Using PPOR in an Exploration of Infant Mortality Trends Nebraska, 1979-2010

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Nebraska Department of Health and Human Services

Presentation at the CSTE 2012 Annual Conference

June 5, 2012
Infant Mortality Rates
U.S. and Nebraska, 1979-2011

Infant Deaths / 1,000 Live Births


Nebraska
Infant Mortality Rates
U.S. and Nebraska, 1979-2011

Infant Deaths / 1,000 Live Births

U.S.

Nebraska
Crude and Logarithmic Infant Mortality Rates
Nebraska and the U.S., 1979-2010

Infant Deaths per 1,000 Live Births

Nebraska - IMR
U.S. - IMR
Nebraska - ln(IMR)
U.S. - ln(IMR)
Statistical software for the analysis of inflection points in trend data

- Models the data as multiple, different lines connected at “joinpoints”
- Produces models with 0-9 joinpoints
- Poisson regression for ln(IMR) and ln(PPOR) rates
- Linear regression with constant variance for PT and LBW
No significant join points

* The Annual Percent Change (APC) is significantly different from zero at alpha = 0.05
Two non-significant join points

The Annual Percent Change (APC) is significantly different from zero at alpha = 0.05
Infant Mortality Rates
U.S. and Nebraska, 1979-2010

Infant Deaths / 1,000 Live Births

Period of Interest
What are possible explanations for the observed trends?
Infant Mortality Rates
U.S. and Nebraska, 1979-2011

- **NE-Singletons**
- **NE-all births**
- **US-all births**
What are possible explanations for the observed trends?

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<tr>
<td>Multiples</td>
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Infant Mortality Rates
U.S. and Nebraska, 1979-2011

Infant Deaths / 1,000 Live Births

- NE-White
- NE-all births
- US-all births

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Infant Mortality Rates
U.S. and Nebraska, 1979-2011

Infant Deaths / 1,000 Live Births

- NE-all births
- US-all births
- NE-Black
Infant Mortality Rates
U.S. and Nebraska, 1979-2011

Infant Deaths / 1,000 Live Births

- NE-all births
- US-all births
- NE-Hispanic

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What are possible explanations for the observed trends?

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Pregnancy Outcomes, as Modeled by Joinpoint
Nebraska, 1979-2010

Events / 100 Live Births

Preterm
LBW
PT/LBW

Arrows indicate significant join points.
Prematurity Status of Infant Deaths
Nebraska and the U.S., 1990-2010

http://205.207.175.93/Vitalstats/TableViewer/tableView.aspx
What are possible explanations for the observed trends?

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<tr>
<td>Preterm</td>
<td>✓</td>
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<tr>
<td>Low birth weight</td>
<td></td>
<td>✓</td>
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<tr>
<td>PT/LBW</td>
<td>✓</td>
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What are possible explanations for the observed trends?

- No clear answer!
Research Question:

- Do PPOR categories help understand changing IMRs during the 3 periods?
## Perinatal Periods of Risk

<table>
<thead>
<tr>
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<th>Post-Neonatal Deaths</th>
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<td><strong>500-1499 grams</strong></td>
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### Perinatal Periods of Risk

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- Nebraska linked infant birth:death file, 1979-2010
- Alexander et al. (1996) criteria for birth weight appropriate-for-gestational age
PPOR - Infant Mortality Rates
Nebraska, 1979-2010

Maternal Health / Prematurity
Newborn Care
Infant Health
PPOR - Infant Mortality Rates
Nebraska, 1979-2010

Maternal Health / Prematurity
Newborn Care
Infant Health

1981 - 1991
1992 - 1996
1997 - 2010
PPOR Infant Mortality Rates
Nebraska, 1979-2010

* Gap represents excluded data.
PPOR Infant Mortality Rates – Newborn Care
Nebraska, 1979-2010
PPOR Infant Mortality Rates – Infant Health
Nebraska, 1979-2010

Significant joinpoint
Infant Causes of Death
Nebraska, 1979-2010
Major Causes of Death in PPOR Categories
Nebraska, 1979-2010

Percent of Deaths in PPOR Category

- MH/P
- NBC
- IH

Categories include:
- Prematurity
- Other
- Respiratory
- Birth
- Maternal
- Birth Defects
- SIDS
- Other
- Accident
Infant Cause of Death - Unspecified Anomaly of Heart*
Nebraska, 1979-1998

Number of Deaths

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<td>8</td>
<td>9</td>
<td>17</td>
<td>5</td>
<td>6</td>
<td>10</td>
<td>6</td>
<td>6</td>
<td>4</td>
<td>3</td>
<td>8</td>
<td>10</td>
<td>11</td>
<td>3</td>
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*ICD9 - 7469
Infant Mortality Rates
U.S. and Nebraska, 1979-2011

Infant Deaths / 1,000 Live Births

NE-all births

40 deaths
Conclusions

- PPOR revealed interesting trends in infant mortality, but did not explain observed shifts between 1991 and 1996.
- The observed shifts do not appear to reflect specific temporal changes and most likely reflect random variation in several different factors.
Next Steps

- Continue using PPOR to direct infant mortality interventions
- Continue to monitor mortality trends
References


Many thanks to Dr. Carol Gilbert, Ms. Jamie Kim, and Dr. Deborah Rosenberg for their extremely helpful suggestions on this presentation.