### Systematic Literature Review of Indoor School Exposure to PM$_{2.5}$ in Children

**Presenter:** Brittany Wagner | **Advisor:** Dr. Ami Zota

---

#### STUDY QUESTION

Does exposure to indoor PM$_{2.5}$ in school children increase the risk of asthma or worsen existing asthma in children already diagnosed?

#### PECO STATEMENT

**Population:** School aged Children 5-18  
**Exposure:** Indoor PM$_{2.5}$ air pollution in schools  
**Comparator:** Children in schools with less indoor PM$_{2.5}$ exposure  
**Outcome:** Asthma

#### BACKGROUND, OBJECTIVES & METHODS

**BACKGROUND:** Air pollution in schools affects a vulnerable population who are indoors for large amounts of their daily schedule.

**OBJECTIVES:** I conducted a systematic literature review regarding indoor school exposure to indoor PM$_{2.5}$ (Particulate Matter) and asthma prevalence in children.

**METHODS:** I searched articles published between 1 January 2002 and 15 September 2017, and included original studies that assessed indoor school exposure PM$_{2.5}$ in school children. I evaluated the risk of bias of individual studies and the overall quality and strength of the evidence according to the Navigation Guide systematic review methodology. I established criteria a priori to identify studies that could be included for synthesis.

---

#### Pathology of Asthma

Asthma and Your Airways

- Asthma and Your Airways
- Normal airway
- Asthma airway
- Airway narrowing
- Asthma airway during attack

---

#### RESULTS

**Risk of Bias Heat Map**

**Summary & Comparison of Methods/Results**

<table>
<thead>
<tr>
<th>Source</th>
<th>Location</th>
<th>[n]</th>
<th>Age</th>
<th>Exposure measure</th>
<th>Outcome measure</th>
<th>Evaluation of Risk of Bias</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sarnat</td>
<td>Texas, USA &amp; Mexico</td>
<td>58</td>
<td>6-12 y/o</td>
<td>48 hour samplings via Harvard cascade impactors</td>
<td>ENO: exhaled nitric oxide (dilimeter or airflow inflammation)</td>
<td>With increased PM$_{2.5}$, there was a 2.7% (CI: 1.4, 4.9) change in ENO</td>
</tr>
<tr>
<td>Rabiovitov</td>
<td>Colorado, USA</td>
<td>20</td>
<td>7-12 y/o</td>
<td>Continuous active personal aerosol nephelometer monitor, 4 days interval</td>
<td>UT urine samples to measure outcome, Dose related uptake monitor and surveys</td>
<td>Increase of 5 pg/m$^3$ of PM$_{2.5}$ resulted in 13.3% (CI: 5.7, 18.0) increase in bilateral and UT levels by 10.6% (CI: 9.0, 24.6) on day 0</td>
</tr>
<tr>
<td>Ferreira</td>
<td>Portugal</td>
<td>1019</td>
<td>6-10 y/o</td>
<td>80 minutes VelocityCalc 95SS-P</td>
<td>Questionnaire</td>
<td>Prevalence of asthma was 11.8% in study population; no significant association with exposure</td>
</tr>
<tr>
<td>Maseno</td>
<td>France</td>
<td>4643</td>
<td>9-10 y/o</td>
<td>5 day intervals using filter-based samples</td>
<td>Skier pick test, exercise-induced asthma and questionnaire</td>
<td>OR 3.28 (CI 1.00, 1.65) PM$<em>{2.5}$ and asthma; OR 1.41 (CI 1.16, 1.73) PM$</em>{2.5}$ and allergic asthma</td>
</tr>
<tr>
<td>Jeong</td>
<td>Korea</td>
<td>1226</td>
<td>8-10 y/o</td>
<td>GT-831 monitor</td>
<td>Skier pick test, questionnaire</td>
<td>Prevalence of asthma not significant (13.13% IncNh on 13.13% IncNh); Prevalence of wheeze $n$ IncNh on 24.96 and 2.88% which was significant higher PM$_{2.5}$ in IncNh</td>
</tr>
</tbody>
</table>

*Generally Probably Low Risk of Bias for each individual study and across studies as a whole*