Causes of Infant Mortality: Why is Infant Mortality a Public Health Concern?

Presented by
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September 2012

DELAWARE HEALTH AND SOCIAL SERVICES
Division of Public Health
Center for Family Health Research and Epidemiology
Causes of Infant Mortality: Why is Infant Mortality a Public Health Concern?

Today, we will do the following:

1. Define infant mortality.

2. Describe the social determinants of health contributing to disparities in infant mortality rates.

3. Identify leading causes of infant mortality.

4. Discuss best practices for reducing poor birth outcomes and infant mortality disparities.

5. Identify areas of research needed to further understand and address disparities in infant mortality.
What is Infant Mortality?

- **Infant Mortality Rate (IMR):** The number of infant deaths at one year of age or younger per 1,000 live births.

- In more precise terms, the Infant Mortality Rate is the product of the:
  - Birth weight distribution of the population.
  - Risk of low birth weight babies of dying.

The Infant Mortality Rate is one of the key indicators of a nation's health status.

What is Infant Mortality?

- Related measures of Infant Mortality:

  **Neonatal Mortality Rate:** Number of infant deaths between 1 hour of birth and under 28 days of age per 1,000 live births.

  **Postneonatal Mortality Rate:** Number of infant deaths between 28 and 364 days of age per 1,000 live births.
What is Infant Mortality?

- Delaware’s infant mortality rate was **8.4 infant deaths per 1,000 live births** in the 2004-2008 period.

- The U.S. infant mortality rate was **6.7 infant deaths per 1,000 live births** in the 2004-2008 period.

- Delaware’s infant mortality rate has been consistently higher than the national rate.

Five-year Average Infant Mortality Rates

![Chart showing the five-year average infant mortality rates for Delaware and the U.S. from 1980 to 2008. The chart displays a downward trend in mortality rates for both periods, with Delaware generally having lower rates than the U.S.]
Five-year Average Infant Mortality Rates
Delaware Counties and City of Wilmington, Delaware, 1990-2008

Source: Delaware health Statistics Center
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In the 2004-2008 period in Delaware…
- The **Black non-Hispanic** infant mortality rate was 15.2 per 1,000 births.
- The **White non-Hispanic** infant mortality rate was 5.9 per 1,000 births.
- The **Hispanic** infant mortality rate was 7.7 per 1,000 births.

Based on these figures alone, **considerable disparities exist among race/ethnicity groups in the infant mortality rate.**

Percent Change in Five-year Average Infant Mortality by Gestation and Race

Source: Delaware Health Statistics Center
The social determinants of health that contribute to these disparities in infant mortality rates can be traced back to disparities in **perinatal health**.

The following non-genetic factors have been linked to disparities in perinatal health:
- **Access to and Quality of Health Services**
- **Disparate Economic Resources**
- **Environment** (e.g., Pollution)
- **Health Behavior** (e.g., Smoking)
- **Stress**

Social Determinants of Health
Contributing to Disparities in Infant Mortality Rates

• To uncover what specific non-genetic factors contributed to the disparities in the infant mortality rate in Delaware, a **Perinatal Periods of Risk (PPOR)** assessment was performed.

• Designed by CityMatCH, PPOR is a simple method based on a strong conceptual framework to mobilize a community to prioritize prevention efforts relevant to fetal and infant mortality reduction.

PPOR Results for Delaware, 2001-2005:

- Black non-Hispanics had a higher frequency of very low birth weight (VLBW) births compared to White non-Hispanics.

  The difference in the prevalence of VLBW births was the strongest cause of the infant mortality disparity between the two race/ethnicity groups.

- Black non-Hispanics also had a higher frequency of sudden infant death syndrome (SIDS) deaths compared to White non-Hispanics.
PPOR Results for Delaware, 2001-2005:

Among the perinatal risk factors examined, having lower prenatal care utilization and higher rates of hypertension (chronic and gestational) were significantly more common among Black non-Hispanic mothers compared to White non-Hispanic mothers.

For White non-Hispanic mothers, plurality (twins, triplets) was the strongest predictor for having VLBW births. For Black non-Hispanic mothers, not having adequate prenatal care utilization was the strongest predictor.
Social Determinants of Health
Contributing to Disparities in Infant Mortality Rates

Additional factors:

• Analysis of DE data showed:

- Disparities persist among Black non-Hispanic women with college education and access to insurance

- Black non-Hispanic mothers are more likely to feel sad/hopeless/down during and after pregnancy.
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## Leading Causes of Infant Mortality
### United States, 2005

<table>
<thead>
<tr>
<th>Cause of Death</th>
<th>Number</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Congenital malformations, deformations and chromosomal abnormalities (Q00–Q99)</td>
<td>5,562</td>
<td>134.3</td>
</tr>
<tr>
<td>Disorders related to short gestation and low birth weight, not elsewhere classified (P07)</td>
<td>4,709</td>
<td>113.7</td>
</tr>
<tr>
<td>Sudden infant death syndrome (R95)</td>
<td>2,107</td>
<td>50.9</td>
</tr>
<tr>
<td>Newborn affected by maternal complications of pregnancy (P01)</td>
<td>1,786</td>
<td>43.1</td>
</tr>
<tr>
<td>Newborn affected by complications of placenta, cord and membranes (P02)</td>
<td>1,111</td>
<td>26.8</td>
</tr>
<tr>
<td>Accidents (unintentional injuries) (V01–X59)</td>
<td>1,069</td>
<td>25.8</td>
</tr>
<tr>
<td>Respiratory distress of newborn (P22)</td>
<td>861</td>
<td>20.8</td>
</tr>
<tr>
<td>Bacterial sepsis of newborn (P36)</td>
<td>834</td>
<td>20.1</td>
</tr>
<tr>
<td>Neonatal hemorrhage (P50–P52,P54)</td>
<td>664</td>
<td>16.0</td>
</tr>
<tr>
<td>Necrotizing enterocolitis of newborn (P77)</td>
<td>549</td>
<td>13.3</td>
</tr>
</tbody>
</table>

Leading Causes of Infant Mortality

- In the 2004-2008 period in Delaware...
  - 94 percent of all infant deaths took place within the first 6 months of life.
  - 70 percent of all infant deaths took place within the first 28 days of life.
  - 41 percent of all infant deaths took place within 24 hours of birth.

Therefore, the leading causes of infant mortality occur within the neonatal period.

In the 2004-2008 period in Delaware, the three leading causes of infant death were:
- At 24.1 percent, disorders related to short gestation and fetal malnutrition (prematurity and low birthweight).
- At 13.2 percent, congenital anomalies (birth defects).
- At 8.9 percent, sudden infant death syndrome (SIDS).

In the 2004-2008 period in Delaware…

- Disorders related to **short gestation and low birth weight** was the most frequent cause of death for both Black and White infants.

- However, while **birth defects** were responsible for 17.2 percent of all White infant deaths, they accounted for only 7.7 percent of Black infant deaths.

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Best Practices for Reducing Poor Birth Outcomes and Infant Mortality Disparities

Causes of infant mortality disparities and best practices to mitigate their effects:

<table>
<thead>
<tr>
<th>Causes of Infant Mortality Disparities</th>
<th>Best Practices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access to and Quality of Health Services</td>
<td>Case Management</td>
</tr>
<tr>
<td>Disparate Economic Resources</td>
<td>Government Programs</td>
</tr>
<tr>
<td>Environment (e.g., Pollution)</td>
<td>Health Promotion</td>
</tr>
<tr>
<td>Health Behaviors (e.g., Smoking)</td>
<td>Patient Education</td>
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<tr>
<td>Stress</td>
<td>Risk Assessment</td>
</tr>
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</table>

What do these best practices look like?

Best Practices for Reducing Poor Birth Outcomes and Infant Mortality Disparities

Examples of **Case Management** and **Government Programs** that may help reduce the prevalence of poor birth outcomes and disparity in infant mortality:

<table>
<thead>
<tr>
<th>Best Practices</th>
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<tbody>
<tr>
<td>“Back to Sleep” and “Cribs for Kids” Campaigns</td>
</tr>
<tr>
<td>Child Abuse, Child Neglect, and Domestic Violence Services</td>
</tr>
<tr>
<td>Community Health Centers</td>
</tr>
<tr>
<td>Healthy Start Infant Mortality Reduction Program</td>
</tr>
<tr>
<td>Home Visiting Programs</td>
</tr>
<tr>
<td>Medicaid, Temporary Assistance for Needy Families (TANF)</td>
</tr>
<tr>
<td>Special Supplemental Nutrition Program for Women, Infants and Children (WIC)</td>
</tr>
</tbody>
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Best Practices for Reducing Poor Birth Outcomes and Infant Mortality Disparities

Recognized best practices related to **Health Promotion**, **Patient Education**, and **Risk Assessment** that are linked to a reduction in poor birth outcomes:

<table>
<thead>
<tr>
<th>Best Practice</th>
<th>Poor Birth Outcome Addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breastfeeding</td>
<td>Immunological Deficiencies, Poor Nutrition</td>
</tr>
<tr>
<td>Folic Acid Use</td>
<td>Birth Defects (Neural Tube Defects)</td>
</tr>
<tr>
<td>Infant Sleep Position</td>
<td>SIDS</td>
</tr>
<tr>
<td>Interconception Care</td>
<td>Birth Defects, LBW/Preterm Birth, SIDS</td>
</tr>
<tr>
<td>Periodontal Care</td>
<td>LBW/Preterm Birth</td>
</tr>
<tr>
<td>Prenatal Care</td>
<td>Birth Defects, LBW/Preterm Birth</td>
</tr>
<tr>
<td>Well-Child Care</td>
<td>Immunological Deficiencies</td>
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Best Practices for Reducing Poor Birth Outcomes and Infant Mortality Disparities

What is still missing:
- Poverty, racism, environmental justice, gender inequality…

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5. Identify areas of research needed to further understand and address disparities in infant mortality.
Further research is needed to further understand and address disparities in infant mortality. Areas of research include:

- Relationship between LBW and Infant Mortality
- Understanding Educational Factors
- Neighborhood Effects
Relationship between LBW and Infant Mortality

LBW is a risk factor for infant mortality but some researchers suggest that a tendency to focus solely on LBW may leave unexplored some underlying factors that compromise fetal development.

Researchers may need to distinguish more rigorously between LBW births that are “compromised during fetal development” and LBW births that are otherwise “normal”.


Areas of Research Needed to Further Understand and Address Disparities in Infant Mortality

- **Understanding of Educational Factors**
  The gap in infant mortality based on mothers’ years of formal education has widened significantly since 1985.

Increasing maternal education appears to be an important predictor of infant survival for White non-Hispanics but not for Black non-Hispanics. More research will need to be performed in order to elucidate why this disparity exists.


Areas of Research Needed to Further Understand and Address Disparities in Infant Mortality

- **Neighborhood Effects**
  Some argue that birth outcomes are rooted in social inequalities and neighborhood effects rather than economic differences alone.

Researchers have began to explore the relationship between birth outcomes and contextual factors (such as racial segregation or community disorder), but affirm that it is “difficult to disentangle contextual effects from the characteristics of individuals”.


Areas of Research Needed to Further Understand and Address Disparities in Infant Mortality

Current efforts in Delaware to understand and address disparities in infant mortality include:

- Data Collection and Surveys on Poor Birth Outcomes
- Analysis Using Models Designed by Thought Leaders
Areas of Research Needed to Further Understand and Address Disparities in Infant Mortality

• **Data Collection and Surveys on Poor Birth Outcomes**
  - **FIMR** (Fetal and Infant Mortality Review)
  - **PRAMS** (Pregnancy Risk Assessment Monitoring System)

Such sources allow us to better understand the type of poor birth outcome and where it occurred (FIMR).

They also can highlight specific maternal health categories in which racial/ethnic disparities are present before, during, and after the pregnancy (PRAMS).
Analysis Using Models Designed by Thought Leaders

As previously mentioned, a PPOR analysis was conducted in Delaware.

Models such as PPOR help us understand in what specific time frames (fetal, neonatal, or postneonatal) are racial/ethnic disparities in poor birth outcomes present.

Knowing this, we can then investigate whether these disparities are a result of unequal or uneven access to services or health behaviors, for example.
Areas of Research Needed to Further Understand and Address Disparities in Infant Mortality

• Current work in Delaware to address disparities:
  • Healthy Women/Healthy Babies (HWHB) Preconception, interconception, prenatal, nutrition and mental health intervention for high-risk women.
  • Reproductive Life Planning
  • Kicks Count
Statewide Education Campaign

• Developed Reproductive Life Plan toolkits to help teens and women set and follow personal goals to achieve optimum health.
**KICKS COUNT**

- Provider and patient education campaign to promote fetal movement tracking.
- Includes materials in English and Spanish, custom made materials for low literacy patients, and a clear call to action – **10 Kicks in 2 Hours**
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THANK YOU