The Epidemiology of Infant Mortality and Disparities in Birth Outcomes in Ohio

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Ohio Department of Health

Ohio Equity Institute
July 23, 2013
Acknowledgements

MCH Epidemiology Section
- Connie Geidenberger
- Sarah Miller
- Missy Vonderbrink
- Rich Thomas

Vital Statistics
- John Paulson

Fellows/Interns
- Celia Quinn
- Wengora Thompson
- Alison Nelson
INFANT MORTALITY
Infant mortality rates by state, 2010

Ohio overall IM rank = 4th
Ohio black IM rank = 2nd
Decline in infant mortality rates by state, 2005-2010

U.S. change = -10.5

- Statistically significant decline of 20% or more
- Statistically significant decline of <20%
- No significant change

Source: National Vital Statistics System, NCHS, CDC
Infant mortality rates, Ohio & US, 1990-2012

Source: Office of Vital Statistics, Ohio Department of Health  *2012 data preliminary
NCHS, *US 2011 data preliminary
Infant Mortality Rate by Maternal Race/Ethnicity, Ohio, 2010

Maternal Race/Ethnicity

- Non-Hispanic White: 6.0
- Non-Hispanic Black: 14.1
- Hispanic: 7.0
- Total: 7.5

Healthy People 2020 Goal: 6.0

Source: Ohio Department of Health Vital Statistics Linked Birth/Infant Death File
Neonatal and postneonatal mortality rates, Ohio and United States, 2000-2011


**Statistically significant at 5% level
Infant mortality by gestational age, Ohio, 2008

Source: Ohio Department of Health Vital Statistics Linked Birth/Infant Death Data Set
Percent of births and infant deaths by gestational age (weeks), Ohio, 2008

Live Births

- <32: 2%
- 32-33: 2%
- 34-36: 8%
- 37+: 88%

Infant Deaths

- <32: 32%
- 32-33: 5%
- 34-36: 8%
- 37+: 55%

Source: Ohio Department of Health Vital Statistics linked birth/infant death data set
Percentage of preterm births—Ohio, 2000-2011

Source: Ohio Department of Health Vital Statistics Birth Data
Percent distribution of births by gestational age, Ohio, 2006 and 2010

Source: Ohio Department of Health Vital Statistics Birth Certificate Data
Preterm and Low Birth Weight Births—Ohio, 2006-2011

Source: Ohio Department of Health Vital Statistics Birth Certificate Data
Low Birth Weight, Preterm & Early Term Singleton Births, by Race/Ethnicity, Ohio, 2010-2011

<table>
<thead>
<tr>
<th></th>
<th>Non-Hispanic White</th>
<th>Non-Hispanic Black</th>
<th>Hispanic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth Weight &lt;2,500g</td>
<td>7.5</td>
<td>13.8</td>
<td>7.7</td>
</tr>
<tr>
<td>Preterm, &lt;29 Weeks</td>
<td>1.0</td>
<td>2.7</td>
<td>1.3</td>
</tr>
<tr>
<td>Preterm, 29-36 Weeks</td>
<td>10.2</td>
<td>15.0</td>
<td>11.3</td>
</tr>
<tr>
<td>Early Term, 37-38 Weeks</td>
<td>24.4</td>
<td>26.6</td>
<td>26.5</td>
</tr>
</tbody>
</table>

Source: Ohio Department of Health Vital Statistics Birth Certificate Data
Percent of Preterm Births by County, 2008-2011

Source: Ohio Department of Health Vital Statistics Birth Certificate Data
Percent of Low Birth Weight Births by County, 2008-2011

Source: Ohio Department of Health Vital Statistics Birth Certificate Data
Ohio Perinatal Quality Collaborative (OPQC)
Change in Full Term + Near Term Births

Percent distribution of OPQC full-term and near-term births, by month
January 2006 to April 2011

Baseline averages were calculated from the initial 24 months, January 2006 to December 2007.

A quality improvement initiative launched in 2008 with 20 large Ohio birthing hospitals to reduce inductions <39 weeks gestation without medical indication

Near-Term Births (36-39 wks gestation), by Race and Delivery Hospital OPQC Participation—Ohio, 2007-10
Why did black women experience a smaller reduction in near-term births than white women from 2007 to 2010?

Because most early births to black women are for reasons unaffected by the initiative:

- The initiative targeted births from 36-38 weeks, but
- Black women were more likely than white to give birth even before 36 weeks
- After reaching 36-38 weeks, Black women are more likely to have spontaneous labor or a medical indication for induction

Elimination of disparities in preterm and near term birth will require approaches that target the common reasons for birth <39 weeks among black women and reduce:

- Early and spontaneous preterm births
- Medical indications for induction before 39 weeks gestation
CAUSES OF INFANT MORTALITY
Top 10 Causes of Infant Death, Ohio, 2011

- Congenital Malformations: 21%
- Disorders related to preterm birth, low birth weight: 18%
- Other: 17%
- Unknown: 10%
- Maternal complications of pregnancy: 9%
- Sudden infant death syndrome: 9%
- Transport accidents: 7%
- Newborn affected by complications of placenta, cord and membranes: 5%
- Diseases of the circulatory system: 2%
- Hemorrhagic and hematological disorders of newborn: 2%

Source: Ohio Vital Statistics

Source: Ohio Department of Health Vital Statistics Birth and Death Files
Reviews of Infant Deaths by Leading Cause of Death, 2006-2010

Source: Ohio Child Fatality Review
n = 5,546
Spotlight on sleep-related deaths

41% of infant deaths after 28 days
39% to black infants - disproportionate to the 17% of the population they represent

Source: Ohio Child Fatality Review
RISK FACTORS FOR INFANT MORTALITY
Breastfeeding

Breastfeeding Initiation in HRSA Region 5 States, 2008

Percent of Infants Ever Breastfed
- >80%
- >75% to 80%
- >70% to 75%
- ≤70%

Source: National Immunization Survey
Ohio Pregnancy Risk Assessment Monitoring System, 2009-2010, Ohio Department of Health
Mothers reporting placing their infant to sleep on back, by race

Source: Ohio Pregnancy Risk Assessment Monitoring System, 2009-2010, Ohio Department of Health
Perinatal Smoking– Ohio, 2010

![Chart showing smoking rates](chart.png)

Source: Pregnancy Risk Assessment Monitoring System, Ohio Department of Health
Smoking During Pregnancy (last 3 mos), by Demographics, Ohio, 2009-10

Source: Ohio Pregnancy Risk Assessment Monitoring System, Ohio Department of Health
Teen Births

Infant Mortality, by Maternal Age, Ohio, 2010

Trends in Teen (15-17) Births, by Race and Ethnicity, Ohio, 2006-2011

- White, non-Hispanic
- Black, non-Hispanic
- Hispanic
- Total
Birth Rates are per 1,000 females aged 15-17 years. **Rates based on less than 20 observations may be unstable and are not reported.

Teen Birth Rate for the State of Ohio 2009-2011: 16.3 per 1,000 females aged 15-17 years. The mean of the county birth rates on which the standard deviations were based (map key) was 16.0 per 1,000 females aged 15-17 years.

Social Determinants of Health

“The conditions in which people are born, grow, live, work and age. These circumstances are shaped by the distribution of money, power, and resources at global, national, and local levels. The social determinants of health are mostly responsible for health inequities – the unfair and avoidable differences in health status seen within and between countries”

The World Health Organization
Infant Mortality Rate – per 1,000 live births

<table>
<thead>
<tr>
<th>County/State</th>
<th>Socioeconomic Tertile</th>
<th>Infant Mortality Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cuyahoga County</td>
<td>Lower SES</td>
<td>12.3</td>
</tr>
<tr>
<td></td>
<td>Middle SES</td>
<td>8.6</td>
</tr>
<tr>
<td></td>
<td>Higher SES</td>
<td>4.1</td>
</tr>
<tr>
<td>Franklin County</td>
<td>Lower SES</td>
<td>11.1</td>
</tr>
<tr>
<td></td>
<td>Middle SES</td>
<td>6.2</td>
</tr>
<tr>
<td></td>
<td>Higher SES</td>
<td>4.0</td>
</tr>
<tr>
<td>Hamilton County</td>
<td>Lower SES</td>
<td>11.4</td>
</tr>
<tr>
<td></td>
<td>Middle SES</td>
<td>8.9</td>
</tr>
<tr>
<td></td>
<td>Higher SES</td>
<td>7.0</td>
</tr>
<tr>
<td>Ohio (2007-2011)</td>
<td></td>
<td>7.7</td>
</tr>
<tr>
<td>United States (2007-2010)</td>
<td></td>
<td>6.6</td>
</tr>
</tbody>
</table>

Healthy People 2020 Objective 6.0

Socioeconomic status defined by median household income and attainment of a bachelor degree by individuals ≥25 years of age
Sources:
- Socioeconomic status calculated from American Community Survey 5 year estimates (2007-2011)
- Ohio Risk Factor Data from Ohio Department of Health Vital Statistics Birth Files (2007-2011)
Low Birth Weight Births—Less than 2,500 grams

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- Ohio Risk Factor Data from Ohio Department of Health Vital Statistics Birth Files (2007-2011)
Preterm Births—Less than 37 weeks gestation

<table>
<thead>
<tr>
<th></th>
<th>Socioeconomic Tertile¹</th>
<th>% Preterm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cuyahoga County (2007-2011)</td>
<td>Lower SES</td>
<td>17.9</td>
</tr>
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<td></td>
<td>Middle SES</td>
<td>13.1</td>
</tr>
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<tr>
<td>Ohio (2007-2011)</td>
<td></td>
<td>17.9</td>
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<tr>
<td>United States (2007-2010)</td>
<td></td>
<td>13.1</td>
</tr>
</tbody>
</table>

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- Ohio Risk Factor Data from Ohio Department of Health Vital Statistics Birth Files (2007-2011)
### Early Prenatal Care – First Trimester

**Healthy People 2020 Objective 77.9%**

<table>
<thead>
<tr>
<th>Socioeconomic Tertile¹</th>
<th>% with Early Prenatal Care</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cuyahoga County</strong> (2007-2011)</td>
<td></td>
</tr>
<tr>
<td>Lower SES</td>
<td>57.5</td>
</tr>
<tr>
<td>Middle SES</td>
<td>69.5</td>
</tr>
<tr>
<td>Higher SES</td>
<td>78.3</td>
</tr>
<tr>
<td><strong>Franklin County</strong> (2007-2011)</td>
<td></td>
</tr>
<tr>
<td>Lower SES</td>
<td>54.8</td>
</tr>
<tr>
<td>Middle SES</td>
<td>69.2</td>
</tr>
<tr>
<td>Higher SES</td>
<td>80.4</td>
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<tr>
<td><strong>Hamilton County</strong> (2007-2011)</td>
<td></td>
</tr>
<tr>
<td>Lower SES</td>
<td>54.2</td>
</tr>
<tr>
<td>Middle SES</td>
<td>71.3</td>
</tr>
<tr>
<td>Higher SES</td>
<td>79.1</td>
</tr>
<tr>
<td><strong>Ohio (2007-2011)</strong></td>
<td>54.8</td>
</tr>
<tr>
<td><strong>United States (2007-2010)</strong></td>
<td>67.9</td>
</tr>
</tbody>
</table>

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*Socioeconomic status defined by median household income and attainment of a bachelor degree by individuals ≥25 years of age
Sources: Socioeconomic status calculated from American Community Survey 5 year estimates (2007-2011)
Ohio Risk Factor Data from Ohio Department of Health Vital Statistics Birth Files (2007-2011)
Mothers Who Did Not Begin Prenatal Care As Early As Wanted, By Race, Ohio, 2009-2010

Overall: 19.0%
Black, non-Hispanic: 23.7%
White, non-Hispanic: 17.3%

Source: Pregnancy Risk Assessment Monitoring System, Ohio Department of Health
Reasons for Not Beginning Prenatal Care As Early as Wanted, Ohio, 2009-2010

- Couldn't get appointment
- Not enough money or insurance
- Doctor/health plan wouldn't start...
- No transportation
- Too busy
- No time off from work/school
- Didn't have Medicaid card
- No child care
- Didn't know about pregnancy
- Didn't want others to know about...

Note: Mothers could select all that applied
Source: Pregnancy Risk Assessment Monitoring System, Ohio Department of Health
Maternal Smoking During Pregnancy

<table>
<thead>
<tr>
<th></th>
<th>Socioeconomic Tertile</th>
<th>% Smoking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cuyahoga County (2007-2011)</td>
<td>Lower SES</td>
<td>15.5</td>
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<tr>
<td></td>
<td>Higher SES</td>
<td>4.7</td>
</tr>
<tr>
<td>Franklin County (2007-2011)</td>
<td>Lower SES</td>
<td>22.0</td>
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<td></td>
<td>Middle SES</td>
<td>12.2</td>
</tr>
<tr>
<td></td>
<td>Higher SES</td>
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<tr>
<td>Hamilton County (2007-2011)</td>
<td>Lower SES</td>
<td>16.8</td>
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<tr>
<td></td>
<td>Middle SES</td>
<td>12.3</td>
</tr>
<tr>
<td></td>
<td>Higher SES</td>
<td>7.8</td>
</tr>
<tr>
<td>Ohio (2007-2011)</td>
<td></td>
<td>18.5</td>
</tr>
<tr>
<td>United States (2007-2010)</td>
<td></td>
<td>9.5</td>
</tr>
</tbody>
</table>

Socioeconomic status defined by median household income and attainment of a bachelor degree by individuals ≥25 years of age
Sources: Socioeconomic status calculated from American Community Survey 5 year estimates (2007-2011)
Ohio Risk Factor Data from Ohio Department of Health Vital Statistics Birth Files (2007-2011)
Infant Mortality Rate by Quality of Prenatal Care Measured by the Kotelchuck Index, Ohio, 2010

Healthy People 2020 Goal: 6.0

Source: Ohio Department of Health Vital Statistics Linked Birth/Infant Death File
Infant Mortality Rate by Maternal Education, Ohio, 2010

- 8th Grade or Less: 8.9
- Some High School: 12.5
- High School Graduate: 8.2
- Some College: 6.9
- College Graduate: 4.4
- Post Graduate: 4.8

Healthy People 2020 Goal: 6.0

Source: Ohio Department of Health Vital Statistics Linked Birth/Infant Death File
## White-Black Dissimilarity Index* and Infant Mortality Rates** for Selected Ohio Cities

<table>
<thead>
<tr>
<th>Ohio City</th>
<th>Dissimilarity Index</th>
<th>Infant Mortality Rate (per 1,000 births)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Overall</td>
<td>White, non-Hispanic</td>
</tr>
<tr>
<td>Cincinnati</td>
<td>0.63</td>
<td>10.4</td>
</tr>
<tr>
<td>Columbus</td>
<td>0.61</td>
<td>8.7</td>
</tr>
<tr>
<td>Cleveland</td>
<td>0.79</td>
<td>9.2</td>
</tr>
</tbody>
</table>

*Calculated from [http://censusscope.org](http://censusscope.org) using Census 2000 data
**Ohio Department of Health Vital Statistics Final Death Files (2009-2011)
Note: Infant mortality calculated using deaths in Hamilton, Franklin, and Cuyahoga counties
Prevalence of Stressful Events in the 12 Months Before Baby Was Born, By Race, Ohio, 2009-2010

Source: Pregnancy Risk Assessment Monitoring System, Ohio Department of Health

Note: Mothers could select all that applied
Number of Stressful Events in the 12 Months Before Baby Was Born, By Race, Ohio, 2009-2010

Source: Pregnancy Risk Assessment Monitoring System, Ohio Department of Health
Mothers Who Always, Often, or Sometimes Felt Unsafe in Their Neighborhood, By Race, Ohio, 2009-2010

Source: Pregnancy Risk Assessment Monitoring System, Ohio Department of Health
Thank you!

ElizabethJ.Conrey@odh.ohio.gov
EXTRA SLIDES
### Infant mortality, Ohio, 2007-2012

*(2012 is preliminary)*

<table>
<thead>
<tr>
<th>Year</th>
<th>Infant deaths</th>
<th>Births</th>
<th>Infant Mortality Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>1,163</td>
<td>150,784</td>
<td>7.71</td>
</tr>
<tr>
<td>2008</td>
<td>1,144</td>
<td>148,592</td>
<td>7.70</td>
</tr>
<tr>
<td>2009</td>
<td>1,109</td>
<td>144,569</td>
<td>7.67</td>
</tr>
<tr>
<td>2010</td>
<td>1,068</td>
<td>139,034</td>
<td>7.68</td>
</tr>
<tr>
<td>2011</td>
<td>1,086</td>
<td>138,024</td>
<td>7.87</td>
</tr>
<tr>
<td>2012 (preliminary)</td>
<td>1,040</td>
<td>138,863</td>
<td>7.49</td>
</tr>
</tbody>
</table>

Source: Office of Vital Statistics, Ohio Department of Health

-4.8%
Infant mortality rates by race/ethnicity, Ohio, 2000, 2005 and 2011

Source: Ohio Department of Health Vital Statistics Linked Birth/Infant Death Data Set
Infant mortality, rates by race—Ohio resident occurrences only, 2007-2012 (2012 preliminary)

Black/White disparity ratio declined from 2.52 (2011) to 2.17 (2012)

Source: Office of Vital Statistics, Ohio Department of Health
Neonatal and Post-neonatal mortality rates—Ohio occurrences only, 2007-2012 (2012 is preliminary)

Source: Office of Vital Statistics, Ohio Department of Health
Neonatal and Post-neonatal mortality rates, by race— Ohio occurrences only, 2007-2012 (2012 preliminary)

Source: Office of Vital Statistics, Ohio Department of Health
Infant Mortality Rate by Month of Prenatal Care Initiation, Ohio, 2010

<table>
<thead>
<tr>
<th>Prenatal Care Initiation</th>
<th>Infant Mortality Rate per 1,000 Live Births</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Trimester</td>
<td>5.5</td>
</tr>
<tr>
<td>Second Trimester</td>
<td>6.6</td>
</tr>
<tr>
<td>Third Trimester</td>
<td>5.5</td>
</tr>
<tr>
<td>Unknown</td>
<td>11.4</td>
</tr>
<tr>
<td>No PNC</td>
<td>47.3</td>
</tr>
<tr>
<td>Total</td>
<td>7.5</td>
</tr>
</tbody>
</table>

Healthy People 2020 Goal: 6.0

Source: Ohio Department of Health Vital Statistics Linked Birth/Infant Death File