Infant Mortality in Indiana

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Definitions

- **Infant mortality** is defined as the death of a baby before his or her first birthday.

- The **infant mortality rate (IMR)** is the number of infant deaths per 1,000 live births.

- A **live birth** is any infant who breathes or shows any other evidence of life (such as beating of the heart, pulsation of the umbilical cord, or definite movement of voluntary muscles) after separation from the mother’s uterus, regardless of the duration of gestation.

- A **fetal death** (stillbirth) is death prior to the complete expulsion or extraction from its mother of a product of human conception and which is not an induced termination of pregnancy. The death is indicated by the fact that after such expulsion or extraction, the fetus does not breathe or show any other evidence of life. (Indiana - 20 weeks of gestation or more, Indiana Code section 16-18-2-341)

Source: Indiana State Department of Health, Maternal & Child Health Epidemiology Division [December 1, 2015]
One baby dies approximately every 13 hours in Indiana.

Your actions do make a difference. Visit www.LaborofLove.in.gov or call 211 to learn more.

Labor of Love
Helping Indiana Reduce Infant Death
International Infant Mortality Rates 2010

<table>
<thead>
<tr>
<th>Country</th>
<th>Rate per 1,000 live births</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>6.1</td>
</tr>
<tr>
<td>Slovakia</td>
<td>5.7</td>
</tr>
<tr>
<td>New Zealand</td>
<td>5.5</td>
</tr>
<tr>
<td>Norway</td>
<td>4.2</td>
</tr>
<tr>
<td>Spain</td>
<td>3.8</td>
</tr>
<tr>
<td>Greece</td>
<td>3.8</td>
</tr>
<tr>
<td>Portugal</td>
<td>3.2</td>
</tr>
<tr>
<td>Netherlands</td>
<td>3.8</td>
</tr>
<tr>
<td>Sweden</td>
<td>2.5</td>
</tr>
<tr>
<td>Austria</td>
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</tr>
<tr>
<td>Czech Republic</td>
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</tr>
<tr>
<td>United Kingdom</td>
<td>4.2</td>
</tr>
<tr>
<td>Poland</td>
<td>5.3</td>
</tr>
<tr>
<td>Hungary</td>
<td>5.5</td>
</tr>
<tr>
<td>Japan</td>
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<td>France</td>
<td>3.6</td>
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<tr>
<td>United States</td>
<td>6.1</td>
</tr>
<tr>
<td>Belguim</td>
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<tr>
<td>Ireland</td>
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<tr>
<td>Denmark</td>
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<td>Greece</td>
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<td>Poland</td>
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<td>Austria</td>
<td>3.9</td>
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<td>Australia</td>
<td>4.1</td>
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<tr>
<td>United Kingdom</td>
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<tr>
<td>Portugal</td>
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<tr>
<td>Russia</td>
<td>3.2</td>
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<td>Hungary</td>
<td>5.3</td>
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<tr>
<td>New Zealand</td>
<td>5.5</td>
</tr>
<tr>
<td>United States</td>
<td>6.1</td>
</tr>
</tbody>
</table>

Source: Indiana State Department of Health, Maternal & Child Health Epidemiology Division [October 26, 2015]
Original Source: CDC/NCHS, linked birth/infant death data set (U.S. data); and OECD 2014 (all other data). Data are available from http://www.oecd.org
Infant Mortality Rates
United States, 2013

Rate per 1,000 live births

Source: Indiana State Department of Health, Maternal & Child Health Epidemiology Division [October 26, 2015]
Infant Mortality Rates
Indiana, U.S. and Healthy People 2020 Goal
2007 - 2013

<table>
<thead>
<tr>
<th>Year</th>
<th>Indiana</th>
<th>U.S.</th>
<th>HP 2020 Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>7.5</td>
<td>6.8</td>
<td>6.0</td>
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<tr>
<td>2008</td>
<td>6.9</td>
<td>6.6</td>
<td>6.0</td>
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<tr>
<td>2009</td>
<td>7.8</td>
<td>6.4</td>
<td>6.0</td>
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<tr>
<td>2010</td>
<td>7.5</td>
<td>6.1</td>
<td>6.0</td>
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<tr>
<td>2011</td>
<td>7.7</td>
<td>6.05</td>
<td>6.0</td>
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<tr>
<td>2012</td>
<td>6.7</td>
<td>5.98</td>
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<tr>
<td>2013</td>
<td>7.15</td>
<td>5.96</td>
<td>6.0</td>
</tr>
</tbody>
</table>

Source: Indiana State Department of Health, Maternal & Child Health Epidemiology Division [October 26, 2015]
United States Original: Centers for Disease Control and Prevention National Center for Health Statistics
Indiana Original Source: Indiana State Department of Health, PHPC, ERC, Data Analysis Team
Infant Mortality Rates
County Level, All Races
2009 - 2013

**HIGHEST** Infant Mortality Rates in State
- Adams, 9.9
- Henry, 9.8
- Montgomery, 9.7
- Grant, 9.5
- Marion, 9.5
- Daviess, 9.5
- Cass, 9.2
- Bartholomew, 9.1
- LaPorte, 8.6
- Lake, 8.5
- St. Joseph, 8.2

**LOWEST** Infant Mortality Rates in State
- Hamilton, 4.0
- Clark, 4.2
- Porter, 4.5
- Howard, 5.0
- Monroe, 5.1
- Hendricks, 5.3
- Tippecanoe, 5.6
- Boone, 6.0

*All have rates at or below the Healthy People 2020 Goal*

Source: Indiana State Department of Health, Maternal & Child Health Epidemiology Division [October 26, 2015]
Indiana Original Source: Indiana State Department of Health, PHPC, ERC, Data Analysis Team
INFANT MORTALITY
BY RACE
Infant Mortality Rates by Race
Indiana
2002 - 2013

Rate per 1,000 live births

Source: Indiana State Department of Health, Maternal & Child Health Epidemiology Division [October 26, 2015]
Indiana Original Source: Indiana State Department of Health, PHPC, ERC, Data Analysis Team
Infant Mortality Rates by Ethnicity
Indiana
2002 - 2013

<table>
<thead>
<tr>
<th>Year</th>
<th>Indiana</th>
<th>Non-Hispanic</th>
<th>Hispanic</th>
<th>Healthy People 2020 Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>7.6</td>
<td>7.6</td>
<td>8.0</td>
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<tr>
<td>2003</td>
<td>7.4</td>
<td>7.6</td>
<td>8.0</td>
<td>6.0</td>
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<tr>
<td>2004</td>
<td>8.1</td>
<td>8.0</td>
<td>8.0</td>
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<td>2005</td>
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<tr>
<td>2006</td>
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<td>2007</td>
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<tr>
<td>2008</td>
<td>6.9</td>
<td>7.8</td>
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<tr>
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<td>7.8</td>
<td>7.4</td>
<td>7.4</td>
<td>6.0</td>
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<td>7.5</td>
<td>7.8</td>
<td>7.8</td>
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<tr>
<td>2011</td>
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<tr>
<td>2012</td>
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<tr>
<td>2013</td>
<td>7.15</td>
<td>7.2</td>
<td>7.3</td>
<td>6.0</td>
</tr>
</tbody>
</table>

Note: Hispanic ethnicity can be of any race.

Source: Indiana State Department of Health, Maternal & Child Health Epidemiology Division [October 26, 2015]
Indiana Original Source: Indiana State Department of Health, PHPC, ERC, Data Analysis Team
Infant Mortality Rates
County Level, by Race
2009 - 2013

Black Infant Mortality
- Worst counties for combined years:
  - Allen County
    - (Black IMR = 19.9)
  - St. Joseph County
    - (Black IMR = 16.5)
  - Marion County
    - (Black IMR = 14.4)
  - Lake County
    - (Black IMR = 12.8)
- These 4 counties account for nearly 80% of all the black infant deaths in Indiana between 2009 and 2013

White Infant Mortality
- Worst counties for combined years:
  - Montgomery County
    - (White IMR = 10.3)
  - Daviess County
    - (White IMR = 10.2)
  - Adams County
    - (White IMR = 9.7)
  - Henry County
    - (White IMR = 9.7)

Source: Indiana State Department of Health, Maternal & Child Health Epidemiology Division [October 26, 2015]
Indiana Original Source: Indiana State Department of Health, PHPC, ERC, Data Analysis Team
Counties With the Worst Infant Mortality Rates Aggregated Years 2009 - 2013 by Race

Source: Indiana State Department of Health
Division of Maternal and Child Health Epidemiology
October 28, 2015
CAUSES OF INFANT MORTALITY IN INDIANA
Infant Mortality Distribution by Cause
Indiana 2013

Indiana, All Races
N = 594

- 47.6% Perinatal Risks
- 15.3% Other
- 14.0% SUIDs
- 21.7% Congenital Malformations
- 1.3% Assaults/Accidents

Indiana, Whites
N = 393

- 44.5% Perinatal Risks
- 14.5% SUIDs
- 24.4% Congenital Malformations
- 14.8% Other

Indiana, Blacks
N = 153

- 53.6% Perinatal Risks
- 16.3% Congenital Malformations
- 15.7% Other
- 13.1% SUIDs

Source: Indiana State Department of Health, Maternal & Child Health Epidemiology Division [October 26, 2015]
Indiana Original Source: Indiana State Department of Health, PHPC, ERC, Data Analysis Team
Factors Contributing to Infant Mortality in Indiana

- **Obesity (ISDH #2 Priority)**
  - If woman is obese = 25% chance of delivering premature infant
  - If woman is morbidly obese = 33% chance of delivering premature infant
  - Indiana is 9th most obese state in U.S.

- **Smoking (ISDH #3 Priority)**
  - 15.7% of mothers smoke during pregnancy *(TWICE the U.S. average)*
  - 25.9% of mothers on Medicaid smoke
  - Indiana has 7th worst smoking rate among pregnant women in U.S.
  - Indiana has 12th highest smoking rate overall in U.S.

- **Limited Prenatal Care**
  - Only 67.4% of mothers receive prenatal care during the 1st trimester

- **Unsafe Sleep Practices**
  - 14.0% of infant deaths in 2013 can be attributed to SUIDs
OBESITY
Percent of Women Ages 18-44 Who are Obese (BMI $\geq 30$) Indiana, 2014

IN | Non-Hispanic Whites | Non-Hispanic Blacks
---|---------------------|---------------------
31.5% | 31.2% | 37.9%

Source: Indiana State Department of Health, Division of Nutrition and Physical Activity, BRFSS 2014 [October 26, 2015]
SMOKING AMONG PREGNANT WOMEN
% Women Smoking During Pregnancy
Indiana, by Race
2009 - 2013

Source: Indiana State Department of Health, Maternal & Child Health Epidemiology Division [October 26, 2015]
Indiana Original Source: Indiana State Department of Health, PHPC, ERC, Data Analysis Team
Percent of Mother’s Who Smoked Anytime During Pregnancy, by Race
3 Worst Counties
2013

Whites

<table>
<thead>
<tr>
<th>County</th>
<th>Percent of Live Births</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crawford</td>
<td>33.0%</td>
</tr>
<tr>
<td>Scott</td>
<td>32.9%</td>
</tr>
<tr>
<td>Owen</td>
<td>32.3%</td>
</tr>
</tbody>
</table>

Indiana = 17.4%

Blacks

<table>
<thead>
<tr>
<th>County</th>
<th>Percent of Live Births</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grant</td>
<td>25.0%</td>
</tr>
<tr>
<td>Vanderburgh</td>
<td>22.9%</td>
</tr>
<tr>
<td>Madison</td>
<td>22.6%</td>
</tr>
</tbody>
</table>

Indiana = 11.8%

Source: Indiana State Department of Health, Maternal & Child Health Epidemiology Division [October 26, 2015]
Indiana Original Source: Indiana State Department of Health, PHPC, ERC, Data Analysis Team
WOMEN RECEIVING EARLY PRENATAL CARE
% Women Receiving PNC 1st Trimester
Indiana, by Race
2009 - 2013

Healthy People
2020 Goal 77.9%

Source: Indiana State Department of Health, Maternal & Child Health Epidemiology Division [October 26, 2015]
Indiana Original Source: Indiana State Department of Health, PHPC, ERC, Data Analysis Team
Percent of Mother’s Who Received Prenatal Care in the 1st Trimester, by Race 3 Worst Counties 2013

Whites

<table>
<thead>
<tr>
<th>County</th>
<th>Percent of all Live Births</th>
</tr>
</thead>
<tbody>
<tr>
<td>LaGrange</td>
<td>44.4%</td>
</tr>
<tr>
<td>Adams</td>
<td>39.2%</td>
</tr>
<tr>
<td>Kosciusko</td>
<td>36.2%</td>
</tr>
</tbody>
</table>

Indiana = 69.9%

Blacks

<table>
<thead>
<tr>
<th>County</th>
<th>Percent of all Live Births</th>
</tr>
</thead>
<tbody>
<tr>
<td>St. Joseph</td>
<td>48.8%</td>
</tr>
<tr>
<td>Grant</td>
<td>48.8%</td>
</tr>
<tr>
<td>Floyd</td>
<td>42.0%</td>
</tr>
<tr>
<td>Allen</td>
<td>40.8%</td>
</tr>
</tbody>
</table>

Indiana = 56.8%

Source: Indiana State Department of Health, Maternal & Child Health Epidemiology Division [October 26, 2015]
Indiana Original Source: Indiana State Department of Health, PHPC, ERC, Data Analysis Team
UNSAFE SLEEP PRACTICES
SUIDs Rates by Cause
Indiana, 2009-2013

Rate per 100,000 live births

- Combined SUIDs Death Rate
- Sudden Infant Death Syndrome (R95)
- Accidental Suffocation and Strangulation in Bed (W75)
- Unknown (R99)

SUIDs = W75, R95, R99

Source: Indiana State Department of Health, Maternal & Child Epidemiology Division [October 21, 2015]
Indiana Original Source: Indiana State Department of Health, PHPC, ERC, Data Analysis Team
Breakdown of SUIDs deaths
Indiana, 2013

% Distribution of SUIDs Deaths
N = 72

- 66.7% SIDS
- 9.7% Unknown
- 23.6% Accidental Suffocation/Strangulation in Bed

Source: Indiana State Department of Health, Maternal & Child Epidemiology Division [October 21, 2015]
Breakdown of SUIDs deaths by Race
Indiana, 2009-2013

% Distribution of SUIDs Deaths
Whites
N = 252

- 69.8% SIDS
- 21.8% Accidental Suffocation/Strangulation in Bed
- 8.3% Unknown

% Distribution of SUIDs Deaths
Blacks
N = 97

- 56.7% SIDS
- 35.1% Accidental Suffocation/Strangulation in Bed
- 8.2% Unknown

SUIDS = W75, R95, R99
Source: Indiana State Department of Health, Maternal & Child Epidemiology Division [October 21, 2015]
Indiana Original Source: Indiana State Department of Health, PHPC, ERC, Data Analysis Team
PERINATAL PERIODS OF RISK (PPOR)
What is PPOR?

- Analytic framework for investigating and preventing feto-infant mortality at a local level
- Widely used by health departments and supported by CDC, March of Dimes, WHO, and CityMatCH
- Six stages:
  - Assure community and analytic readiness
  - Conduct analytic phases of PPOR
  - Develop strategic actions for targeted prevention
  - Launch new prevention initiatives
  - Monitor and evaluate the approach
  - Sustain stakeholder investment and political will
- Used to identify opportunity gaps, guide further investigations, and focus prevention efforts
The Perinatal Periods of Risk

Feto-infant Mortality Map

Age at Death

- Fetal Death: >=24 weeks
- Neonatal: 0-27 days
- Post-neonatal: 28-364 days

Birthweight

- 500-1499 grams
- 1500+ grams

Maternal Health / Prematurity

- Maternal Care
- Newborn Care
- Infant Health
Study Population

- **Indiana Overall**
  - Mother IN resident at time of delivery
  - 2011 live births, >= 500 grams
  - 2011 fetal deaths, >= 500 grams and >= 24 weeks gestation
  - Death cohort - All infant deaths that occurred in 2011, regardless of year of birth (2010, 2011), >= 500 grams

- **Subpopulations**
  - White, Non-Hispanic
  - Black, Non-Hispanic
  - Hispanic
Internal Reference Group

- **Purpose:** Underlying assumption is that if the reference group can have low mortality, the study group should also be able to reach that goal.

- In general, rates tend to be lower for white, well-educated women between the ages of 20-35.

- 2011 Indiana internal reference population, defined by maternal characteristics:
  - 20 years of age or older
  - 13 or more years of education
  - Non-Hispanic, White
  - Indiana resident at time of baby’s birth
Phase 1 Results
# 2011 Indiana Feto-Infant Mortality

<table>
<thead>
<tr>
<th>Category</th>
<th>Subcategory</th>
<th>Death Count</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fetal Death</td>
<td>&gt;=24 weeks</td>
<td>270 deaths</td>
<td>3.22</td>
</tr>
<tr>
<td>Maternal Health/Prematurity</td>
<td></td>
<td>168 deaths</td>
<td>2.01</td>
</tr>
<tr>
<td>Maternal Care</td>
<td></td>
<td>59 deaths</td>
<td>0.70</td>
</tr>
<tr>
<td>Newborn Care</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Infant Health</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-neonatal</td>
<td>28-364 days</td>
<td>248 deaths</td>
<td>2.96</td>
</tr>
</tbody>
</table>

**Feto-Infant Deaths = 745**

**Live Births + Fetal Deaths = 83,722**

**Overall rate*: 8.90 per 1,000 live births and fetal deaths**

*The sum of the four periods may not exactly equal the total because of differences due to rounding

Source: Indiana State Department of Health, Maternal & Child Health Epidemiology Division [2014]
# 2011 Internal Reference Group

<table>
<thead>
<tr>
<th>Period</th>
<th>500-1499 grams</th>
<th>1500+ grams</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fetal Death &gt;=24 weeks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neonatal 0-27 days</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-neonatal 28-364 days</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maternal Health/Prematurity</td>
<td>2.46</td>
<td></td>
</tr>
<tr>
<td>Maternal Care</td>
<td>1.64</td>
<td>1.64</td>
</tr>
<tr>
<td>Newborn Care</td>
<td>0.68</td>
<td>0.68</td>
</tr>
<tr>
<td>Infant Health</td>
<td>2.24</td>
<td>2.24</td>
</tr>
</tbody>
</table>

Overall rate*: 7.03 per 1,000 live births and fetal deaths

*The sum of the four periods may not exactly equal the total because of differences due to rounding

Source: Indiana State Department of Health, Maternal & Child Health Epidemiology Division [2014]
## 2011 Excess Mortality
### IN vs. Reference Group

<table>
<thead>
<tr>
<th></th>
<th>Maternal Health/ Prematurity</th>
<th>Maternal Care</th>
<th>Newborn Care</th>
<th>Infant Health</th>
<th>Total*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Indiana Overall</strong></td>
<td>3.22</td>
<td>2.01</td>
<td>0.70</td>
<td>2.96</td>
<td>8.90</td>
</tr>
<tr>
<td><strong>Reference Group</strong></td>
<td>2.46</td>
<td>1.64</td>
<td>0.68</td>
<td>2.24</td>
<td>7.03</td>
</tr>
<tr>
<td><strong>Excess Rate</strong></td>
<td>0.76</td>
<td>0.36</td>
<td>0.02</td>
<td>0.72</td>
<td>1.86</td>
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<tr>
<td><strong>Estimated Preventable Deaths</strong></td>
<td>64</td>
<td>31</td>
<td>2</td>
<td>60</td>
<td>156</td>
</tr>
</tbody>
</table>

* The sum of the four periods may not exactly equal the total because of differences due to rounding.

A = For each period and total, excess rates are the rates for the study population group minus the rates for the internal reference group.

B = Number of excess deaths is the excess rate multiplied by the number of fetal deaths and live births divided by 1,000.

Source: Indiana State Department of Health, Maternal & Child Health Epidemiology Division [2014]
## 2011 Feto-Infant Mortality by Race/Ethnicity

<table>
<thead>
<tr>
<th>Race/Ethnicity</th>
<th>Maternal Health/Prematurity</th>
<th>Maternal Care</th>
<th>Newborn Care</th>
<th>Infant Health</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Non-Hispanic Whites</strong></td>
<td>2.87</td>
<td>1.94</td>
<td>0.77</td>
<td>2.87</td>
</tr>
<tr>
<td><strong>Feto-Infant Deaths</strong></td>
<td>536</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Live Births + Fetal Deaths</strong></td>
<td>63,394</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Overall rate</strong></td>
<td>8.46</td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Non-Hispanic Blacks</strong></th>
<th>Maternal Health/Prematurity</th>
<th>Maternal Care</th>
<th>Newborn Care</th>
<th>Infant Health</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4.67</td>
<td>2.59</td>
<td>0.62</td>
<td>4.15</td>
</tr>
<tr>
<td><strong>Feto-Infant Deaths</strong></td>
<td>116</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Live Births + Fetal Deaths</strong></td>
<td>9,635</td>
<td></td>
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</tr>
<tr>
<td><strong>Overall rate</strong></td>
<td>12.04</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hispanic</th>
<th>Maternal Health/Prematurity</th>
<th>Maternal Care</th>
<th>Newborn Care</th>
<th>Infant Health</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3.83</td>
<td>1.73</td>
<td>0.49</td>
<td>1.98</td>
</tr>
<tr>
<td><strong>Feto-Infant Deaths</strong></td>
<td>65</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Live Births + Fetal Deaths</strong></td>
<td>8,093</td>
<td></td>
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<tr>
<td><strong>Overall rate</strong></td>
<td>8.03</td>
<td></td>
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</tbody>
</table>

Source: Indiana State Department of Health, Maternal & Child Health Epidemiology Division [2014]
## 2011 Excess Mortality Subpopulations vs. Reference Group

<table>
<thead>
<tr>
<th></th>
<th>Maternal Health/ Prematurity</th>
<th>Maternal Care</th>
<th>Newborn Care</th>
<th>Infant Health</th>
<th>Total*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Non-Hispanic Whites</strong></td>
<td></td>
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<tr>
<td>Excess Rate A</td>
<td>0.41</td>
<td>0.30</td>
<td>0.09</td>
<td>0.63</td>
<td>1.42</td>
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<tr>
<td>Estimated Preventable Deaths B</td>
<td>26</td>
<td>19</td>
<td>6</td>
<td>40</td>
<td>90</td>
</tr>
<tr>
<td><strong>Non-Hispanic Blacks</strong></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Excess Rate A</td>
<td>2.21</td>
<td>0.95</td>
<td>-0.06</td>
<td>1.91</td>
<td>5.01</td>
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<tr>
<td>Estimated Preventable Deaths B</td>
<td>21</td>
<td>9</td>
<td>-1</td>
<td>18</td>
<td>48</td>
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<tr>
<td><strong>Hispanic</strong></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Excess Rate A</td>
<td>1.37</td>
<td>0.09</td>
<td>-0.19</td>
<td>-0.27</td>
<td>1.00</td>
</tr>
<tr>
<td>Estimated Preventable Deaths B</td>
<td>11</td>
<td>1</td>
<td>-2</td>
<td>-2</td>
<td>8</td>
</tr>
</tbody>
</table>

* The sum of the four periods may not exactly equal the total because of differences due to rounding.
A = For each period and total, excess rates are the rates for the study population group minus the rates for the internal reference group.
B = Number of excess deaths is the excess rate multiplied by the number of fetal deaths and live births divided by 1,000.

Source: Indiana State Department of Health, Maternal & Child Health Epidemiology Division [2014]
Phase 1 Conclusions

- 156 preventable deaths in 2011 when compared to the internal reference population

- Highest excess rate found in Non-Hispanic Black population, but larger impact (more preventable deaths) occurring in Non-Hispanic White population

- Maternal Health / Prematurity and Infant Health are the two periods of risk to investigate further for Non-Hispanic Whites and Blacks
Phase 2 Analysis

- Investigating the opportunity gaps
  - In phase 2, the population(s) with the largest excess mortality become the study population(s) and the focus
    - Non-Hispanic, Whites
    - Non-Hispanic, Blacks

- Phase 2 analyses will unlikely discover new causes of feto-infant mortality, but will help verify which known causes are of local importance
Phase 2 Materials and Methods

- Phase 1 datasets

- Three primary steps for each risk period investigation:
  
  1. Identify causal pathways or biologic mechanisms for excess mortality
     - KITAGAWA ANALYSIS/CAUSE-SPECIFIC MORTALITY RATES
  
  2. Estimate prevalence of risk and preventive factors by type of mechanism
     - COMPARE PREVALENCE OF RISK FACTORS IN THE STUDY POPULATIONS AT RISK TO THE REFERENCE POPULATION
  
  3. Estimate the impact of the risk and preventive factors
     - COMPARE PREVALENCE OF RISK FACTORS AMONG STUDY POPULATIONS WITH AND WITHOUT OUTCOME OF INTEREST (VLBW, DEATH)
     - MEASURE THE ASSOCIATION BETWEEN OUTCOME AND RISK FACTORS
     - CALCULATE POPULATION ATTRIBUTABLE RISK%
Limitations

• Possible reporting inaccuracies on the birth, death, and fetal death certificates (e.g. weight, height)

• Self-reporting bias

• Residual confounding could be possible due to the lack of data for certain covariates (e.g. substance abuse)

• Results from a statewide PPOR are not as strong as community level studies

• Observational studies do not generally show causal link, so PPOR is unlikely to identify previously unknown causes.
Conclusions

- 156 preventable deaths in 2011 with the most preventable deaths occurring in Non-Hispanic White population, but the highest excess rate occurring among Non-Hispanic Blacks

- Prevention efforts would be best geared toward methods that help reduce the number of VLBW births and SIDS/suffocation deaths

- Future Implications of PPOR
  - PPOR conducted at state-level annually - approximately 6 month time frame, aggregate future years (2012-2013)
  - Local level PPORs across Indiana
  - Fetal Infant Mortality Reviews (FIMR)
  - Pregnancy Risk Assessment Monitoring System (PRAMS)
Questions

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