From Home to School: Tribal Indoor Air Quality Study

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Research Supported by US EPA NCER Grant 83559601
Presenters

• David Reisdorph: Research Consultant The University of Tulsa
• Mike King: Sr. Environmental Specialist Navajo Nation EPA

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Presentation Summary

- Tribal Asthma Background & Study Overview—David Reisdorph
- Traditional Ecological Knowledge—Mike King
- Working with Homes & Schools: Data Collection—David Reisdorph
- Home & School Conditions—Mike King
- Preliminary Results—David Reisdorph

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Background & Study Overview
David Reisdorph
Potential Benefits of Research

• **Improved health and attendance of children and staff** in schools because of improved IAQ, and reduction of asthma/allergy reactions and infectious illness due to school and home exposure.
  • Most vulnerable children and staff, such as those with asthma or suppressed immune systems, are expected to benefit most from health improvements.

• **Improved student performance**, coincident with improved health including reduction in low-level symptoms that do not cause absences but do interfere with learning.
Data Collection

• Three visits over the school year at each home and school (fall, winter, spring)
• IAQ measurements: Carbon dioxide, relative humidity, temperature, carbon monoxide
• Allergens: dust mite, cat, dog, mouse & cockroach
• High-touch points/targeted surfaces: swab to gauge surface residual bio contamination
• Visual inspections: interior & exterior

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Traditional Ecological Knowledge
Mike King
Traditional Ecological Knowledge

- The evolving knowledge acquired by indigenous and local peoples over hundreds or thousands of years through direct contact with the environment.
  - Holistic that looks at relationships throughout the environment
  - Adaptive to change
From Home to School TEK

• Study is a more holistic look at asthma triggers.

• Considers how modern homes and school buildings change our indoor environments
  – Changes homes and schools such as bringing water indoors.
  – Concentrates asthma triggers
  – Alters traditional human contact with natural environment
Restoring Balance

• Careful consideration of materials in indoor environments.
  – For example, highly volatile and irritating cleaning chemicals.

• Remove contaminants through rotation, cleaning and ventilation that exchanges indoor for outdoor air.

• Increase renewal and restoration.

• Reconnecting with the outdoor world.
TEK Focus

• Balance:
  – Reduce asthma triggers.
  – Focus where triggers concentrate.

• Restoration/renewal:
  – Replace damaged materials.
  – Minimize clutter.

• Purify:
  – Use simple & safe cleaning.
    • Water & soap.
    • Consider cleaning a removal & reduction process not a war on germs.
  – Ventilate-fresh air.
Working with Homes & Schools

David Reisdorph—Homes
Mike King—Schools
Nez Perce Tribe
Air Quality Program
Home Sampling

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10. Record Indoor Living Room Temperature (F), Relative Humidity, CO2, & CO.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Time Recorded</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>82.5</td>
<td>13:30</td>
</tr>
<tr>
<td>Relative Humidity</td>
<td>44.9</td>
<td></td>
</tr>
<tr>
<td>Carbon Dioxide</td>
<td>1349</td>
<td></td>
</tr>
<tr>
<td>Carbon Monoxide</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

- Is living room temperature below 60 degrees F?
  - Yes [ ]
  - Nox [ ]

- Is living room RH% above 60%?
  - Yes [ ]
  - Nox [ ]
# Example Field Data Sheet

## Main Living Area

<table>
<thead>
<tr>
<th>Current Study Code:</th>
<th>63106923</th>
</tr>
</thead>
<tbody>
<tr>
<td>Previous Study Code:</td>
<td>63102369</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sample</th>
<th>Study Home:</th>
<th>Surface Description:</th>
<th>Surface Material:</th>
<th>Clean/Dirty:</th>
<th>RLU:</th>
<th>Time:</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1</td>
<td>STUDY - ATP Only</td>
<td>Coffee Table</td>
<td>wood</td>
<td>clean</td>
<td>269476</td>
<td>1:30 PM</td>
</tr>
<tr>
<td>#2</td>
<td>STUDY - ATP Only</td>
<td>Coffee Table</td>
<td>wood</td>
<td>clean</td>
<td>301649</td>
<td>1:32 PM</td>
</tr>
<tr>
<td>#3</td>
<td>STUDY - ATP Only</td>
<td>Coffee Table</td>
<td>wood</td>
<td>clean</td>
<td>283444</td>
<td>1:34 PM</td>
</tr>
<tr>
<td>#4</td>
<td>STUDY - ATP Only</td>
<td>Coffee Table</td>
<td>wood</td>
<td>clean</td>
<td>469177</td>
<td>1:36 PM</td>
</tr>
</tbody>
</table>

Example Field Data Sheet

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House Conditions

Research Supported by US EPA NCER Grant 83559601
Interior – Moisture/Mold

Research Supported by US EPA NCER Grant 83559601
Interior – Flooring
Interior - Wood Stoves

[Image of a wood stove]

Research Supported by US EPA NCER Grant 83559601
Interior - Pets

Research Supported by US EPA NCER Grant 83559601
Interior - Pests
Exterior – Roof & Siding

Research Supported by US EPA NCER Grant 83559601
Exterior – Water Drainage

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School Sampling

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School Conditions

Research Supported by US EPA NCER Grant 83559601
Interior – VOCs - classroom chemicals
Interior – Cleanable Surfaces

Research Supported by US EPA NCER Grant 83559601
Interior – Moisture/Mold

Research Supported by US EPA NCER Grant 83559601
Interior – Classroom Pets
Preliminary Results
David Reisdorph
Asthma Symptom Free Days

During past 2 weeks, how many asthma symptom free days did your child have?

- Cherokee Homes
- Increase in both groups, especially in control homes

- Nez Perce Homes
- Only small changes in the study group (Note: small sample size)
Preliminary Results

During the past 4 weeks, how many days, if any, did your child have a respiratory illness such as a cold, allergies or sinus infection?

- Decrease in study homes
- Increase in control homes, decrease in study homes

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Preliminary Results

During the past 4 weeks, how many days, if any, did your child have a gastro-intestinal illness such as stomachache, vomiting, or diarrhea?

- Same trends in both groups (seasonal?)
- Some differences between groups, esp. round 3

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Preliminary results, **All Cherokee schools**: Absence rate (% students absent)

- Daily absence rates studied across two school years (14-15 & 15-15)
- Significant variation observed through school year and between school years
- School composition also significantly associated with absence rates (inc. gender ratio and eligibility for free lunch)
Preliminary results: Absence vs. ATP (interactions)

- Data from winter months (flu season) used to study if high ATP levels representing different locations could have cumulative effects
- Absence rates were found to be
  - Significantly higher for schools that graded 1 (reasonable) for cafeteria tables but 2 (higher) for stall doors
  - Lower but NS for schools that graded 1 for both classroom desks and stall doors
  - Higher but NS for schools that graded 1 for both classroom desks and cafeteria tables
- (ATP levels measured from cafeteria tables appeared to have opposite trends as compared to other surface types)
Lets work together to preserve the health of generations of Native people.
What’s Next?
Outreach & Education

• Research Publication
  – Conferences
  – Journal articles
• ITEP Intern
  – Webinars
  – Guidance Materials
• Outreach Cherokee Nation, Navajo Nation & Nez Perce Tribe
Acknowledgements

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• Charm ATP Meters
• HL Turner Group
• Sealed Air Diversey
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