Assessing Imperial Valley Respiratory Health and the Environment

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Satellite images taken by the Landsat program, which is co-managed by NASA and the U.S. Geological Survey, show the Salton Sea beginning to shrink between 1995 and 2016.
Wind-blown dust

Shrinking sea, desertification & changing climate likely to increase wind-blown dust and dust events

Playa dust is associated with a higher proportion of PM$_{10}$, often with pesticides and heavy metals
- PM$_{10}$ = Coarse dust
- PM$_{2.5}$ = Fine dust

Impacts on respiratory health, quality of life
- Can harm lung development
- Exacerbate asthma risk
- Can affect brain health
- Lead to heart disease
Lessons from the Aral Sea & Owens Lake

- Drying of lake $\rightarrow$ Increases in ambient dust $\rightarrow$ harm to health and quality of life
- Owens Lake was one of the largest source of PM$_{10}$ in the US until mitigation
- Dust from the Aral Sea found to harm kidney function, perhaps lung function
Environmental Health Concerns

Asthma Prevalence Among Children (2014)

Percentage of population

- U.S: 8
- CA: 14
- Imperial: 22

Imperial Valley

- Shrinking Salton Sea
- Air Pollution
- Diesel Pollution
- Agricultural Activities
- Asthma Prevalence
The Children’s AIRE Study
California, USA
Salton Sea

2002
RECEDING SHORELINE
2017

WIND BLOWN DUST

PUBLIC HEALTH EFFECTS
Children’s AIRE Study Aims

• Establish cohort of 500 children from the northern end of Imperial Valley to assess respiratory health

• Quantify and assess the impacts of children’s exposures to particulate matter

• Administer a written questionnaire and collect data on weight, height, blood pressure, lung function

• Utilize data to establish a community health education and advocacy program
Assessing Air Quality

Community Air Monitoring

PM collection + Compositional Analysis
Assessing Lung Health

- Symptoms surveys
- Spirometry
  - Measures lung size and function
- Forced Exhaled Nitric Oxide (FeNO)
  - Inflammation in airways
Preliminary demographics

- 487 children
- 94% Latino/a
- 55% female
- 76% have public health insurance
- 12% have a biological mother with asthma
- ¾ of parents finished 12th grade
- 4% live with a smoker
- 29% have a household pet
- 38% play sports 2x week
- 4% live with a smoker
Prevalence of Respiratory Health Outcomes

- Asthmatic: 22.41%
- Lifetime wheezing: 35.29%
- Allergies: 36.13%
- Dry cough: 33.33%
- Bronchitis symptoms: 28.57%
- Doctor's Visit Due to Wheezing: 28.85%
- ER Visit Due to Wheezing: 15.97%

Farzan et al, IJ ERPH 2019
Prevalence of Respiratory Symptoms Among School-Age Asthmatic and Non-Asthmatic Participants

- Asthmatic
- Non-Asthmatic

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Asthmatic</th>
<th>Non-Asthmatic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lifetime wheezing</td>
<td>80%</td>
<td>20%</td>
</tr>
<tr>
<td>Allergies</td>
<td>60%</td>
<td>40%</td>
</tr>
<tr>
<td>Dry cough</td>
<td>70%</td>
<td>30%</td>
</tr>
<tr>
<td>Dry cough for more than 3 weeks</td>
<td>60%</td>
<td>40%</td>
</tr>
<tr>
<td>Dry cough in the morning</td>
<td>50%</td>
<td>50%</td>
</tr>
<tr>
<td>Dry cough at other times of the day</td>
<td>40%</td>
<td>60%</td>
</tr>
<tr>
<td>Congestion</td>
<td>30%</td>
<td>70%</td>
</tr>
<tr>
<td>Bronchitic symptoms</td>
<td>20%</td>
<td>80%</td>
</tr>
</tbody>
</table>
Ongoing Work

- Integration of air quality data into analyses to inform health risks for children

- Development of infographics to disseminate key information

- Understanding community health needs and develop community public health action plan

- Use of study data to help support health supportive school, local and state policy changes