Evaluating the 2003 Birth Certificate Data: Preliminary Findings from the PRAMS Data Quality Improvement Project

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Pregnancy Risk Assessment Monitoring System
PRAMS

PRAMS
- State-based surveillance system funded by CDC
- Birth certificates are sampling frame
  - Links BC to questionnaire data

PRAMS Data Quality Improvement Project
- Goal to assess sensitivity and specificity of selected 2003 birth certificate and PRAMS items using the medical record as the gold standard.

This presentation will focus on the birth certificate items that were included in the project.
Previous Birth Certificate Evaluations

- Evaluations of the 1989 version
  - Excellent sensitivity of birth weight, sex, mode delivery
  - Moderate to low sensitivity for medical complications
  - Excellent specificity

- 2003 revised birth certificate includes
  - Maternal height, pre-pregnancy weight
  - Maternal weight at delivery
  - Augmentation/induction labor
  - Gestational diabetes, gestational hypertension
In FY 2011, CDC’s Division of Reproductive Health and CDC’s Division of HIV Prevention co-funded:

- New York City Department of Mental Health and Hygiene
- Vermont Department of Health
Sample

- **New York City**
  - All PRAMS respondents who had delivered at a city hospital January-June 4, 2009
  - N=41 hospitals
  - N=603 respondents

- **Vermont**
  - All PRAMS respondents who delivered at a Vermont hospital or at a New Hampshire hospital close to Vermont’s state border during January-August 2009
  - N=13 hospitals
  - N=664 respondents
Abstraction of Data

- Abstracted information from parent worksheet, prenatal care and hospital delivery records onto a standardized abstraction form

- Data abstractors were nurse midwives or trained medical abstractors
Abstraction of Data cont.

- Abstractors trained on use of abstraction form
  - To evaluate reliability of record abstraction, about 25 records in New York City and Vermont were re-abstracted
  - Errors in abstraction were noted, reviewed, and resolved
Analysis

- Weighted analyses
- Stratified by site
- Missing values ranged from
  - NYC: BMI 33%
  - VT: BMI 13%
- Calculated Sensitivity, Specificity, 95% Confidence Intervals (CI) for categorical variables
- Pearson correlations for continuous variables
Analysis

- Sensitivity and Specificity
  - High (>90%)
  - Moderate (70-90%)
  - Low (<70%)

- Continuous variables
  - Pearson Correlations - assesses linear relationship
    - 1 is perfect correlation
Analysis

- Medical record gold standard for most items

- No gold standard for height and pre-pregnancy weight
  - Based on self-report captured on parent worksheet
  - Examined correlations between data abstracted
Pre-pregnancy Items

- Mother’s height
- Mother’s weight
- Body mass index
- Previous live birth
- Previous C-section
- Previous preterm
During Pregnancy Items

- Gestational diabetes
- Gestational hypertension
- Weight at delivery
Labor and Delivery Items

- Augmentation
- Induction
- Prolonged labor
- Premature rupture of the membranes
- Vaginal delivery
- C-section
Infant Items

- Neonatal intensive care unit admission
- Gestational age - obstetric estimate
- Gestational age - LMP estimate
Preliminary Results
## Demographics

<table>
<thead>
<tr>
<th>Demographic Characteristics</th>
<th>NYC</th>
<th>Vermont</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;12 Years Education</td>
<td>25</td>
<td>9</td>
</tr>
<tr>
<td>WIC</td>
<td>57</td>
<td>46</td>
</tr>
<tr>
<td>Unmarried</td>
<td>46</td>
<td>37</td>
</tr>
<tr>
<td>White-NH</td>
<td>22</td>
<td>95</td>
</tr>
<tr>
<td>Black-NH</td>
<td>20</td>
<td>0.6</td>
</tr>
<tr>
<td>Hispanic</td>
<td>42</td>
<td>1</td>
</tr>
<tr>
<td>Other</td>
<td>15</td>
<td>3</td>
</tr>
</tbody>
</table>
## Pre-pregnancy Items - Correlations

<table>
<thead>
<tr>
<th></th>
<th>NYC</th>
<th>Vermont</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td>.71</td>
<td>.78</td>
</tr>
<tr>
<td>Pre-pregnancy weight</td>
<td>.82</td>
<td>.99</td>
</tr>
<tr>
<td>BMI</td>
<td>.80</td>
<td>.97</td>
</tr>
</tbody>
</table>
Sensitivity for Pre-pregnancy Items

- Previous Live Birth
- Previous Preterm
- Previous C-section

Legend:
- NYC
- VT

CDC™
## During Pregnancy Items - Correlations

<table>
<thead>
<tr>
<th>Item</th>
<th>NYC</th>
<th>Vermont</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight at delivery</td>
<td>.87</td>
<td>.94</td>
</tr>
</tbody>
</table>
Sensitivity for Pregnancy Items

- GDM
- Gestational hypertension

NYC vs VT
Sensitivity for Labor and Delivery Items

- Augmentation
- Induction
- Prolonged labor

NYC - VT
Sensitivity for Labor and Delivery Items

- PROM
- C-section
- Vaginal delivery

NYC
VT

CDC
Sensitivity for Infant Items

- NICU
- <37 Gest age - LMP
- <37 Gest age - OE

Legend:
- NYC
- VT
# Sensitivity-Summary

<table>
<thead>
<tr>
<th>Both</th>
<th>VT Only</th>
<th>NYC Only</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High</strong></td>
<td><strong>Moderate</strong></td>
<td><strong>Low</strong></td>
</tr>
<tr>
<td>&gt;90%</td>
<td>70-90%</td>
<td>&lt;70%</td>
</tr>
</tbody>
</table>

- Previous LB
- Vaginal delivery
- C-section

- GDM
- GA <37 LMP

- Previous preterm
- Prolonged labor
- NICU
- Gest. hypertension
- PROM

- Previous C-section
- GA <37 OB

- Augmentation
- Induction

- Augmentation
- Induction
- Previous C-section
Specificity

>90% for all items
Summary

- Consistent with previous studies
  - High specificity overall
  - High sensitivity for mode of delivery
  - Moderate to low sensitivity for pre-pregnancy and pregnancy items, complications

- New items
  - Good correlations for pre-pregnancy BMI - VT
  - Moderate to low sensitivity for induction and augmentation - varied by site
Limitations

- Possible data abstraction errors
- Conducted in only 2 sites
- Large percent of missing values pre-pregnancy BMI
- Wide confidence intervals for rare conditions
Implications

- New item, pre-pregnancy BMI, collected from mother good addition

- Differences between sites suggests medical record documentation, hospitals procedures for birth certificate reporting affects sensitivity

- Items with poor data quality for both sites suggest poor documentation in medical record
  - Link items with low sensitivity to other data sources
  - Possibly drop in next revision
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The findings and conclusions in this presentation are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.
Evaluating the Accuracy of Birth Certificate Data: Preliminary Findings from the PRAMS Data Quality Improvement Project (DQIP)

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## Analysis

Condition (according to medical record)

<table>
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<tr>
<th>Data Source</th>
<th>Condition (Yes)</th>
<th>Condition (No)</th>
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</thead>
<tbody>
<tr>
<td>Yes</td>
<td>True Positive</td>
<td>False Positive</td>
</tr>
<tr>
<td>No</td>
<td>False Negative</td>
<td>True Negative</td>
</tr>
</tbody>
</table>

Sensitivity = \( \frac{\text{True Positive}}{\text{Condition (Yes)}} \)

Specificity = \( \frac{\text{True Negative}}{\text{Condition (No)}} \)
Sensitivity for Pre-pregnancy Items

- Normal BMI
- Overweight BMI
- Obese BMI

New York City (NYC) vs. VT
## Analysis

### Condition (according to medical record)

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### Sensitivity =  
True Positive / Condition (Yes)

### Specificity =  
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## Analysis

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### Sensitivity = True Positive / Condition (Yes)

### Specificity = True Negative / Condition (No)
2003 Birth Certificate

- Parent Worksheet
  - Pre-pregnancy weight
  - Height

- Facility Worksheet
  - Medical complications
  - Pregnancy history
  - Labor and Delivery complications
  - Infant items
Availability of records

- New York City
  - Prenatal record (50.8% full, 43.6% partial)
  - Hospital record (99.4%)

- Vermont
  - Prenatal record (89.3% full)
  - Hospital record (99.8%)
Analysis

- **Sensitivity**
  - % of people who have a condition that are correctly classified with the condition on data source

- **Specificity**
  - % of people who do not have a condition that are correctly classified without condition on data source
Strengths

- Representative of live births in each locality
- Two different locations: one urban and one rural