Asthma in Tribal Communities
Indoor Air Quality in Tribal Communities

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Asthma and Native Americans

- Native Americans are affected disproportionately by asthma and asthma-related morbidity.
- Data collected from the 2001-2005 National Health Interview Survey (NHIS) indicated that current asthma prevalence for NA/AN children is 13.0%, the second highest of all racial/ethnic groups.
Presentation

- Tribal Healthy Homes and Schools Training
  - Air Matters Kit – A Teaching Tool
- Tribal Asthma Research in Homes and Schools
- Tribal Asthma Education and Outreach

Healthy Homes and Schools Training
Healthy Homes and Schools Trainings

- Variety of Courses – up to 7 days of live training
- Online courses
- Webinars
- Technical Assistance
Toolkits for safer homes, cleaner air, healthier lives

- Hygrometer
- Moisture Meter
- Fresh Air Inlet
- Radon Detection Kit
- Carbon Monoxide Detector
- Lead Paint Detection Kit
- Green Cleaning Kit
- Pest Trap
- Dust Mite Pillow Covers
- Surface Mold Removal Kit
- Walk-Off Mat
- Air Purifier
Air Matters cue cards and tools on display at a health fair

Keep fires burning efficiently and safely

What it is
A chimney thermometer measures the temperature of the fire in your wood stove. The thermometer attaches magnetically to the flue.

What it does
Under optimal burning conditions, the fire in a wood stove heats your home while producing only small amounts of smoke, ash and creosote. The thermometer helps determine if you are burning within the optimal range.

Wood Burning Stove
Chimney Thermometer

What you can do
Start by attaching the thermometer to the flue pipe or stove top.

• Seek professional advice if the temperature reads too high or too low.
• Choose the right firewood. Hardwoods are best.
• Avoid burning green or wet wood (you’ll have to burn more of it to produce the same heat as dry wood). Firewood should have less than 20 percent moisture content.
• To dry firewood, it should be split, securely covered, and seasoned for at least six months.
• Seasoned wood burns hotter, cuts fuel consumption and reduces the amount of smoke produced.
• Open the damper to raise the flue temperature, close it to lower the flue temperature.
• Never burn trash or flecked wood, which puts toxic pollutants into the air inside and around your home.
• Regularly clean ashes from your wood-burning appliance. Ashes can clog the air intake vents, making your stove burn less efficiently.

Fact
Burning green or wet wood is a leading source of indoor and outdoor air pollution, contributing to asthma, heart attack and stroke.
Healthy Air
Hygrometer

What you can do

- Start by attaching the hygrometer to a wall (use a sticky adhesive) or a countertop. Check it daily.
- To achieve ideal humidity (between 30 and 50 percent):
  - When showering or bathing, always run a fan for at least one hour. If there is no fan, open a window.
  - Use the kitchen fan while cooking.
  - Cover pots and pans while cooking.
  - Check that the vent from your dryer is vented to outside the house.
  - Check the crawl space beneath your home. It should be sealed with a heavy black plastic. If it is not, call your property manager or a contractor.
  - Always vent your home, allowing moist air out through open, unlocked vents in the crawl space, walls and attic.

Fact
A crawl space without a vapor barrier (plastic) over the soil brings almost 40 gallons of moisture into the home each day.

Trap dust & dirt with millions of microfibers

What it is
A microfiber cleaning cloth removes dust and dirt without any chemical cleaners.

What it does
Dust makes allergies and asthma worse. No matter how often you clean, dust is in every home and comes from carpets, shoes, drapes, pillows, blankets, pets and just living. But dust does more than make you sneeze. It often contains chemicals, pet dander, bacteria, dust mites and even mold spores.

Dust & Dirt
Microfiber Cleaning Cloth

What you can do

- Start by slightly dampening the cloth and using it on surfaces. Cloth is machine-washable.
  - Take off shoes at the door.
  - Vacuum hard floors and carpets weekly.
  - Use a dry or slightly damp microfiber cloth to pick up dust.
  - Place a walk-off mat at all exterior doors.
  - Wash handles with plain soap and warm water before eating.

Fact
The average U.S. home collects 40 pounds of dust each year.
Asthma Research in Homes and Schools
From Home to School: Tribal Indoor Air Quality Study

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Cherokee Nation
Northeast Oklahoma Area

Navajo Nation
Shiprock, New Mexico Area

Nez Perce
West Central Idaho
Study Focused on Trigger Reduction

Hypothesis

- Improve Health & Increase Attendance
- Reduce Home & School Environmental Asthma Triggers

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.
Traditional Ecological Knowledge Concepts

- The evolving knowledge acquired by indigenous and local peoples over hundreds or thousands of years through direct contact with the environment
- Tribes closely hold and own their TEK
  - For example, knowledge of medicinal plants & materials, treatments, practices, ceremonies including words, prayer & songs are often shared only with selected tribal practitioners

Research Supported by US EPA NCER Grant 83559601

TEK Focus

- Balance
  - Reduce asthma triggers to background or natural levels.
  - Focus where triggers concentrate
- Restoration/renewal
  - Replace damaged materials
- Purify
  - Use simple & safe cleaning
    - Water & soap
    - Ventilate-fresh air

Research Supported by US EPA NCER Grant 83559601
School Sampling

Research Supported by US EPA NCER Grant 83559601

Home Sampling

Research Supported by US EPA NCER Grant 83559601
Education Tools

- **Study homes received targeted education** to reduce asthma triggers based on baseline investigations.
- **Study schools received targeted education** to reduce asthma triggers based on IAQ assessments (modified checklists derived from EPA’s Tools for Schools Program).
- **Control (non-study) homes and schools** received the education at the end of the 12 month study period.

Research Supported by US EPA NCER Grant 83559601

Homes

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Exterior – Roof & Siding

Interior - Wood Stoves

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Interior – Moisture/Mold

Research Supported by US EPA NCER Grant 83559601

Schools

Research Supported by US EPA NCER Grant 83559601
Interior – Cleaning Chemicals

Interior – Classroom Pets
Interior - Ventilation

Exterior – Drainage & Plants
Most Common Recommendations

Homes

1. Control Moisture and Molds
2. Reduce Exposure to Dust Mites
3. Reduce Allergy/Asthma Triggers
4. Reduce Exposure During Trigger-Producing Activities
5. Prevent and Remove Cockroaches and Rodents and Their Allergens

Schools

1. Many classrooms had elevated CO₂ levels indicating inadequate ventilation
2. Desk tops/classroom and bathroom surfaces are not being cleaned well and stand out as areas for improvement
3. High number of classrooms had food storage/preparation
4. Other issues related to use of fragrances and keeping pets in classrooms

School / district policies could be developed to overcome these common issues

Research Supported by US EPA NCER Grant 8353601
**Summary from home investigations**

- Different home types likely contributed to wide variation in the measurement results
- Issues related to moisture/mold, dust mites, and pests were relatively common in homes
- Partial improvement was noted in allergen levels (NP homes)
- Improvement in ACT test was independent of the home education activities
- Improvement in respiratory and GI illnesses may be attributed to home education activities
- School education activities could not be linked to parent reported health outcomes

**Summary from school investigations**

- Ventilation and cleaning effectiveness needed improvement
- Cat, dog, and cockroach allergens were high in schools, and targeted education did not seem to be effective in reducing the levels
- Targeted education impacted cleaning effectiveness to the extent that ATP levels did not increase throughout the school year
- Cleaning effectiveness may affect school absence rates
Preliminary Conclusions

- Partial improvements in respiratory and GI illnesses and school absence were observed in study homes, as well as schools that were cleaning more effectively.
- More focus needed in schools for:
  - Improving ventilation and reducing allergens in tribal schools.
  - Tribal homes to consistently work towards successfully removing environmental triggers.

Mansel’s Conclusions

- Education, leading to CHANGE is difficult.
- Sustained and multiple interventions are needed to make significant CHANGE.
Asthma Education and Outreach

Outreach Settings

Tabling
• Asthma Walk
• Activities
• Fact Sheets

Classroom
• Presentations
• Activities
Asthma Walk

Lung Function Model
Reading Labels

Healthy Cleaning

**Ingredients:** Water, Vinegar, Dr. Bronner’s Soap
Why are lungs important?

- Cells in your body need oxygen to live.
- When we breathe, oxygen is transferred into blood cells.
- Your body inhales O2 for CO2 gas exchange.
- The nose is the entrance for outside air into the respiratory system. The hairs lining the nose’s wall are part of the air cleaning system.
- Air enters through the mouth if the nose is blocked by cold, allergies, or heavy exercise.
- The throat collects incoming air from the nose and mouth and transports it to the windpipe.
- The windpipe divides into the two bronchial tubes for each lung.
- Capillaries are blood vessels in the walls of the alveoli.
- Blood passes through the capillaries.
- Alveoli are the very small air sacs.

Airways

- Sinuses are hollow spaces in your head above and below your eyes connected to your nose by small openings.
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Lungs and Blood Vessels

- The left lung is divided into two lobes. Each lobe is like a balloon filled with sponge-like tissue. Air moves in and out through one opening.
- The right lung is divided into three lobes, or sections.
- Bronchial tubes are lined with cilia (very small like hairs) that move like waves. This motion carries mucus (sticky phlegm or liquid) in and out into your throat.
- The smallest branches of the bronchial tubes are called bronchioles, at the end of which are the air sacs or alveoli.
- Pleura are the two membranes that surround each lobe of the lungs and separate your lungs from your chest wall.

Muscles and Bones

- The diaphragm is the strong wall of muscle that separates your chest cavity from the abdominal cavity. By moving downward, it creates suction in the chest, drawing in air and expanding the lungs.
- The ribs support and protect your chest cavity. They move slightly to help your lungs expand and contract.
What are Outdoor Pollutants?
Outdoor pollutants are present in the air we breathe and can be harmful to human health and can be present as solids, liquids, and gases.

Where do Outdoor Pollutants Come From?
Outdoor pollutants arise from:
- Combination of fossil fuels in the form of household heating & power generators
- Motor vehicles during heavy traffic
- Fire (burning): intentional trash burning, bonfires, and wildfires.

What are Common Outdoor Pollutants?
- Particulate matter
- Carbon monoxide
- Nitrogen dioxide
- Sulfur monoxide
- Methane
- Biological outdoor pollutants: mold, pollen, caster bean dust, soy bean dust

How do Outdoor Pollutants Cause Health Concerns?
- Small particles from the pollution get into the air and get into the lungs through breathing.
- These particles cannot be seen by the naked eye and many people do not know when they have been exposed to outdoor pollution.

How to Reduce Exposure to Outdoor Pollutants
- Reduce traveling during rush hour.
- Close windows and close vents if in heavy traffic.
- Avoid activity outdoors when outdoor pollution levels are high. Check www.airnow.gov for pollution levels.
- When outside, avoid areas close to sources of harmful particle pollution.
- Avoid burning waste.

Particle Size of the Pollutant Matters
- Large particles (2.5–10 micrometers) get deposited in the upper respiratory tract and large airways.
- Small particles (< 2.5 micrometers) may reach terminal bronchioles and alveoli.

Who is at Risk
- People with lung diseases such as asthma or COPD
- Children, teenagers and older adults
- Sick individuals
- People with a cardiovascular disease or diabetes
- People who work or exercise outdoors
- People who live or work near busy highways

Why are Children more Susceptible to Asthma than Adults?
- Children's lung development is not complete at birth.
- Lungs grow through alveolar expansion until 5–8 years of age.
- Lungs do not complete their growth until full adult stature is reached.
- Children inhale more pollutants per kilogram of body weight than do adults.
- Their airways are narrower, therefore irritation can result in proportionately greater airway obstruction.

Asthma Webinar Series
- Resources
- Webinar Recordings
  - https://mediaspace.nau.edu/channel/Asthma/690352

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