

Residential Wood Smoke Interventions Improving Health in Native American Populations

Navajo Nation EPA Air and Toxics Department
University of Montana

October 19, 2017

Woodstoves



Across the US, ~11 million homes report the use of wood as either a primary or secondary heating fuel.

Over 80% of these woodstoves are old and inefficient.

PM_{2.5} health effects

- Over more than 50 years, epidemiologic and clinical research has established the adverse effects of PM_{2.5} on human health.
- Exposure to wood smoke is linked with respiratory problems such as chronic bronchitis and COPD.

Indoor wood smoke exposures



Indoor PM_{2.5}

- Indoor PM_{2.5} concentrations often exceed health based standards such as WHO and EPA NAAQS.



“EldersAIR”

- 5-year R01 funded by the National Institute of Environmental Health Sciences (NIEHS).
- Project Period: 06/19/2014 – 02/28/2019.
- Partners are NNEPA , the Nez Perce Reservation, and the University of Montana.

US MAP

State and Capital



Overview of EldersAir

- Hypothesis: Locally-designed **education-based interventions** will result in efficacious and sustainable strategies for reducing personal exposures to indoor biomass smoke PM2.5 and lead to respiratory health improvements in elderly NA populations.
- Interventions:
 - Community-level wood supply program.
 - Household-level strategies, including 1) filtration units, 2) placebo filtration, and 3) education (randomized trial).
- Participants (63 at Navajo Nation, 126 in total):
 - Elderly populations living in homes that utilize a wood stove as their primary source of heating.

Overview, cont.

- Homes will be followed over two, four-month winter periods (November through February) with the intervention occurring at the beginning of the second winter period.
- Primary outcomes: pulmonary function and respiratory symptoms and infections among adult/elderly residents of participating homes.
- Indoor/personal PM_{2.5} exposures will also be assessed during each winter to evaluate the efficacy of the interventions.

Recruiting

- Posted Flyers
 - Post offices, grocery stores, hospitals, health clinics, gas stations, convenience stores, chapter houses, senior citizen centers, banks, public buildings, restaurants, tribal offices.
- Senior Citizen Centers
 - Fort Defiance Agency



Residential Wood Smoke: Improving Health Among Navajo Elders

PARTICIPANTS NEEDED IN AIR QUALITY STUDY

**Do you use a wood stove for home heating?
Are you 55 years or older?**

Participants from the Fort Defiance Agency are needed for an indoor air quality study with the goal of reducing levels of wood smoke within homes while improving respiratory health among Navajo elders.

Lung function is an important determinant of long-term health, and exposure to wood smoke is known to adversely impact lung function. This study will test community-based exposure reduction strategies in tribal households that use wood stoves for home heating and evaluate the corresponding impact on respiratory function among elderly residents.

Eligible participants are those who:

1. Use a wood stove as the major source for home heating.
2. Are 55 years of age or older.
3. Are capable and willing to complete Spirometry (breathing) tests and record symptom data and wood stove usage data.

Compensation Provided: As part of this study, wood will be provided to the study participants. The participants will be able to burn the wood provided to them. Households will additionally receive a portable air filtration unit, wood stove thermometer, moisture meter, and up to \$200 in compensation at the conclusion of the study.

If you would like to participate or would like more information before deciding to participate, please call the Air & Toxics Department at 871-7800, 871-6790, or 871-7703.

07/18/2016

Community intervention: wood yard

- Community-level wood yard, Navajo Forestry Department.



Public sales of wood to Navajo elderly, 55+>

1/10 cord per day, per person

\$35 Oak, \$35 Juniper, \$20 Pine, \$25 Pinon, \$0 Elm

Wood Processing, Navajo Forestry Department



- Temporary Employment of Laborers; worksite at Fort Defiance
- Purchase of wood processor, other smaller operating equipment

Wood Yard – Fort Defiance, AZ



- 5 cords per participating individual for winter months (4 months)
- Last winter, 5 cords x 16 homes = 80 cords
- This winter, 5 cords x 23 homes = 115 cords

Household intervention: air filtration units



Monitor compliance
(KiloWatt meter).

Household intervention: education

- Videos on Best Burn Practices.



- Training on simple tools:

moisture meter



stove thermometer



firestarter



Education intervention, cont.

- In participating homes, we engage home owners through a checklist (highlights main concepts of videos, and training on simple tools).
- In follow-up phone calls, we reiterate 1 or 2 of the main points with the participants.
- Knowledge, Attitudes, and Behaviors (KAB) survey to assess knowledge gained.

Health Outcomes

- Using an EasyOne Diagnostic portable spirometer, lung function is measured twice during the baseline winter and twice during the intervention winter (four times total).



Exposure Outcomes

- *Personal PM2.5 Monitoring.* A MicroPEM v3.2 (RTI International) single channel continuous personal PM2.5 exposure sensor/sampler.



- *Indoor PM2.5 Monitoring.* A stationary DustTrak (TSI) is used to continuously measure PM2.5 mass with 60-second time intervals.

Exposure Outcomes, cont.

- *Activity Records.* In order to interpret air sampling results within homes, household residents record activities that occurred within the home during the 48-hour sampling periods.

Results

- Number of homes sampled so far in Navajo? 36

Y1= 16 homes

Y2= 23 Homes

3 dropped out

- Number of homes recruited for this winter in Navajo? 27
- Data analysis is in progress.
- Potential to expand the wood yard further into the community? Wood processor and other equipment purchased provides for wood processing significantly quicker and provides for an increased supply of wood for sale to the elderly.

Next steps

- Sampling in 50 homes this winter.
- Intervention sampling in 23 homes next winter.
- Purchase of major equipment for Navajo Forestry Department will contribute to expansion of wood distribution program into Navajo Nation and encourage local projects that will provide free wood to elders.

Acknowledgements

Funding

- NIEHS (1R01ES022583, NIH Program Officer Dr. Symma Finn)

Thank you

- Navajo Nation EPA (Eugenia Quintana, Kayleen Pino, Nolan Hoskie, Terron Chischilly).
- UM (Curtis Noonan, Annie Belcourt, Erin Semmens, Emily Weiler, Carolyn Hester, Kathrene Conway, Desirae Ware, Dr. Paul Smith, Tony Ward).
- Nez Perce Reservation (Julie Simpson, Johna Boulafentis, Crissy Garcia).
- Navajo Nation Human Research Review Board

Contacts Information

Eugenia Quintana, Environmental Department Manager
Air & Toxics Department, Navajo Nation EPA
Box 339 Window Rock, AZ 86515
Work: 928-871-7800

Tony Ward, Ph.D.
The University of Montana
School of Public & Community Health Sciences
177 Skaggs Building
Missoula, MT 59812
Work: 406-243-4325

Curtis W. Noonan, Ph.D.
Director Graduate Education and Research
College of Health Professions and Biomedical Sciences
University of Montana, Missoula, MT 59812
Work: 406-243-495