



Indoor Air Quality and Respiratory Conditions in Alaska Native children: The Healthy Homes Project

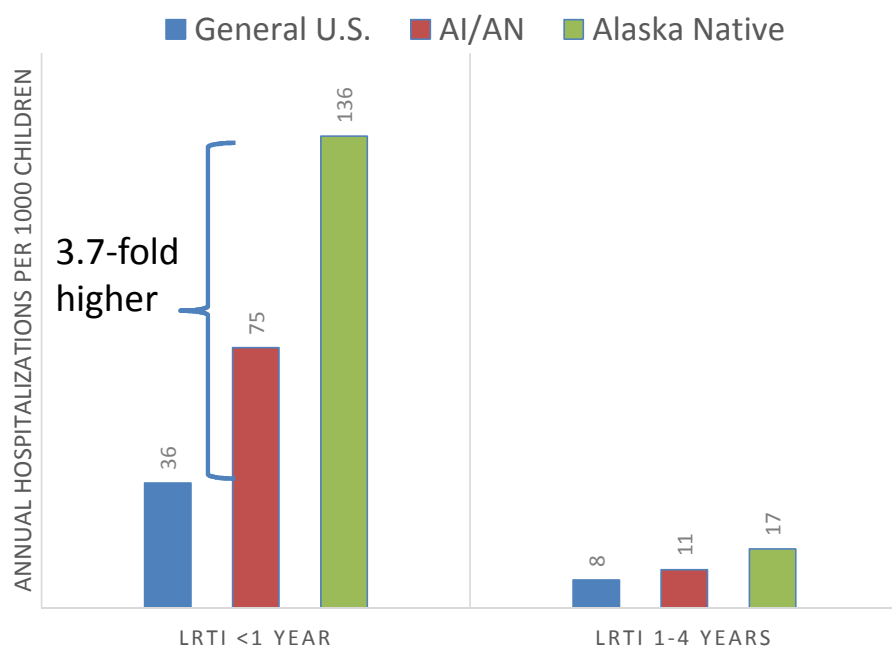
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Lower Respiratory Tract Infection Hospitalization Rates; general US vs. American Indian/Alaska Native vs. Alaska Native, 2009-2011



LRTI hospitalizations

Alaska Native/American Indian infants

- 1.6 fold higher than general US child rate

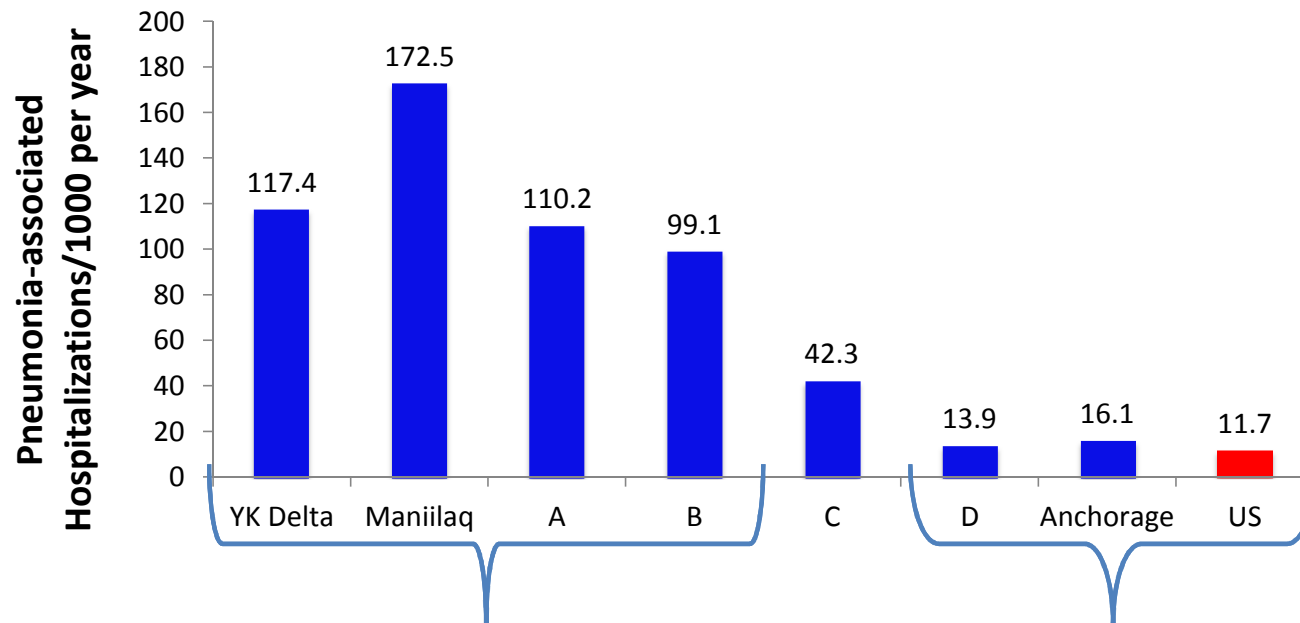
Alaska Native infants:

- 3.7 times higher than that of general US children rate (infants)
 - (136.4 vs. 37.1 per 1000/year)

LRTI – lower respiratory tract infection

Footnote: E et al., 2015, *Int J Circumpolar Hlth*

Pneumonia hospitalizations, Alaska Native infants, by region, 2009-2011



Northern and western rural regions – 10-fold higher than U.S.

Anchorage, urban and Southeast regions – Similar to the U.S.



Indoor Environment Matters!

- Household crowding
- Tobacco Smoke
- Wood-burning
- Chemicals – fuel, fixing engines
- No in-home running water
- Poor ventilation

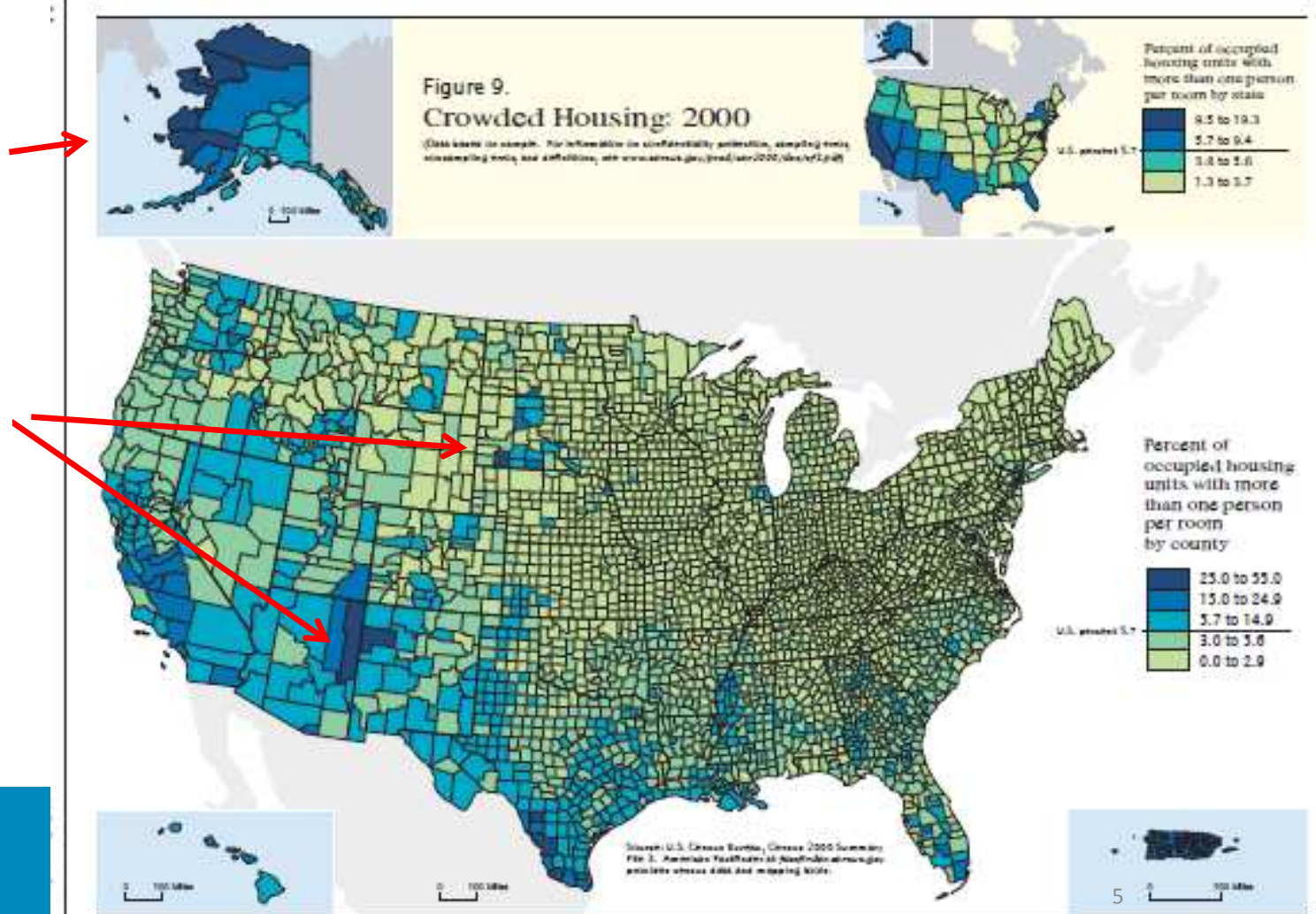
Rural Alaska houses are small, crowded, use woodstoves.



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Household Crowding in the U.S.: 2000 Census Data

Alaska
Native
Villages



American Indian
Reservations

Structural and Occupancy Characteristics of Housing: 2000. Census 2000 brief. US Census Bureau,

The Healthy Homes Study

Partners

- Alaska Native Tribal Health Consortium (lead)
- Yukon Kuskokwim Health Corporation
- Bristol Bay Area Health Corporation
- Arctic Investigations Program - CDC

Goal

- See if home improvements can reduce pollutants and improve health in children with lung disease

Methods

- Identify homes of children with lung problems
- Assess homes for indoor air quality
- Simple home renovations (woodstove changeout, vents, range hoods etc.) and education
- Check indoor air quality (PM2.5, VOC, CO2) and lung symptoms before and after



AJ Salkoski,
Environmental specialist



Air Testing Instruments

- Particulate Matter 2.5 (TSI DustTrak II)
- Volatile Organic Compounds (Ultra III Passive Badges/Radiello Passive Badges)
- Carbon Dioxide, Temperature, Relative Humidity (Hobo/Extech CO210)
- Carbon Monoxide (Lascar)



New and/or Improved Vents

Ventilation intake plugged
with a rag



New ventilation intake



Cooking Stove Exhaust Installed

Cooking stove with no range exhaust



New range exhaust



Woodstove Replacement

Old woodstove



New EPA-certified, low-emission
woodstove



Results: Indoor Air Pollutants and Symptoms

Indoor Air
Quality

- High levels of pollutants (VOCs, PM2.5)

WERE ASSOCIATED WITH

Children's
Symptoms

- Rates of **REPORTED** cough, wheeze, lung infections in children



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Household factors contributing to indoor air pollution

Household smoking contributed to PM2.5

Woodstove use contributed to PM2.5, BTEX

persons in house contributed to PM2.5, BTEX, VOC, CO₂, Rel Humidity

No Piped water contributed to BTEX, VOC, CO₂



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Medical Visits Pre- and Post- Intervention

Visits	High risk children Coefficient (95% CI)	Other household children Coefficient (95% CI)	All children Coefficient (95% CI)
All	-0.12 (-0.24, -0.005)	0.03 (-0.06, 0.12)	-0.012 (-0.08, 0.06)
ARI (acute respiratory infection)	-0.13 (-0.29, 0.03)	0.09 (-0.06, 0.23)	0.02 (-0.09, 0.13)
LRTI (lower respiratory tract infection)	-0.32 (-0.61, -0.03)	0.67 (0.32, 1.03)	0.16 (-0.06, 0.39)

Adjusted for age as 3 linear splines (<2, 2-3, 4-13 years)

Household adults also experienced a decrease in respiratory visits.

Next Step.....

Environmental Health Hospital Consultation Study



Years: 2016-2019

Organizations: ANTHC, SCF, YKHC, Maniilaq, BBAHC

Objectives: Pilot project to test feasibility of hospital-based ANMC environmental consults

Methods: Environmental health specialists does consult with caregivers of inpatient children hospitalized with respiratory illness

- Provide education on home environment, best burn practices, cleaning, water mitigation etc.
- Mail Indoor Air “Toolkit” – CO monitor, wood moisture tester, cleaning supplies etc.
- Village Housing referrals – to fix woodstoves, improve ventilation, fix furnace etc.

Questions?

1. Is it feasible to provide environmental health consults as a regular hospital service?
2. Do consults change caregiver behaviors. Do houses receive the remediation?



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Cue cards included in the AIR MATTERS Toolkit

Each kit is equipped with a book of cue cards seen below. These cards provide information on what the item is, give instructions on how to use it and explain why the item is important for maintaining health.



Screenshot from Tribal Healthy Homes Network website

Environmental Health Hospital Consultation Study

Study Status:

- In Year 3 of this 3 year study.
- Enrolled 80 families: hospital consult/tool kit
- Housing remediation for 58 homes



Long-term Goal:

Provide Environmental Health Consults as routine care for high risk children.



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