Explaining Recent Trends in Infant Mortality

Centers for Disease Control and Prevention
National Center for Health Statistics
Division of Vital Statistics
Authors / Acknowledgements

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Infant mortality rate: United States, 1940-2001

Deaths under 1 year per 1,000 live births

-86%

SOURCE: National Vital Statistics System, NCHS, CDC.
Infant mortality rate: United States, 1990-2002

Deaths under 1 year per 1,000 live births

-26% (1990-2001)

+3% (2001-2002)

* Preliminary data.

SOURCE: National Vital Statistics System, NCHS, CDC.
Challenge:

Explain increase in the IMR for public release with only limited preliminary data
The game plan:

✓ More detailed prelim data
✓ More current prelim data
✓ Unedited fetal death data
✓ 2003 counts of infants deaths
✓ Develop “Supplemental Analyses”

<table>
<thead>
<tr>
<th>Year</th>
<th>Infant deaths</th>
<th>Neonatal (Under 28 days)</th>
<th>Postneonatal (28 days – 11 months)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>Under 7 days</td>
<td>7-27 days</td>
</tr>
<tr>
<td></td>
<td>Under 7 days</td>
<td>days</td>
<td>days</td>
</tr>
<tr>
<td>2002</td>
<td>28,042</td>
<td>7.0</td>
<td>4.7</td>
</tr>
<tr>
<td>2001</td>
<td>27,568</td>
<td>6.8</td>
<td>4.5</td>
</tr>
</tbody>
</table>

*2001 = 0.908, 2002 = 0.931

**NOTE:** Bold underlined numbers indicate a statistically significant difference with the previous year.

**SOURCE:** National Vital Statistics System, NCHS, CDC.
Early and late neonatal and postneonatal mortality rates: United States, 1990-2002

Note: Rates for 2002 are based on partially edited data processed as of January, 2004.

Early neonatal mortality rate = deaths to infant < 7 days per 1,000 live births. Late neonatal mortality rate = deaths to infants 7-27 days. Postneonatal mortality rate = deaths to infants 28 days - 11 months per 1,000 live births.

Source: National Vital Statistics System, NCHS, CDC.

<table>
<thead>
<tr>
<th>Cause of death</th>
<th>2002</th>
<th>2001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Congenital malformations, deformations and chromosomal abnormalities</td>
<td>140.7</td>
<td>136.9</td>
</tr>
<tr>
<td>Disorders relating to short gestation and low birthweight, not elsewhere classified</td>
<td>114.4</td>
<td>109.5</td>
</tr>
<tr>
<td>Sudden infant death syndrome</td>
<td>50.6</td>
<td>55.5</td>
</tr>
<tr>
<td>Newborn affected by maternal complications of pregnancy</td>
<td>42.9</td>
<td>37.2</td>
</tr>
</tbody>
</table>


SOURCE: National Vital Statistics System, NCHS, CDC.
Perinatal, late fetal, and early neonatal mortality rates, 1990-2002

Note: Rates for 2002 are based on partially edited data processed as of January, 2004.

Perinatal mortality rate = late fetal deaths plus infant deaths <7 days per 1,000 live births plus late fetal deaths.

Early neonatal mortality rate = deaths to infants <7 days per 1,000 live births.

Late fetal mortality rate = fetal deaths with stated or presumed gestational ages of 28 weeks or more per 1,000 live births plus late fetal deaths.

Source: National Vital Statistics System, NCHS, CDC.
Provisional 12 month ending infant mortality rates, 2001-2003

<table>
<thead>
<tr>
<th>Month</th>
<th>IMR (per 1,000 live births)</th>
<th>Change 2002 - 2003</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2001</td>
<td>2002</td>
</tr>
<tr>
<td>January</td>
<td>6.6</td>
<td>6.9</td>
</tr>
<tr>
<td>February</td>
<td>6.6</td>
<td>6.8</td>
</tr>
<tr>
<td>March</td>
<td>6.6</td>
<td>6.8</td>
</tr>
<tr>
<td>April</td>
<td>6.6</td>
<td>6.9</td>
</tr>
<tr>
<td>May</td>
<td>6.6</td>
<td>6.8</td>
</tr>
<tr>
<td>June</td>
<td>6.6</td>
<td>6.9</td>
</tr>
<tr>
<td>July</td>
<td>6.6</td>
<td>6.9</td>
</tr>
<tr>
<td>August</td>
<td>6.6</td>
<td>6.9</td>
</tr>
<tr>
<td>September</td>
<td>6.5</td>
<td>6.9</td>
</tr>
<tr>
<td>October</td>
<td>6.6</td>
<td>6.9</td>
</tr>
<tr>
<td>November</td>
<td>6.8</td>
<td>6.9</td>
</tr>
<tr>
<td>December</td>
<td>6.9</td>
<td>6.9</td>
</tr>
</tbody>
</table>

--- Data not available.

SOURCE: National Vital Statistics System, NCHS, CDC.
## Infant mortality rates and international rankings: Selected countries, 1999 and 2000

<table>
<thead>
<tr>
<th>Country</th>
<th>IMR (per 1,000 live births)</th>
<th>Change 1999 - 2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Singapore</td>
<td>3.3 2.5</td>
<td>1</td>
</tr>
<tr>
<td>Japan</td>
<td>3.4 3.2</td>
<td>3</td>
</tr>
<tr>
<td>Finland</td>
<td>3.6 3.8</td>
<td>5</td>
</tr>
<tr>
<td>Spain</td>
<td>4.5 3.9</td>
<td>7</td>
</tr>
<tr>
<td>Italy</td>
<td>5.1 4.5</td>
<td>10</td>
</tr>
<tr>
<td>Austria</td>
<td>4.4 4.8</td>
<td>12</td>
</tr>
<tr>
<td>Northern Ireland</td>
<td>6.4 5.1</td>
<td>15</td>
</tr>
<tr>
<td>Australia</td>
<td>5.7 5.2</td>
<td>17</td>
</tr>
<tr>
<td>Canada</td>
<td>5.3 5.3</td>
<td>18</td>
</tr>
<tr>
<td>United States</td>
<td>7.1 6.9</td>
<td>27</td>
</tr>
</tbody>
</table>

**SOURCE:** Organization for Economic Cooperation and Development
Infant mortality rate

A look at potential explanatory factors

6.8  7.0
2001  2002
Preterm and low birthweight rates: United States, 1990-2002

NOTE: Preterm is less than 37 completed weeks of gestation. Low birthweight is less than 2,500 grams.
SOURCE: National Vital Statistics System, NCHS, CDC.

NOTE: Twin birth rate is the number of live born infants in twin deliveries per 1,000 live births.
SOURCE: National Vital Statistics System, NCHS, CDC.

NOTE: Triplet+ birth rate is the total number of live born infants in triplet+ deliveries per 1,000 live births. Triplet+ includes births in greater than twin deliveries.
SOURCE: National Vital Statistics System, NCHS, CDC.
Preterm and low birthweight rates by plurality: United States, 2002

Percent

Very preterm / very low birthweight

SOURCE: National Vital Statistics System, NCHS, CDC.
Preterm and low birthweight rates among singleton births have also been on the rise...
### Percent very and moderately preterm, and very low and moderately low birthweight among singletons, United States: 1990 and 2002

<table>
<thead>
<tr>
<th></th>
<th>2002</th>
<th>1990</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very preterm</td>
<td>1.57</td>
<td>1.96</td>
</tr>
<tr>
<td>Moderately preterm</td>
<td>8.87</td>
<td>8.01</td>
</tr>
<tr>
<td>Very low birthweight</td>
<td>1.11</td>
<td>1.05</td>
</tr>
<tr>
<td>Moderately Low birthweight</td>
<td>6.12</td>
<td>5.90</td>
</tr>
</tbody>
</table>

Note: Very preterm is less than 32 completed weeks of gestation. Preterm is less than 37 weeks of gestation. Very low birthweight is less than 1,500 grams. Low birthweight is less than 2,500 grams.

SOURCE: National Vital Statistics System, CDC/NCHS
Percent distribution of singleton births by gestational age: U.S., 1990 and 2002

SOURCE: National Vital Statistics System, NCHS, CDC.
Risk of Poor Perinatal Outcome – Singletons*

Assisted Reproductive Therapy (ART)

- Very preterm ➤ 327%
- Preterm ➤ 204%
- Very low birthweight ➤ 300%
- Low birthweight ➤ 70%
- Perinatal mortality ➤ 68%

Non-ART Fertility Therapies

Rates of induction of labor by length of gestation: United States, 1989-2002

SOURCE: National Vital Statistics System, NCHS, CDC.

SOURCE: National Vital Statistics System, NCHS, CDC.
Supplemental Analyses of Recent Trends in Infant Mortality

by Kenneth D. Kochanek, M.A., and Joyce A. Martin, M.P.H.

Overview

Preliminary data for 2002 indicate an increase in the infant mortality rate (IMR) to 7.0 deaths per 1,000 live births from 6.8 in 2001 (1) (table 1). To better understand the increase in the IMR for 2002, the Centers for Disease Control and Prevention's
And... the MEDIA!

U.S. Infant Mortality Rate Rises 3%

First Increase Since ’58 Surprises Officials as Other Health Indicators Keep Improving

By Rob Siente
Washington Post Staff Writer

The number of U.S. babies dying shortly after birth has crept up for the first time in more than four decades, federal health officials reported yesterday.

"The cause of the small but disturbing rise remains unclear, but it may be a combination of the surge in older women having babies, the popularity of fertility treatments, and, paradoxically, advancements in identifying and saving fetuses in distress, experts said.

Regardless of the cause, the surprising increase has raised alarm because the infant mortality rate is considered a fundamental measure of a society's well-being.

"It's always a matter of concern when an important measure of public health such as infant mortality increases," said Joyce A. Martin, head statistician for the National Center for Health Statistics, part of the CDC. "We weren't expecting it.

A follow-up analysis confirmed that the increase would hold true in the final numbers. When researchers parsed the data, they found the increase was caused by a jump in deaths in the first week of life among babies who were either born with birth defects, who were unusually small at birth, or whose mothers had complications during their pregnancy.

"I have to say, it was a surprise," said Martin. "But this is an important measure of public health, and it's important to everyone."

The increase was particularly unexpected because it comes as a number of other important measures of the country's health continue to improve.

In fact, when researchers examined the overall death rate for fetuses born in late pregnancy and after birth, they found no increase.

Martin agreed and added that some of the alarm has been offset by a very preliminary analysis of the 2003 data, which took the...
Is the increase the result of changes in risk BEFORE birth:

- Maternal characteristics
  - age, race, education, medical risk factors, prenatal care, tobacco use
- Infant characteristics
  - plurality
  - birthweight
  - gestational age
  - congenital anomalies
- Characteristics of labor and delivery
  - PROM
  - induction of labor
  - cesarean delivery

If so, how are these factors associated with age/cause of death?

- Congenital malformations
- Disorders related to short gestation/low birthweight
- Maternal complications related to pregnancy
- Others??

OR

Is the 2002 increase in the IMR primarily the result of an increase in the risk of death AFTER birth:

- changes in birthweight/gestation-specific mortality?
- changes in obstetric and neonatal care?
Re-engineering the Vital Records Process...
What could we do better with Re-engineered Vital Statistics Systems?

- **New, improved data items**
  - Fertility therapy – drugs & ART
  - Tobacco use before and during pregnancy
  - Infections during pregnancy
  - Maternal morbidity
  - Breast feeding
  - Source of payment for delivery

- **Configurable electronic systems**
  - Easily modified to capture information on emerging issues
  - Easily improve/change items as needed

- **Integrated electronic systems**
  - Incorporate electronic data transmission standards
  - Permit integration with other systems (prenatal care, newborn screening, immunization)
What could we do better with Re-engineered Vital Statistics Systems? –

✓ Higher quality data
  • Data edited and queried at the source
  • Standardized systems across nation

✓ More standardized data
  • Standardized collection instruments
  • Standardized instructions & definitions

✓ More timely data
  • Data released within months of event
  • Births/infant deaths automatically linked = data available simultaneously
Summary: 2002 rise in the IMR

- First increase in more than 4 decades
- Among neonatal deaths only
- Causes of infant death appear pregnancy-related
- Fetal mortality down/Perinatal mortality unchanged
- Likely decline in IMR for 2003
Stay tuned....

Data from the **Linked Birth/Infant Death Data Set** will allow us to more fully explain this troubling change

- summer 2004