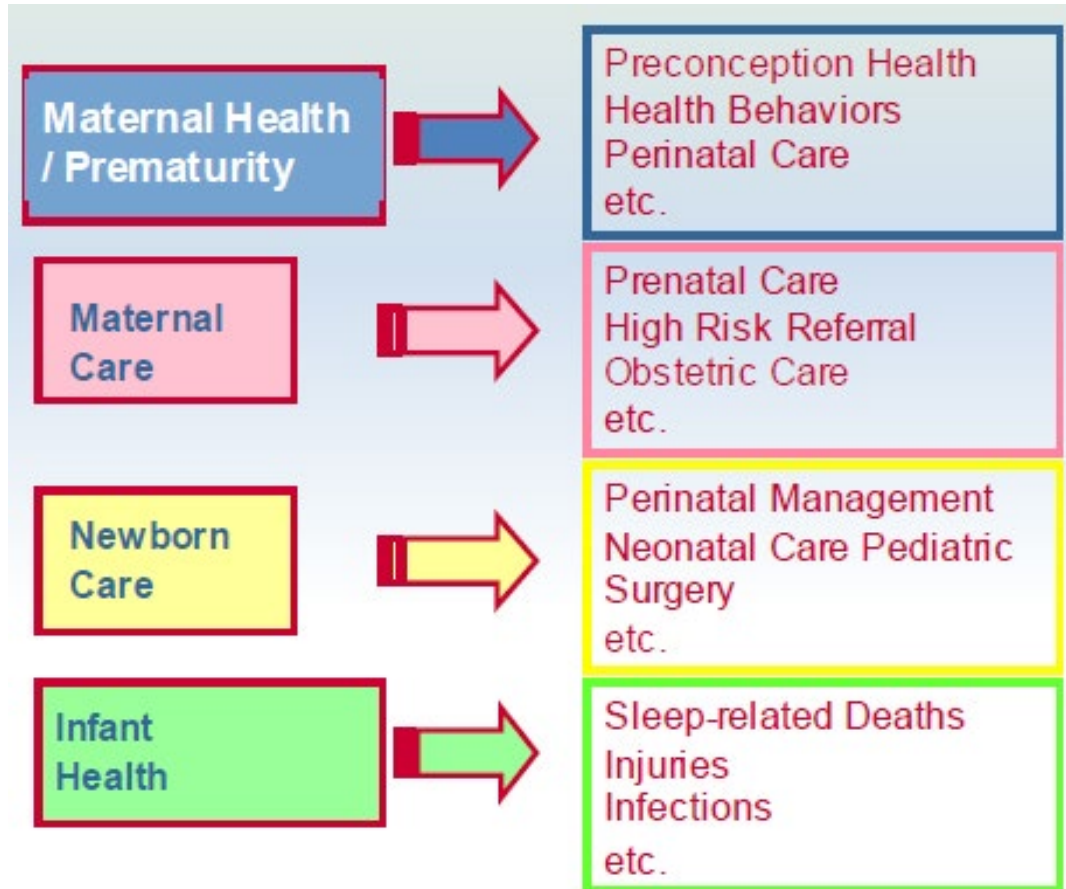
PPOR Phase 1 Results



PPOR Phase 1 Results



PPOR Phase 1 Results



Improving the Preconception and maternal health of Black NH mothers would drastically reduce infant mortality rates. 69% of mortality difference between Black NH women and the reference group was due to birth weight distribution. In other words, Kitagawa analysis suggest too many Black NH babies are born too soon.

Improving Infant Health as it relates to SUIDS/SIDS will also play an important role



Now what?



PPOR Phase 2: Identify Specific Determinants of Adverse Pregnancy Outcomes



PPOR Phase 2

Goal: eliminate racial disparities in adverse pregnancy outcomes (APO)

- Fetal deaths: ≥ 20 weeks gestation
- High risk live births:
 - Very preterm birth (< 32 weeks gestation) & Very low birthweight (< 1500 grams)
- Neonatal deaths (< 28 days old)

Method

- Decomposition analysis to partition the contribution of multiple risk factors to differences in adverse pregnancy outcomes.
- Oaxaca-Blinder method
- Multivariate generalized mixed logit models with random intercepts for community indicators estimated adjusted decomposition coefficients





PPOR Phase 2

Variables Considered

Maternal demographics	Prenatal Characteristics	Hospital characteristics	Census tract level indicators
<ul style="list-style-type: none">• Race• Age• Marital status/paternal involvement• Educational attainment• Pre-pregnancy Body Mass Index (BMI)• Women, Infants, and Children (WIC) program participant• Insurance coverage at delivery (private, Medicaid, other)• Foreign born	<ul style="list-style-type: none">• Gestational weight gain• Tobacco use before or during pregnancy• Hypertension (none, gestational only, or chronic)• Trimester prenatal care began• Congenital anomaly• Delivery method• Breech position• Parity• Number other pregnancy outcomes• Prior preterm birth• Premature rupture of membranes	<ul style="list-style-type: none">• Perinatal care level• Patient mix index (% Medicaid or Black NH births)• Quality index (clinical care and patient perspectives of care)	<ul style="list-style-type: none">• Community socioeconomic disadvantage (CSD) index (median household income, unemployment rate, and % SNAP benefits)• Low access to healthy food (yes vs no)• % Rely on public transportation• % Uninsured• Income inequality index

Jurisdiction group models included only risk factors that were marginally significant ($p < 0.10$) in bivariate analyses

59 Model excludes 19319 (4%) multiple gestation pregnancies. Source of census tract data: American Community Survey 2015 five-year estimates. Hospital quality data is from Center for Medicaid & Medicare Services (CMS) hospital survey data. Healthy food access: USDA

PPOR Phase 2 Results



Leading Potentially Modifiable Risk Factors that Contribute to APO Racial Disparity					
Jurisdiction(s)	First	Second	Third	Fourth	Fifth
Maryland	Marital Status	Education	Insurance type	Hypertension	CSD
Baltimore City	Marital Status	Education	Insurance type	CSD	Prior PTB
Baltimore County	Marital Status	Hypertension	Education	Prior PTB	BMI
Prince George’s	Education	Marital Status	Prior other pregnancy outcome	Hypertension	Insurance type
Montgomery & Howard	Marital Status	Hypertension	Education	Prior PTB	
Anne Arundel	Education	Hypertension	Prior PTB	PROM	Delivery method
North Eastern Shore	Maternal age	Education	Prior PTB	Prior other pregnancy outcome	Hypertension
South Eastern Shore	Insurance type	Hypertension	Prior PTB	Prior other pregnancy outcome	Delivery method
Southern Region	Marital Status	PROM	BMI	Hypertension	Prior PTB
Northern Region	Education	Prior PTB	Hypertension	Delivery method	PROM
Northwest Region	Insurance type				

APO: adverse pregnancy outcome CSD: community socioeconomic disadvantage PTB: preterm birth
PROM: premature rupture of membranes BMI: body mass index Ordered by the percent of APO disparity explained

Leading Potentially Modifiable Risk Factors that Contribute to APO Racial Disparity					
Jurisdiction(s)	First	Second	Third	Fourth	Fifth
Maryland	Marital Status	Education	Insurance type	Hypertension	CSD
Rural Counties	Marital Status	CSD	Education	Insurance	Hypertension
Urban Counties	Marital Status	Education	Insurance type	Hypertension	Prior PTB
Recent National study*	Marital Status	Education	Hypertension	Insurance type	Parity

APO: adverse pregnancy outcome CSD: community socioeconomic disadvantage
 Ordered by the percent of APO disparity explained.

*DeSisto CL, Hirai AH, Collins JW, Rankin KM (2018). Deconstructing a disparity: explaining excess preterm birth among US-born black women. *Annals of Epidemiology*, 28:225-230. Table 3 comparison of US-born black vs US born white PTB disparities.

Leading Potentially Modifiable Contributing Risk Factors, Maryland, 2010-2016

Risk Factor	White NH (n = 221,823) %	Black NH (n = 161,164) %	APO OR (95% CI)	PAR %
1. Marital status				
Married	74.1	37.2	ref	
Unmarried, father involved	20.3	41.2	1.14 (1.05, 1.24)	3.9
No paternal involvement	5.4	21.2	1.55 (1.41, 1.71)	6.2
2. Maternal educational attainment				
College degree	50.8	25.7	ref	
Some college, no degree	26.8	33.6	1.35 (1.24, 1.48)	9.5
High school degree	16.0	28.4	1.41 (1.27, 1.56)	8.0
No high school degree	6.1	11.6	1.37 (1.20, 1.56)	3.0
3. Insurance coverage				
Private	66.0	37.7	ref	
Medicaid	20.8	46.2	1.29 (1.18, 1.40)	8.3
Self-pay/other	5.0	4.4	1.27 (1.09, 1.48)	1.3
4. Hypertension				
None	92.9	90.0	ref	
Pregnancy-associated only	4.8	5.6	2.25 (2.04, 2.48)	6.0
Chronic	2.2	4.2	2.56 (2.30, 2.86)	4.6
5. Community socioeconomic disadvantage				
Low	29.6	9.6	ref	
Low to moderate	31.7	21.8	1.04 (0.92, 1.17)	
Moderate to high	24.4	25.0	1.14 (1.01, 1.30)	3.4
High	14.1	43.7	1.21 (1.05, 1.40)	5.3

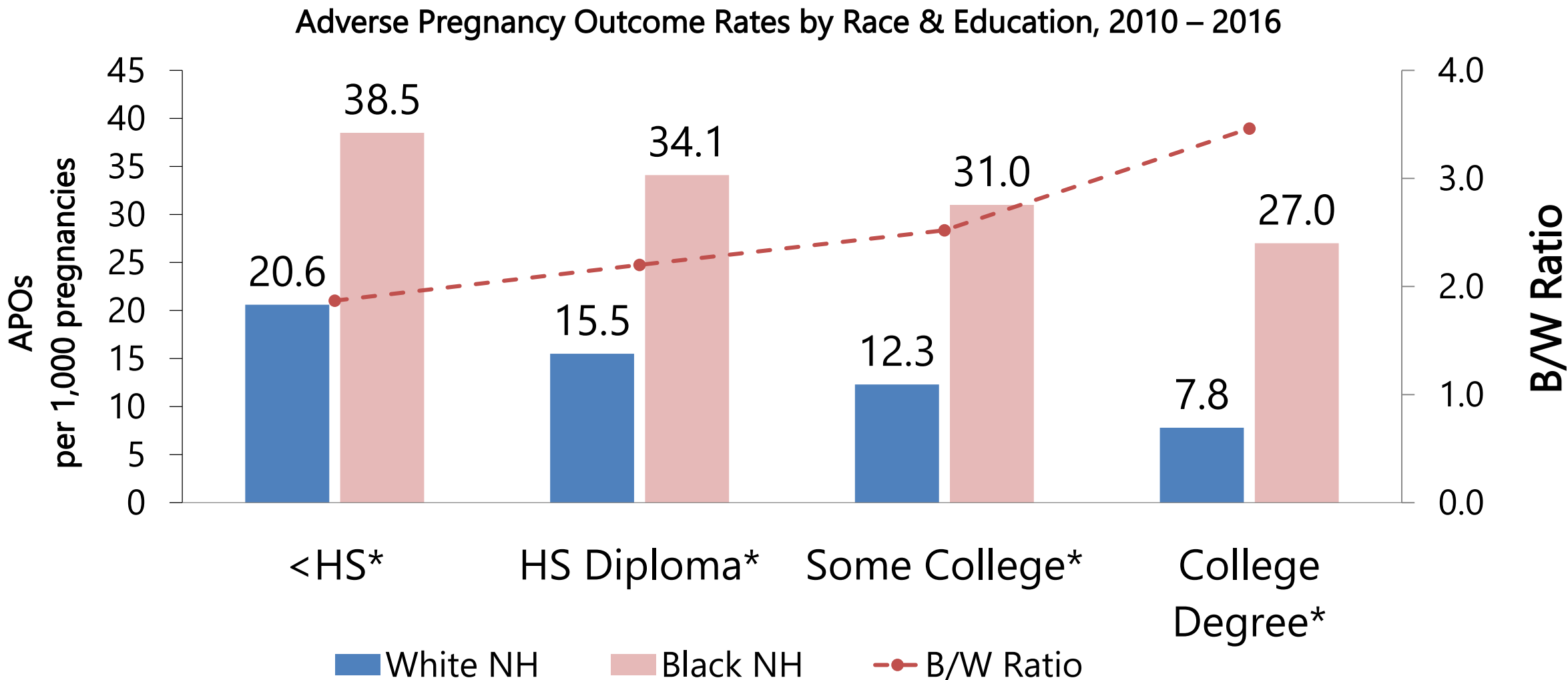
PAR: Population attributable risk describes the proportional (%) reduction in the rate of APOs if the risk of an APO in each group was reduced to that of the reference group. In general, the higher the PAR the greater the impact of eliminating this risk factor has on reducing APO rates.

Leading Potentially Modifiable Contributing Risk Factors, Rural Counties, 2010-2016

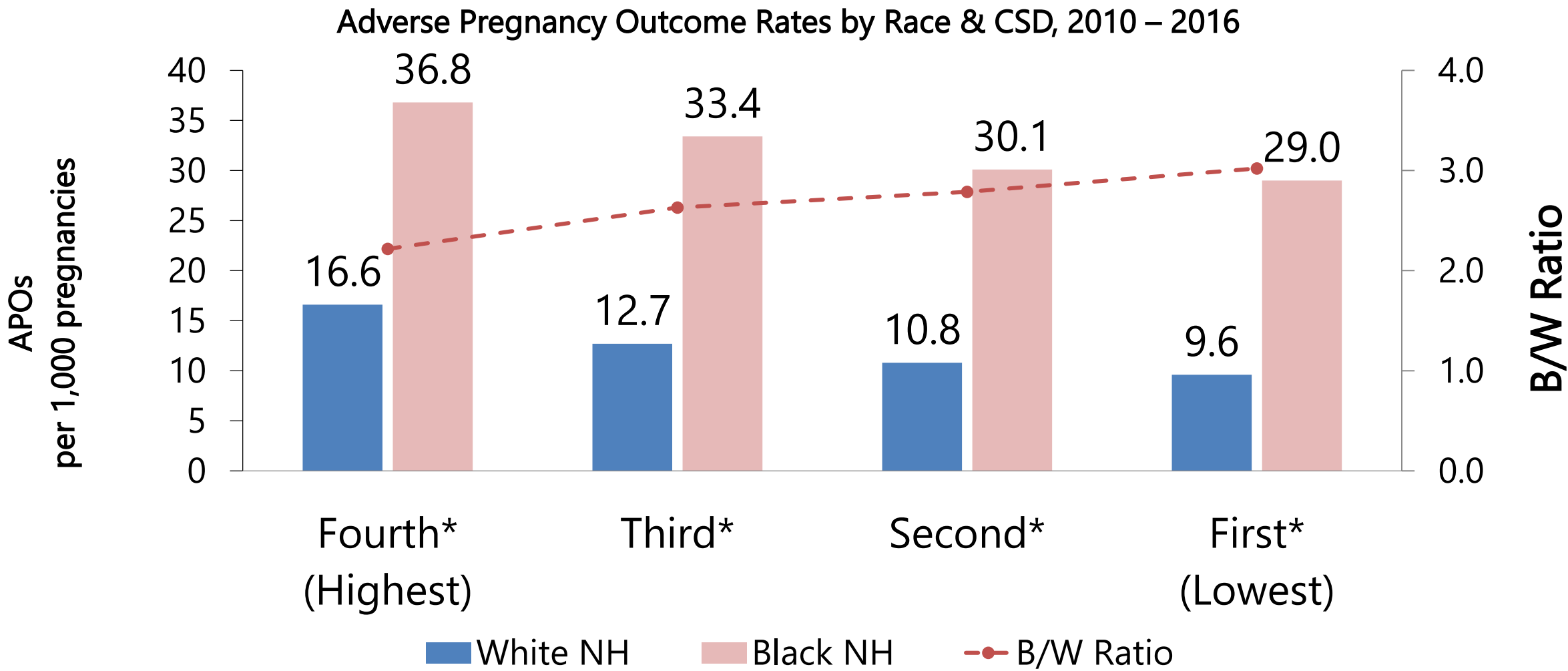
Risk Factor	White NH (n = 91,641) %	Black NH (n = 21,884) %	APO OR (95% CI)	PAR %
1. Marital status				
Married	67.2	33.7	ref	
Unmarried, father involved	25.7	43.3	1.09 (0.91, 1.31)	
No paternal involvement	6.8	22.7	1.45 (1.17, 1.80)	4.3
2. Community socioeconomic disadvantage				
Low	19.9	8.1	ref	
Low to moderate	32.8	27.5	1.10 (0.86, 1.40)	
Moderate to high	30.6	26.7	1.04 (0.79, 1.37)	
High	16.7	37.7	1.40 (1.02, 1.93)	7.7
3. Maternal educational attainment				
College degree	36.5	19.5	ref	
Some college, no degree	33.9	36.0	1.21 (1.00, 1.47)	
High school degree	21.7	30.9	1.44 (1.15, 1.79)	9.3
No high school degree	7.6	13.3	1.64 (1.24, 2.17)	5.3
4. Insurance coverage				
Private	60.6	32.3	ref	
Medicaid	28.4	54.6	1.41 (1.16, 1.70)	11.9
Self-pay/other	4.7	5.5	1.50 (1.07, 2.08)	2.4
5. Hypertension				
None	91.7	89.5	ref	
Pregnancy-associated only	5.7	5.9	1.87 (1.51, 2.31)	4.8
Chronic	2.4	4.3	2.07 (1.60, 2.66)	2.9

**But, reducing risk factor prevalence alone
may not improve racial disparities**

Racial Disparities are Greatest among ‘Low-Risk’ Women



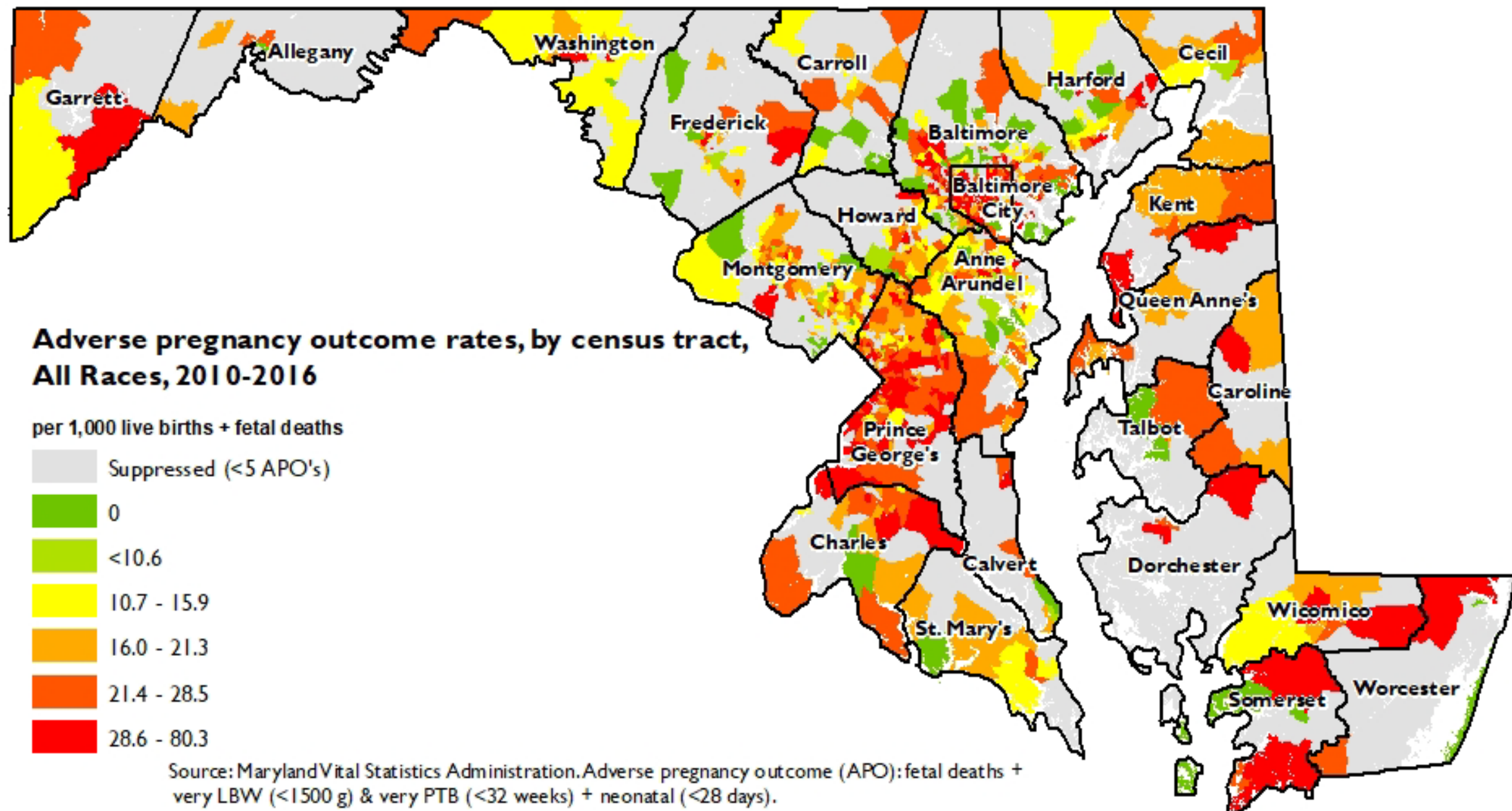
Racial Disparities are Greatest among ‘Low-Risk’ Women

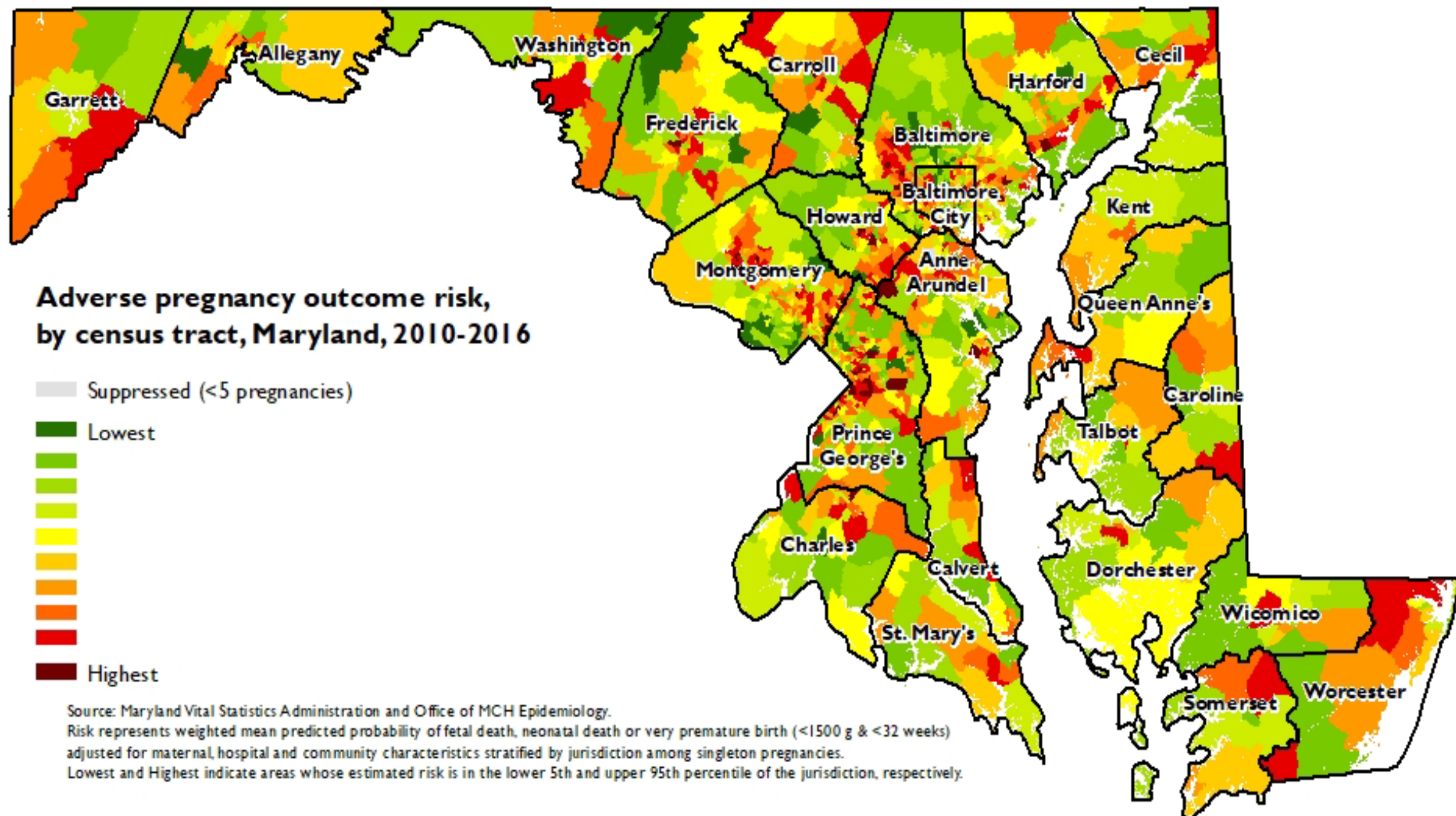


Source: Maryland Vital Statistics Administration.

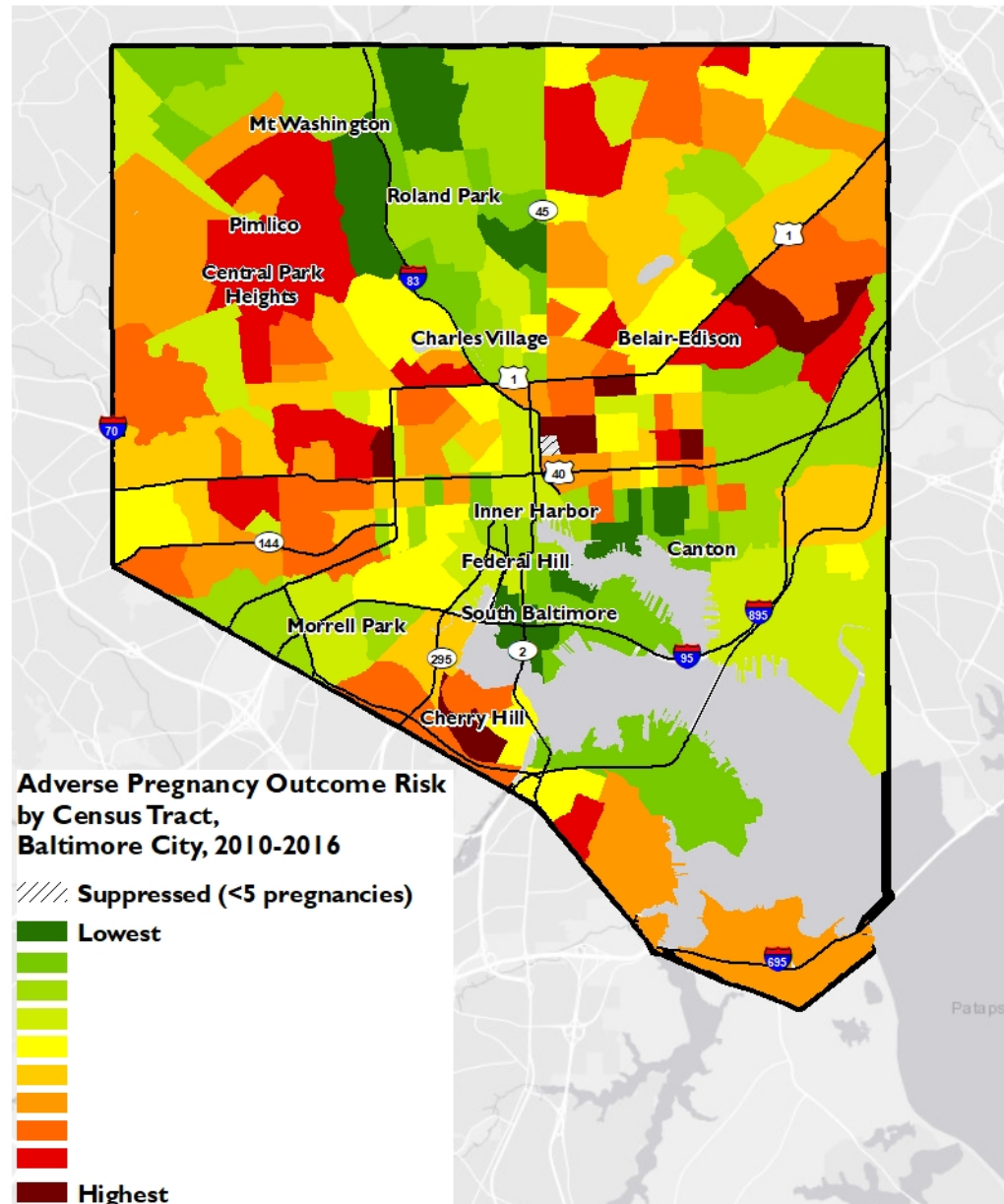
*Rate differs significantly between White NH and Black NH ($p < 0.05$). CSD is an index of median household income, unemployment rates, and % SNAP benefits within the maternal residence census tract.

High Risk Pregnancies Map

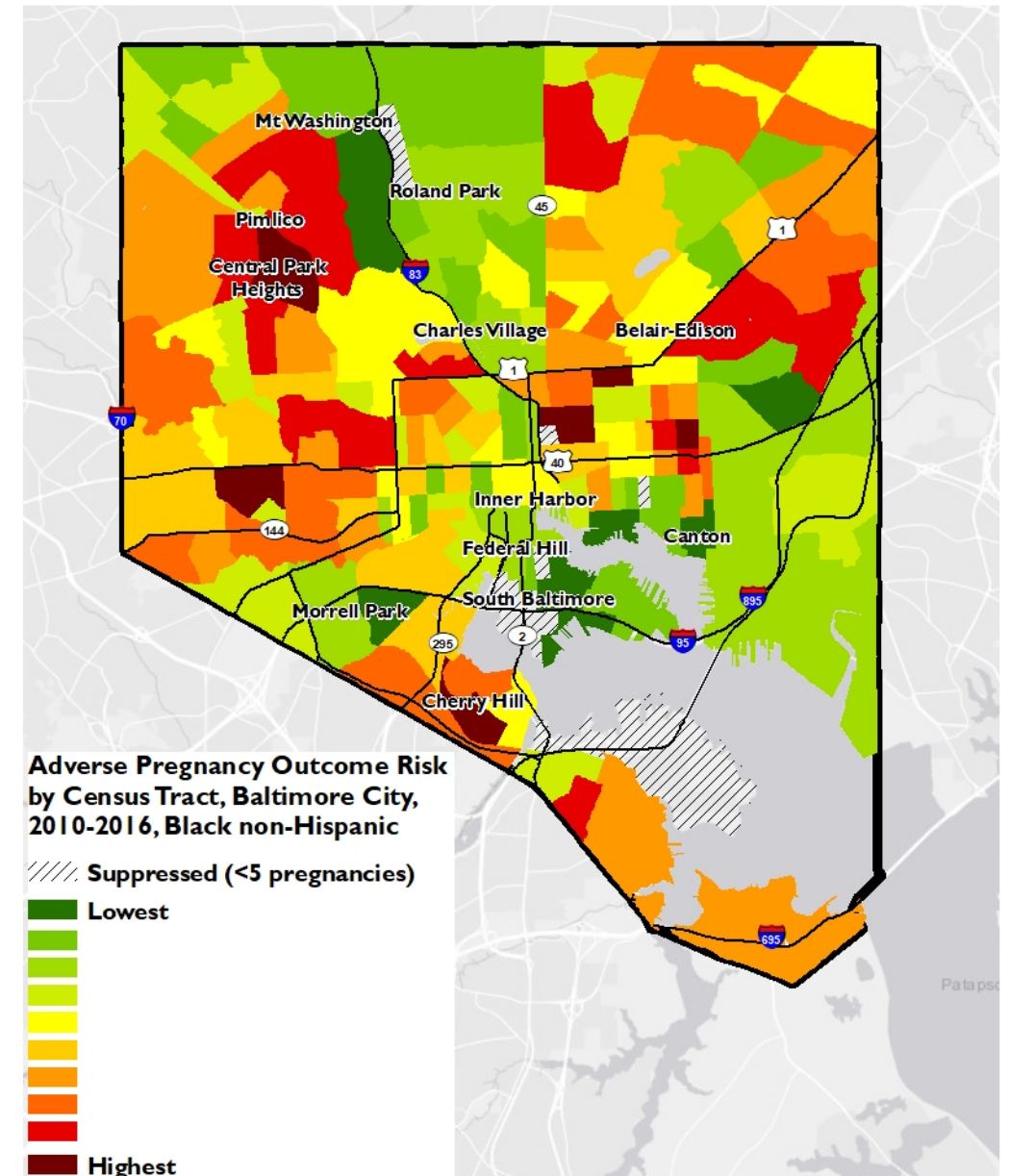




BALTIMORE CITY

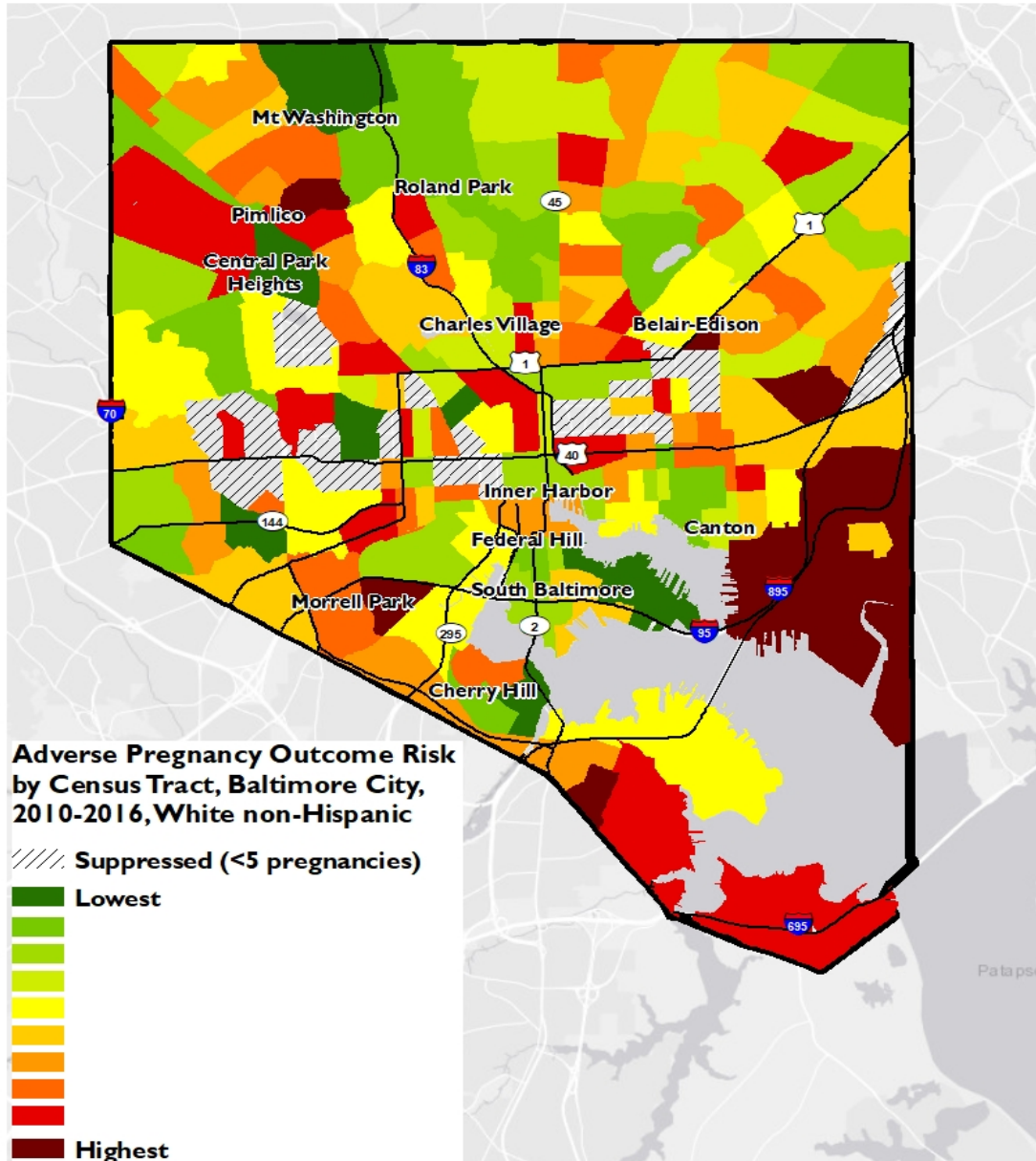


Source: Maryland Vital Statistics Administration and Office of MCH Epidemiology
 Risk represents weighted mean predicted probability of fetal deaths, neonatal deaths, or very premature births (<1,500g & <32 weeks) adjusted for maternal, hospital, and community characteristics stratified by jurisdiction among singleton pregnancies.
 Lowest and Highest indicate areas whose estimated risk is in the lower 5th and upper 95th percentile of the jurisdiction, respectively.

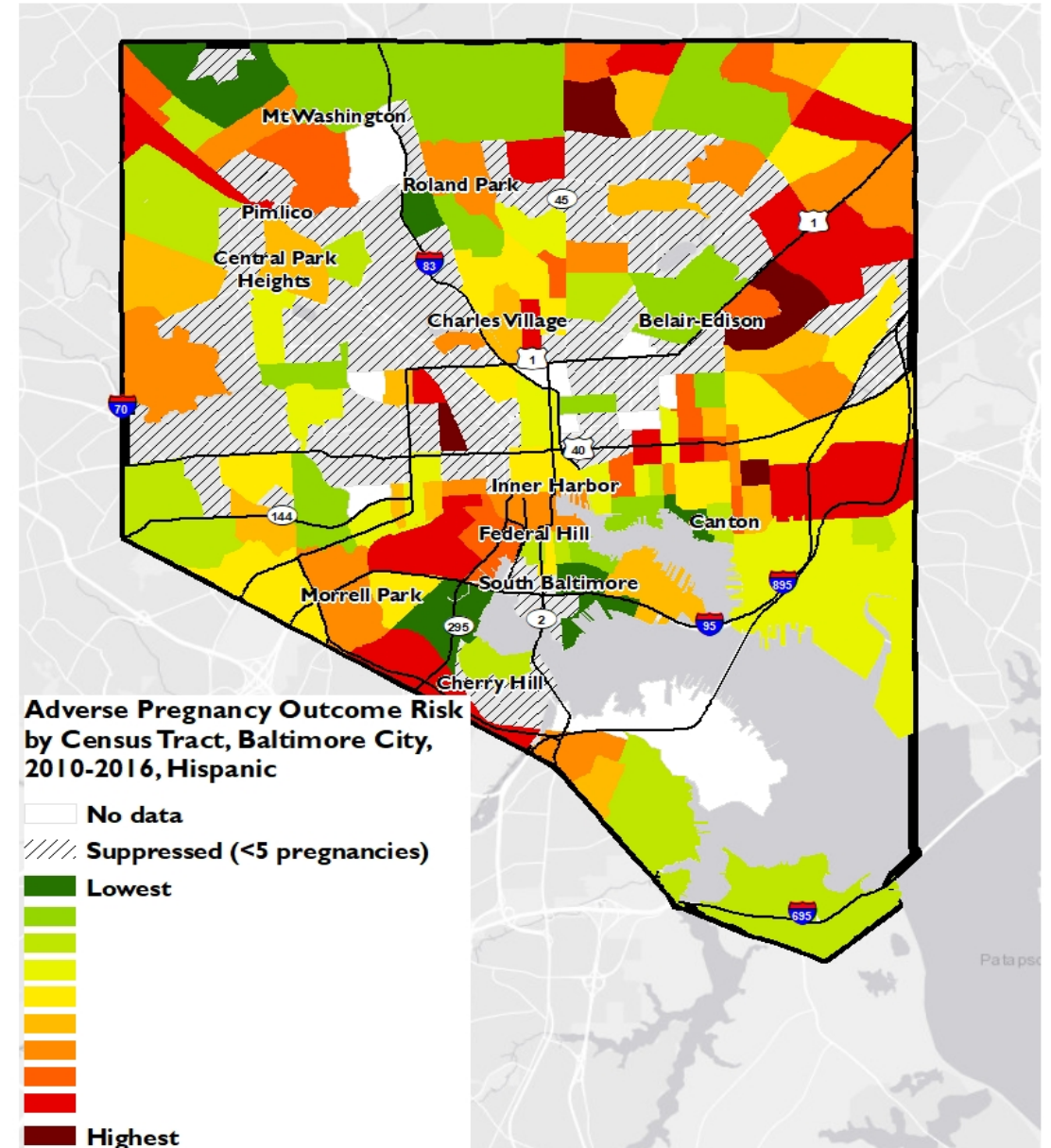


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BALTIMORE CITY



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Conclusions

Summary

- Infant mortality has declined, but disparities persist
- Black NH infant mortality in rural areas has increased, however
- Maternal and preconception health status most important driver of mortality rates
- Leading risk factors to target for reducing racial disparities:

Marital status (social support), maternal education and socioeconomic disadvantage (SES), hypertension, pre-pregnancy BMI (nutrition), teen pregnancy (North Eastern Shore)

- However, reducing the prevalence of these risk factors alone may not eliminate racial disparities
- What can the state do to address the underlying structural and systemic issues that contribute to excess fetal and infant mortality?

Limitations

- Cause of death for infant deaths not available
- Missing data on SUID/SID risk factors from Child Fatality Review; but getting better
- Birth certificate biases (mis- or under-reporting of risk factors)

QUESTIONS