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Mohammad Agha
Richard Glazier
Rahim Moineddin
Aideen M Moore
Astrid Guttmann
Trend in Prevalence

- Overall prevalence of major congenital abnormalities did not change significantly during 1978-2005. Certain defects have declined over time (NTD), and some observed a nearly two-fold increase.

- Improvement in antenatal and newborn screening, early recognition, and public intervention, such as food fortification.

- The apparent increase in the prevalence of minor defects. No change over time in the prevalence of more serious defects.

- Some of the increase can be explained by changes in the distribution of risk factors in the population, such as maternal age, socioeconomic status, and racial variation.
SES & Congenital Abnormalities

- Higher prevalence and mortality due to congenital abnormalities among children born to mothers from low socioeconomic status
  - Both chromosomal and non-chromosomal abnormalities
  - Death rate for congenital anomalies was more than twice as high among Mexican-born women’s infants as US-born women’s infants
  - Compared black infants, white infants have been found to have an increased prevalence of specific anomalies like Ebstein’s anomaly, aortic stenosis, atrioventricular septal defects, tetralogy of Fallot, PDA, and others.

- Some proposed reasons:
  - Barriers in access to screening and diagnostic tools during the prenatal period among low SES mothers.
  - Higher rates of unhealthy behaviors during pregnancy due to low educational attainment.
  - Poor nutrition and food supplementation.
Hypothesis & Objectives

Hypothesis:
Given universal and free access to primary and acute health care in Canada, and presence of public interventions such as food fortification, the differences in the birth defect prevalence between low and high SES groups to diminish over time.

Objectives:
- The trend over time in the prevalence of major congenital abnormalities in Ontario,
- The possible SES gap in the prevalence of congenital abnormalities, and
- If the SES gap in the prevalence of specific defects is diminishing over time.
Methods

- Follow-up of all children born in Ontario, Canada during 1994-2007
- Had at least one diagnosis in CIHI from the Congenital Anomalies chapter of the International Classification of Diseases (ICD9 and ICD10) during their first year of life
- Income quintiles were assigned based on EA or DA.
- “Birth Prevalence”, representing the number of malformations detected at birth or during the first year of life per 1000 live births per calendar year.

<table>
<thead>
<tr>
<th>BD TYPE</th>
<th>Proportion</th>
<th>Birth Prevalence/1000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Congenital Heart Defects</td>
<td>23.2</td>
<td>15.1</td>
</tr>
<tr>
<td>Renal Defects</td>
<td>5.4</td>
<td>4.5</td>
</tr>
<tr>
<td>Brain Defects</td>
<td>3.2</td>
<td>2.7</td>
</tr>
<tr>
<td>Respiratory Defects</td>
<td>2.3</td>
<td>2.0</td>
</tr>
<tr>
<td>Chromosomal Abnormalities</td>
<td>2.0</td>
<td>1.7</td>
</tr>
<tr>
<td>Musculoskeletal defects</td>
<td>1.5</td>
<td>1.2</td>
</tr>
<tr>
<td>Cleft Palate</td>
<td>1.4</td>
<td>1.2</td>
</tr>
<tr>
<td>Non-major anomalies</td>
<td>59.4</td>
<td>50.4</td>
</tr>
</tbody>
</table>
Trend in Birth Prevalence of Major Defects in Ontario

![Graph showing trend in birth prevalence of major defects in Ontario from 1994 to 2007. The graph indicates a peak around 1999, followed by a decline.]
Trend in Birth prevalence of some major defects.
Birth prevalence for selected major defects by socioeconomic status levels.

<table>
<thead>
<tr>
<th>BD TYPE</th>
<th>Q1</th>
<th>Q2</th>
<th>Q3</th>
<th>Q4</th>
<th>Q5</th>
<th>RR*</th>
<th>95 CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart</td>
<td>16.1</td>
<td>15.7</td>
<td>14.9</td>
<td>14.5</td>
<td>13.3</td>
<td>1.21</td>
<td>1.16-1.26</td>
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<tr>
<td>Chromosomal</td>
<td>1.8</td>
<td>1.5</td>
<td>1.7</td>
<td>1.7</td>
<td>1.6</td>
<td>1.07</td>
<td>0.95-1.19</td>
</tr>
<tr>
<td>Brain</td>
<td>2.6</td>
<td>2.4</td>
<td>2.1</td>
<td>2.0</td>
<td>2.1</td>
<td>1.26</td>
<td>1.14-1.39</td>
</tr>
<tr>
<td>Renal</td>
<td>4.3</td>
<td>4.6</td>
<td>4.6</td>
<td>4.4</td>
<td>4.3</td>
<td>0.99</td>
<td>0.92-1.07</td>
</tr>
<tr>
<td>Respiratory</td>
<td>1.7</td>
<td>1.7</td>
<td>1.7</td>
<td>1.6</td>
<td>1.4</td>
<td>1.18</td>
<td>1.05-1.33</td>
</tr>
<tr>
<td>Cleft</td>
<td>1.4</td>
<td>1.3</td>
<td>1.4</td>
<td>1.2</td>
<td>1.1</td>
<td>1.19</td>
<td>1.04-1.36</td>
</tr>
<tr>
<td>Musculoskeletal</td>
<td>1.4</td>
<td>1.2</td>
<td>0.9</td>
<td>0.9</td>
<td>0.9</td>
<td>1.58</td>
<td>1.37-1.83</td>
</tr>
</tbody>
</table>

* RR indicates Q1/Q5 ratio
Birth prevalence (/1000 birth) for Selected major defects by Income Quintile.

Musculoskeletal defects

Renal defects

Cleft lip and palate

Neural Tube Defects
Our Findings

✓ Children born in low income or education areas had significantly higher rates of birth defects.

✓ While the SES gap for non-major defects diminished in more recent years, the prevalence of major anomalies still remained higher among low income quintiles.

✓ Heart defects, NTD and musculoskeletal defects are examples of the significantly higher rates in low income quintile areas.

✓ On average, during the study period, musculoskeletal defects were 50 and heart defects were 20 more prevalent among children born in low income areas.
Discussion

✓ Results of the current study indicate some success in reducing birth defects. Significant declines in brain defects, chromosomal defects and heart defects after the year 2000 are likely due to preventive measures including enhanced antenatal care and food fortification.

✓ Future studies must explore the contribution of factors responsible for the higher prevalence of birth defects in low SES groups. The higher rates in low SES groups could be a part of the cycle that brings greater disadvantage to people in these conditions, both now and in the future.