



From Home to School: Tribal Indoor Air Quality Study Preliminary Results

EPA Grant Number: 83559601

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Presentation Summary

- Study Overview—Richard Shaughnessy & Sohail Khan
- Data Collection Training & Challenges—Richard Shaughnessy
- Data Collection & Sampling—Richard Shaughnessy
- Home Conditions—Richard Shaughnessy
- School Conditions—Richard Shaughnessy
- Preliminary Results—Richard Shaughnessy





Study Overview

Richard Shaughnessy, PI & Sohail Khan, CI



Objectives

- Demonstrate the importance of traditional ecological knowledge (TEK) for addressing asthma triggers.
- Develop and refine asthma/allergy trigger reduction and targeted cleaning education for tribal homes and schools based on TEK.
- Test differences between home and school environments to determine if asthma symptom days are reduced in school and home environments that implement TEK education-based practices.
- Based on study results, develop practical/transferable educational materials/modules to encourage adoption of effective practices in tribal homes and schools.
- Disseminate research results, in publications, webinars, Cherokee, Navajo, and Nez Perce environmental and health related events and outreach activities, and conferences.

Top 10 Diagnosis FY'2008 – FY'2014

1. Diabetes
2. Hypertension
3. Depressive Disorders
4. **Asthma**
5. Hyperlipidemia
6. Oesophageal Reflux Disease
7. Hypothyroidism
8. Acute Upper Respiratory Infection
9. Otitis Media
10. Chronic Airway Obstruction



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Cherokee Nation
Community, Jobs, Language



Data

- CO₂
- Humidity/Temperature

Outdoor
Environmental
Variables
Monitoring



- ATP Sampling
- Allergen Dust Sampling
- Building Condition
- Assessment
- CO₂
- CO
- Humidity/Temp

Indoor
Environmental
Variables



- Illness-absenteeism
- Nurse Visits and reported illnesses/symptoms
- Health Outcomes
- Building Attributes
- Student Demographics

Dependent
Variables &
Covariates



Year 3-4 Analysis

- Structuring databases for analyses
 - Outdoor environmental variables
 - Indoor environmental variables
 - Building conditions/attributes
 - Attendance/health data
 - Health Outcome (Asthma Control Test)
 - Cherokee Nation medical records/asthma codes
- QC reviews of databases
- Statistical analyses/hypotheses tests
- Research Advisory Panel review and interpretation





Year 3-4 Dissemination



- Research Advisory Panel recommendations
- Development of conference presentations
 - ITEP conference (plenary and breakout sessions)
 - ITEC conference
 - NNHRRB Research Conference (Navajo Nation)
 - Selected conferences
- ITEP intern development of training modules/guides
- ITEP family/school outreach
- Preparation of scholarly articles for publication
- EPA technical reporting





Year 2 Data Collection Training & Challenges Richard Shaughnessy



Field Researcher Training

Training covered:

- Asthma triggers
- Research protocol
- Equipment use
- Safety
- CITI human subject
- Engaging families



Field
Researcher
training is
ongoing process
throughout data
collection.





Field Research Challenges



Getting lost



Rugged Roads



No One Answers Door/Cancelled Appointments





Challenge: Variety of Homes





Sampling Challenges



Finding Sampling Site is a Challenge



Sampling on Dresser Drawer



Children Wanting to Assist





Year 2 Data Collection & Sampling

Richard Shaughnessy



Sampling

- Three visits over the school year at each school and home
- IAQ: CO₂, RH, Temp, CO
- Allergen: dust mite, cat, dog, mouse and cockroach
- High-touch points/targeted surfaces – swab to gauge surface residual bio contamination





From Home to School Study: Protocol & Data Form



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

Temperature

Relative Humidity

Time Recorded

Carbon Dioxide

Carbon Monoxide

Is living room temperature below 60 degrees F?

Yes

No

Is living room RH% above 60%?

Yes

No



Example Field Data Sheet



Main Living Area	
Current Study Code: 63106923	
Previous Study Code: 63102369	
Study Home: STUDY - ATP Only	
Sample #1	Surface Description: Coffee Table
	Surface Material: wood
	Clean/Dirty: clean
	RLU: 269476
	Time: 1:30 PM
Sample #2	Surface Description: Coffee Table
	Surface Material: wood
	Clean/Dirty: clean
	RLU: 301649
	Time: 1:32 PM
Sample #3	Surface Description: Coffee Table
	Surface Material: wood
	Clean/Dirty: clean
	RLU: 283444
	Time: 1:34 PM
Sample #4	Surface Description: Coffee Table
	Surface Material: wood
	Clean/Dirty: clean
	RLU: 469177
	Time: 1:36 PM



Example Allergen Data



Project ID#	Site	Dust ID#	Fel d1 (ng/g)	Can f1 (ng/g)	Mus m1 (ng/g)	Der f1 (ng/g)	Der p1 (ng/g)	Bla g2 (ng/g)
66497014	BR	#4107	876.31	1978.62	59.57	169.42	710.39	1269.27
66497014	LR	#4108	712.83	547.54	155.49	106.50	956.85	916.09
10034544	BR	#4109	805.55	383.81	10.65	15.05	135.34	46.62
10034544	LR	#4110	1407.00	2108.77	467.52	18.64	635.59	153.39
13552099	BR	#4111	178.17	4163.44	1324.72	1484.34	1166.14	298.39
13552099	LR	#4112	696.57	1372.44	399.97	89.77	632.22	802.93



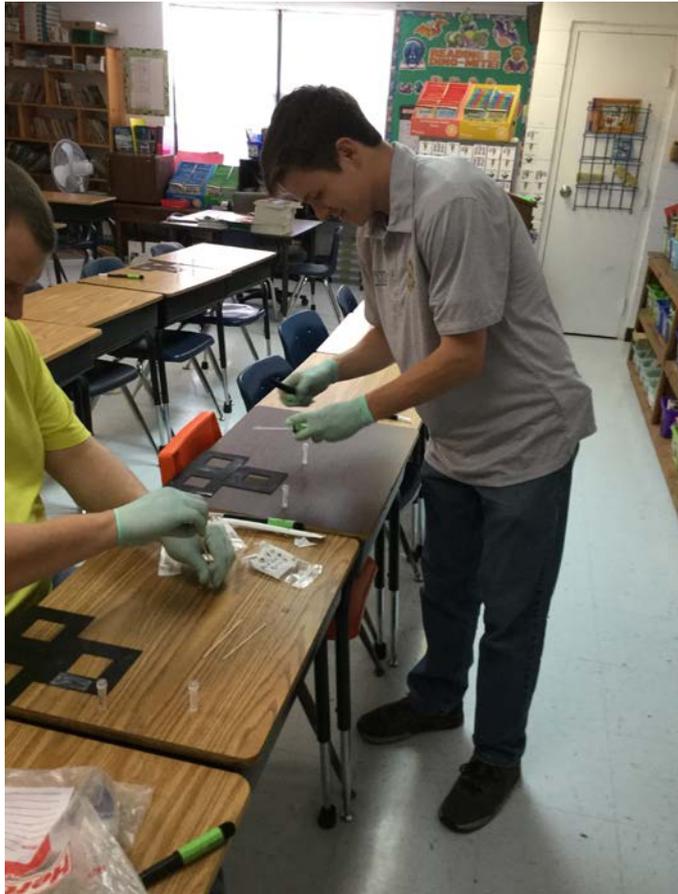


Home Sampling Grady





School Sampling





Year 2 Data Collection House Conditions Richard Shaughnessy



House Conditions Siding Issues





House Conditions

Mouse Hole





House Conditions Warped Ceiling/Wood Stove





House Conditions Moldy Shade & Rusty Blinds





House Conditions Stained & Moldy Carpet



Research Supported by US EPA NCER Grant 83559601



House Conditions Pets





House Conditions Roof Issues





Year 2 Data Collection School Conditions Richard Shaughnessy





School Conditions Outdoor Sources



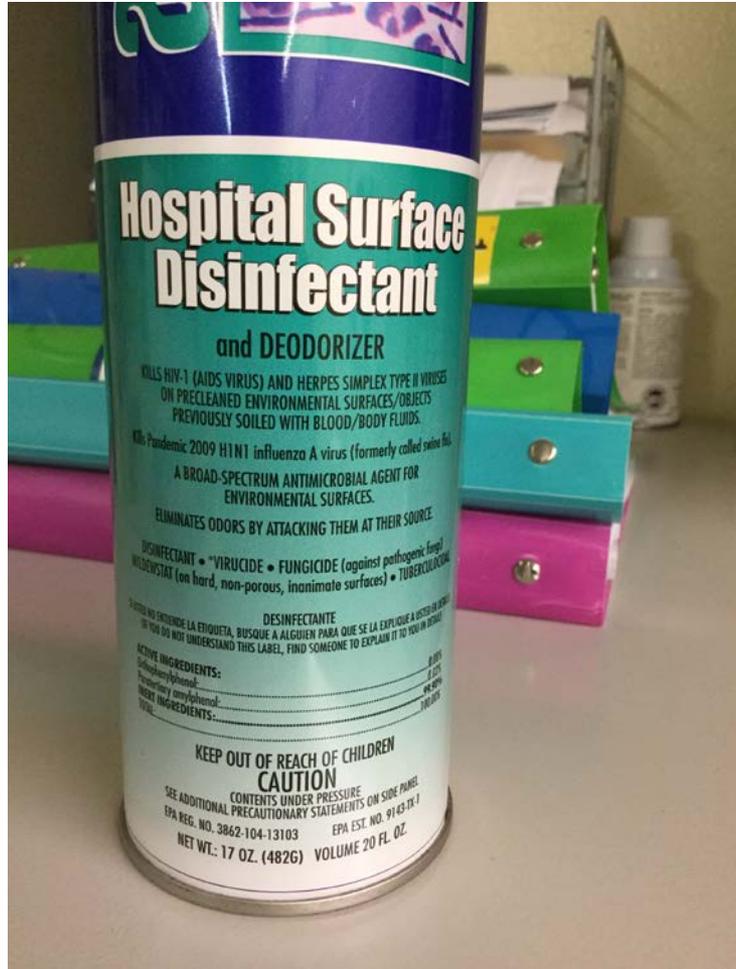


School Conditions Moisture





School Conditions VOC Sources





School Conditions Pets





Preliminary Results

Richard Shaughnessy



Baseline Data

- Predominantly, parents satisfied with their home
- Most frequent indoor environmental concerns related to dampness/mold, and pests



Base-line data	Control home	Study home
Year house built, mean (SD)	1986 (19)	1987 (20)
Square footage [ft ²], mean (SD)	1607 (535)	1578 (545)
<i>Satisfied or highly satisfied with the home, N (%)</i>	27 (66)	34 (76)
Pets in child's bedroom reported, N (%)	20 (47)	23 (51)
Smoking inside the home reported, N (%)	5 (13)	3 (7)
Stuffy or lingering odors reported, N (%)	7 (13)	9 (20)
Places that are persistently damp or mold, N (%)	8 (19)	8 (18)
Evidence of cockroaches reported, N (%)	5 (11)	5 (10)
Evidence of rodents reported, N (%)	12 (27)	10 (20)
<i>No asthma symptom free days (past 2 weeks), N (%)</i>	8 (20)	8 (19)
<i>Doctor visit because of asthma symptoms, N (%)</i>	5 (12)	8 (18)
<i>Asthma medication changed, N (%)</i>	5 (12)	9 (20)





Similar Conditions

Similar conditions in the study and control homes at the baseline provides necessary background information for assessment of effects of home and school-based educational efforts to reduce asthma triggers and symptoms among the study population

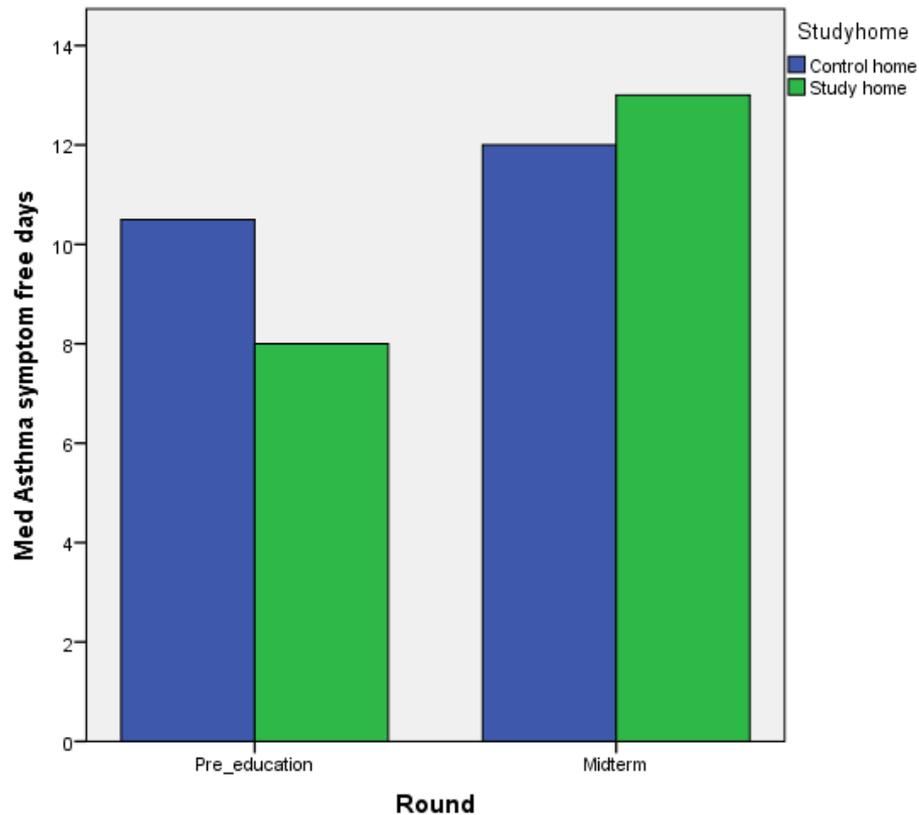




Asthma Symptom Free Days

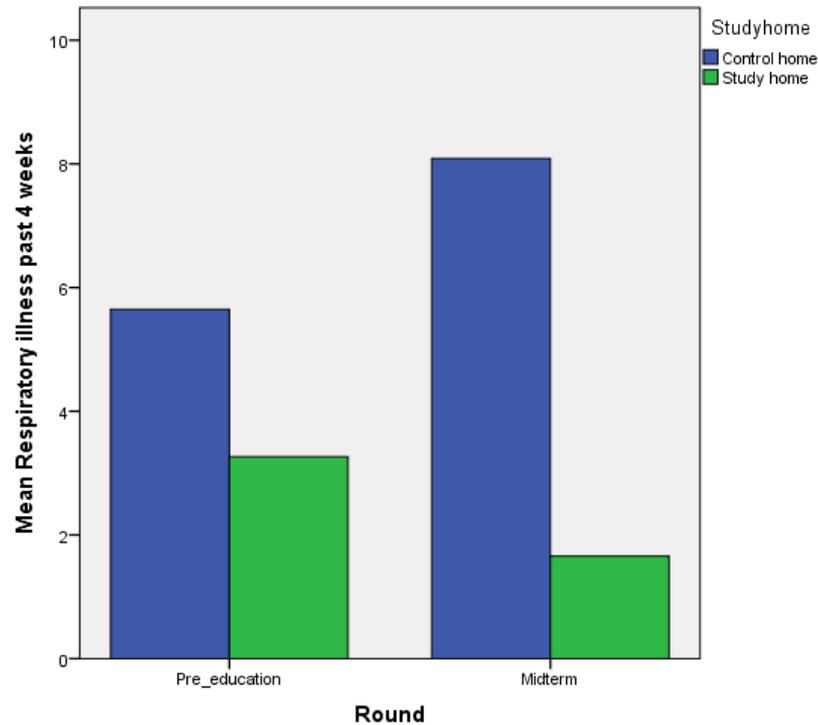
During past 2 weeks, how many asthma symptom free days did your child have?

- Increase in both groups, especially in study homes





Preliminary Results

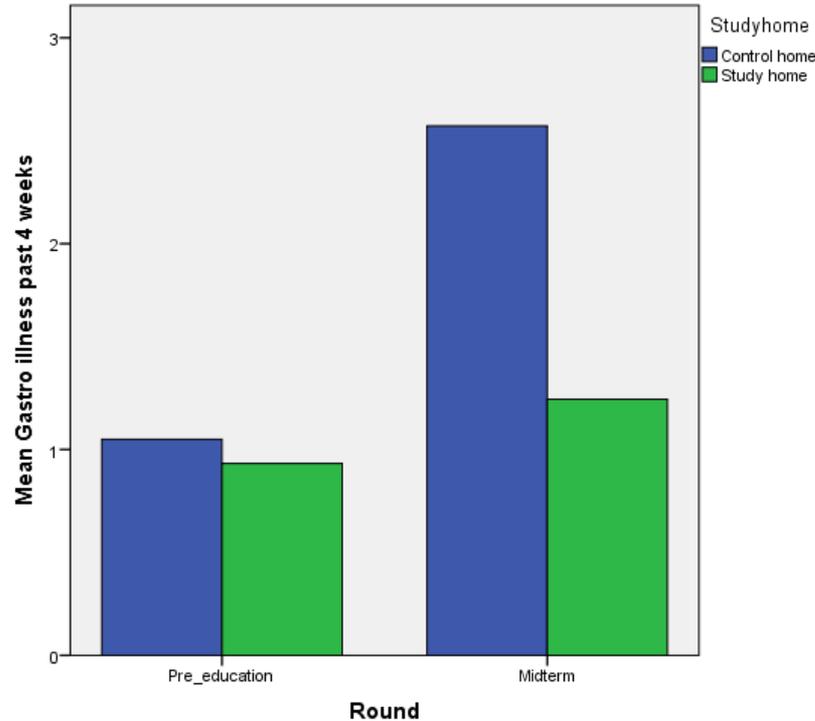


During the past 4 weeks, how many days, if any, did your child have a respiratory illness such as a cold, allergies or sinus infection?

- Increase in control homes, decrease in study homes



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?

- Increase in both groups (seasonal related?), especially in control homes



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