Children and Ambient Air Pollution
21st Century Canaries in a Coal Mine

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Today’s children are likely to be the first generation to live shorter, less healthy lives than their parents.
Prenatal and Perinatal Effects

The impact of environmental exposures on fetal development may be far-reaching, with exposures in utero influencing later risk for heart disease, diabetes, and obesity as adults.
Protecting the Tails of the Curve

Utah Population Census 2012: 2.9 million
<table>
<thead>
<tr>
<th>Stage: Age:</th>
<th>Newborn 0-2 mos</th>
<th>Infant/Toddler 2 mos-2 yrs</th>
<th>Young Child 2-6 yrs</th>
<th>School-Age Child 6-12 yrs</th>
<th>Adolescent 12-18 yrs</th>
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<tbody>
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<td>Lung development:</td>
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<td>Air pollution risks:</td>
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<td>Respiratory death</td>
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<td>Chronic cough and bronchitis</td>
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<td>Reduced lung function</td>
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<td>Wheezing and asthma attacks</td>
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<td>Respiratory-related school absences</td>
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</tbody>
</table>

*Air pollution exposure has also been more recently linked to respiratory symptoms and illnesses in early life including cough, bronchitis, wheeze and ear infections*
4000 excess deaths during episode

Elevated death rates for weeks

Infant mortality doubled

London Fog of 1952, 10:30 am
(Source: National Archives)
Critical Exposure Periods with Lasting Effects on Lung Health
Immunity and Epigenetics

FA = Fresno Asthmatics
FNA = Fresno Nonasthmatics
SA = Stanford Asthmatics
SNA = Stanford Nonasthmatics
Disproportionate Impacts
Near Roadway Air Pollutant Gradients

Major Stationary Sources of Air Pollution and Minority Population in the Bronx

5-Year Average Asthma Hospitalization Rates in the Bronx (1995-1999) By Census Block Group

Percentage of children ages 0 to 17 years living in counties with 8-hour ozone and 24-hour PM$_{2.5}$ concentrations above the levels of air quality standards, by frequency of occurrence, 2009

- **Ozone (8-hour standard)**
  - No monitoring data
  - No days with concentrations above the standard
  - 1-3 days
  - 4-10 days
  - 11-25 days
  - 26 or more days

- **PM$_{2.5}$ (24-hour standard)**
  - No monitoring data
  - No days with concentrations above the standard
  - 1-7 days
  - 8-10 days
  - 11-25 days
  - 26 or more days

Ozone Air Pollution in the Uintah Basin

Source: Utah DEQ
Figure 44. Asthma Hospitalization Rate by Small Area, Utah Adults, 2006-2010