

## **Online Data Supplement**

### **Environmental Concerns for Children with Asthma on the Navajo Nation**

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<b>ADMINISTRATIVE INFORMATION</b>	
<b>1. Title of Review</b>	<i>Environmental concerns for children with asthma on the Navajo Nation</i>
<b>2. Identification</b>	The report is a protocol for a systematic integrative review
<b>3. Registration</b>	NA
<b>4. Authors</b>	
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<p><b>B. Contributions</b></p>	<p>6. University of Arizona Native American Training and Research Center, Tucson, AZ  7. University of Arizona College of Medicine, Tucson, AZ  8. University of Utah College of Medicine, Salt Lake City, UT</p> <p>AAL is the guarantor. LBG is the corresponding author. All authors contributed to the conception and design of the work, and all authors read, provided feedback and approved the final manuscript.</p>
<p><b>5. Amendments</b></p>	<p>NA</p>
<p><b>6. Support</b></p> <p><b>A. Sources</b></p> <p><b>B. Role of Sponsor or funder</b></p>	<p>This project was funded by the AzAHEC Research and Project Small Grant Program and by the National Institutes of Health, National Heart, Lung, and Blood Institute (U34 HL130762).</p> <p>Advice was sought from Mari Stoddard, Health Promotion Sciences librarian (retired) at the University of Arizona Mel and Enid Zuckerman College of Public Health and Dr. Lynn B. Gerald. In addition, a training program in Meta-Analysis and Systematic Review by the University of Arizona College of Pharmacy Center for Health Outcomes &amp; PharmacoEconomic Research was completed by Ashley A. Lowe, the corresponding guarantor of the manuscript.</p>

<p><b>INTRODUCTION</b></p>
<p><b>7. Rationale</b></p> <p>More than 4 million children with asthma live outside of urban areas. Most of these children seek medical care in settings where asthma is often inadequately managed, representing a significant gap in asthma management. In spite of perceptions to the contrary, asthma rates are not lower in rural as compared to urban populations and are complicated by agricultural and indoor housing exposures not typical in urban communities. Health disparities for rural children with asthma include poverty, limited access to specialty care, and environmental challenges which include high levels of indoor and outdoor air pollution exposure.</p> <p>For Native American children, asthma risks are even greater. Children with asthma living on the reservation are less likely than children in urban areas to be treated by an asthma specialist and are more likely to be living in poverty. These children have a significantly higher</p>

prevalence of asthma than the general United States (U.S.) population, a fact that is frequently misunderstood due to sampling bias in epidemiological studies. The Navajo reservation is a rural region that spans across 6 counties and 3 states in northeastern Arizona, northwestern New Mexico and southeastern Utah. In addition, the region consists of multiple U.S. census blocks and the Hopi reservation is fully contained within the Navajo reservation, complicating epidemiologic data sets.

While potential risk factors for pediatric asthma on the Navajo reservation have been identified, little information is known regarding the environmental determinants believed to contribute to an increased prevalence and severity of childhood asthma on the Navajo reservation. In fact, pediatric asthma on the Navajo reservation has been routinely overshadowed by more prevalent health problems including: heart disease, cancer, unintentional injuries, and diabetes. These comorbidities not only present confounding health issues, but may also present risk factors that contribute to higher asthma prevalence.

In this review, we consider the environmental factors potentially contributing to pediatric asthma prevalence and severity on the Navajo reservation. Currently, our understanding of childhood asthma prevalence and severity among Navajo children is limited, and to our knowledge, no existing literature review has reported on the physical environment and pediatric asthma specific to the Navajo reservation and American Indian populations in general. Because Native Americans are severely under-represented in the scientific literature, further investigation is necessary to understand the increased prevalence and severity of pediatric asthma in Navajo children. We will employ a systematic integrative literature review approach to evaluate the strength of peer-reviewed scientific evidence, but also to incorporate non-peer-reviewed health information that will provide the necessary background information on childhood asthma and exposure risks. This method will allow our team to summarize diverse literature that is specific to environmental factors believed to contribute to increased childhood asthma prevalence and severity on the Navajo reservation, identify gaps in the current knowledge, and prioritize future research.

## **8. Objectives**

The aim of this systematic integrative review is to evaluate the existing literature relevant to asthma on the Navajo reservation and investigate the potential environmental determinants of childhood asthma prevalence and severity. The literature reviewed will examine the multifactorial components known to contribute to childhood asthma in the general population, but will incorporate the unique environmental determinants present on the Navajo reservation including: epidemiologic background, indoor exposures, and out exposures. The proposed systematic integrative review will answer the following questions:

1. What is known about environmental factors (specifically indoor and outdoor air) that contribute to increased asthma prevalence and severity on the Navajo reservation?
2. What gaps in research exist in our current knowledge of increased asthma prevalence and severity on the Navajo reservation and what future directions should we take?

## METHODS

### 9. Eligibility Criteria

Studies will be selected according to the criteria outlined below.

#### A. Inclusion Criteria

##### Studies

We will include all peer-reviewed literature that is specific to asthma or respiratory disease and the Navajo Nation or an American Indian/Native American population. The primary search methodology will include the combination of these terms: (Asthma OR Respiratory Infection OR Respiratory Illness) AND (Navajo OR Navaho OR Diné OR Dineh OR Southwest OR Native American OR American Indian). All peer-reviewed randomized controlled trials (RCT), case-control studies, and prospective and retrospective comparative cohort studies will be considered for review if they meet the primary search methodology. Qualitative studies will only be included if they include the primary search terms and are peer-reviewed studies.

We will also use secondary search concepts to assess the literature regarding two environmental domains: indoor air exposures and outdoor air exposures. The secondary search concepts must include “Navajo” or “American Indian/Native American” and any combination of the following secondary search terms:

- *Asthma*
- *Pediatric, Childhood, Children*
- *Anti-asthmatic, Atopic Asthma, Bronchial Hyper-reactivity, Respiratory Hypersensitivity, Reactive Airway, Wheeze, Wheezing Illness*
- *Environment, Physical Environment, Environmental Justice*
- **Indoor Exposures:** *Domestic Pollution, Biomass Smoke, Indoor Air Pollution, Household Air Pollution, Biomass Combustion, Cook Stove, Wood-burning Stove, Coal Combustion, Tobacco Smoke Exposure, Mountain Tobacco Smoke, Dził Na't'oh, Na't'oh*
- **Outdoor Exposures:** *Outdoor Air Pollution, Coal combustion, Desertification, Climate Change, Dust Storm, Desert Sand Storms, Wildfire Severity, Allergen, Sagebrush, Rabbitbrush, Juniper, Grasses, Heavy Metals, Diesel Exhaust, School Bus Idling, Rural Busing*

	<p><b>Participants</b></p> <p>We will include studies examining the pediatric population of Navajo children with asthma (18-years and younger); however, given the limited availability of American Indian/Native American research we will include all peer-reviewed studies that address both adults and children if data is provided separately. We will also include studies that examine asthma or respiratory diseases in American Indian/Native American populations and rural populations.</p> <p><b>Interventions</b></p> <p>Of primary interest are interventions that examine two areas of environmental risks: indoor air exposures and outdoor air exposures. We will consider all intervention studies that examine the following indoor domains: Wood-burning stoves, indoor coal combustion, cook stoves, tobacco smoke and indoor allergens. We will also consider all intervention studies that examine the following outdoor domains: Coal-fired power plants, mining and dust, and diesel exhaust. We will consider integrating other types of interventions as suggested by the non-American Indian/Native American (AI/AN)-specific literature.</p> <p><b>Language</b></p> <p>All studies included in this systematic integrative review will be published in English.</p>
<p><b>10. Information Sources:</b></p>	<p>No limits regarding the study design or date of publication will be imposed during the search process, but all studies must be published in English. A primary search will be conducted in Google Scholar and a systematic search will be conducted in PubMed, Latin American and Caribbean Health Sciences Database (LILACS), Web of Science and Education Resources Information Center (ERIC) databases. In addition, the reviewers will consult with experts in the field and will scan all references of literature identified for review. The search will be updated towards the end of the review process.</p>
<p><b>11. Search Strategy:</b></p>	<p>An example of the search strategy in PubMed is described below:</p>

	<p>("Asthma"[Mesh:NoExp] or asthma[ti]) AND ("Indians, North American"[Mesh] OR "Native Americans"[tiab] OR "Navajo"[tiab] OR "Navaho"[tiab] OR "Southwest"[tiab] OR "Diné"[tiab] OR "Dineh"[tiab])</p>
<p><b>12. Selection Process:</b></p>	<p>The primary author and senior author will independently screen the titles of the abstracts yielded by the search and full-text articles will be selected for review if the article meets the inclusion criteria. Furthermore, a librarian will be consulted during the search process to assist with identifying articles that meet inclusion criteria. Review authors will seek additional information from all authors to resolve questions regarding full-text review. Any disagreement regarding studies that are excluded will be resolved through discussion between the review team. All duplicate studies identified during the search process will be removed and any reason a peer-reviewed study was excluded from the review will be documented.</p>