



TRIBAL ASTHMA SURVEY PROJECT

ASTHMA AND HOUSING CONDITIONS IN
CALIFORNIA AMERICAN INDIAN AND ALASKA NATIVE ADULTS

- SUMMARY REPORT -



CALIFORNIA TRIBAL EPIDEMIOLOGY CENTER
CALIFORNIA RURAL INDIAN HEALTH BOARD

TRIBAL ASTHMA SURVEY PROJECT (TASP)

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KEY TERMS

AIAN: American Indian or Alaska Native.

Body Mass Index (BMI): Weight (in kilograms) divided by height (in meters) squared. This measure correlates closely with body density and skin fold thickness. The CDC gives BMI category ranges for adults aged 20 and older:

BMI	Weight Status
Below 18.5:	Underweight
18.5 – 24.9 :	Normal
25.0 – 29.9:	Overweight
30.0 + :	Obese

Cross-Sectional Study: A study that examines the relationship between a health condition or disease and other conditions for a certain population at one point in time.

Confidence Interval: An interval specifying a range within which the true value is estimated to be. A 95% confidence interval means that if the data collection and analysis were replicated, the results of these replications would fall in the confidence interval 95% of the time.

Correlate: The degree to which variables change together.

Epidemiology: The study of the distribution and determinants of a disease in a population.

Measures of Central Tendency:

Mean: Commonly known as an “average”. Computed by adding all the individual values in the group and dividing by the number of values in the group.

Median: Dividing a set of measurements in to two parts (and upper and lower half); the point on the scale that divides the group in this way is called the median.

Mode: The most frequently occurring value in a set of observations.

Morbidity: A state of being sick or ill. Morbidity can be measured by counting the number of persons who were ill, the characteristics of illnesses experienced, or the duration of the illness.

Prevalence: The total number of cases (for example, instances of a given disease or other condition) in a given population at a designated time, divided by the number of individuals in that population.

Prevalence Ratio: The probability of a disease being present in one population compared to another population.

Standard Deviation: A measure of variation. A summary of how widely dispersed the observed values of a measure are within a population.

Key terms are derived from A Dictionary of Epidemiology (4th Edition) by John Last.

EXECUTIVE SUMMARY

There are very few studies documenting the prevalence of asthma in American Indians and Alaska Natives (AIAN) living in California. In two statewide surveys it was found that AIANs have the highest prevalence of asthma of all the major race/ethnicity groups in California. The California Tribal Epidemiology Center, with support from the California Department of Public Health (CDPH), Environmental Health Investigations Branch, California Breathing Asthma Program, implemented the comprehensive Tribal Asthma Survey Project (TASP). This survey gathered information on asthma and housing conditions.

The specific aims of this study were to:

- 1) Determine the prevalence of self-reported asthma in AIAN adults in California; and
- 2) Examine the relationship between housing conditions and asthma in California AIAN adults.

Adult participants were recruited from Indian events such as Pow-Wows, Big Times, health fairs, and community gatherings throughout California over a 7-month period, between October 2009 and May 2010. There were a total of 610 surveys collected. The majority of the sample was female (65%) and lived in California (94%). The average age was 42 years, the average Body Mass Index (BMI) was 32 (obese), and 57% reported they had greater than a high school education. Over half of the sample (55%) reported they lived in a one-family house, and 28% lived on a Reservation or Rancheria.

Twenty-two percent (n=129) of the sample had been diagnosed by a doctor or other health professional with asthma. Of those diagnosed with asthma, the sample was 78% female, and the average age was 45 years. The prevalence of asthma was 15% for males and 26% for females. Of those who had been diagnosed with asthma (n=131), 76% still had asthma. The average age of diagnosis was 27 years. Half (50%) reported that their asthma had been made worse by workplace conditions. The average number of days that respondents reported having symptoms of asthma (defined as coughing, wheezing, shortness of breath, chest tightness, or phlegm production without a cold or respiratory infection) was 9 of the past 30 days, indicating that, on average, the asthma of respondents was not well controlled.¹

After adjusting for age and smoking status, among females, the prevalence of asthma was higher for those who had seen mold in the home in the past 30 days, smelled mold or a musty odor in the home in the past 30 days, had pets with fur or feathers living in the home in the past 6 months, or used pesticides or chemicals to kill plants, animal or insect pests in the yard or garden in the last 12 months, compared to those who had not seen or smelled mold, did not have pets, and did not use pesticides in their garden. Among men, only smelling mold or a musty odor in the home in the past 30 days was associated with asthma prevalence. As a result, educational efforts on controlling mold in the home may be beneficial to the California AIAN community. No statistically significant associations between socioeconomic status and asthma were observed in men or women.

The collection of this information can empower tribes to determine program priorities, direct program planning, and develop new policies and culturally appropriate intervention strategies.

This report and other products from the Tribal Asthma Survey Project can be found on the California Tribal Epidemiology Center's website at www.crihb.org/ctec.

INTRODUCTION

AMERICAN INDIANS AND ALASKA NATIVES IN CALIFORNIA

According to the 2000 Census, California has more American Indians and Alaska Natives (AIAN) than any other state, with 627,562 (1.9%) people self-identified as AIAN alone or in combination with one or more races, and 333,346 (1.0%) people self-identified as being only AIAN.²⁶ The Bureau of Indian Affairs has certified 108 federally recognized tribes, Rancherias and federations in California.²⁷ AIAN in California have a median household income of \$38,764 compared to \$53,734 for non-Hispanic Whites. Nearly a third of the AIAN adult population 25 years of age and older (32%) do not have a high school diploma compared to 11% of non-Hispanic Whites.²⁶

ASTHMA IN AMERICAN INDIANS AND ALASKA NATIVES

There are very few studies documenting the prevalence of asthma in AIAN living in California. According to the California Health Interview Survey (CHIS) and the California Behavioral Risk Factor Surveillance System (BRFSS) survey, AIAN have the highest prevalence of asthma of the major race/ethnicity groups in California. In 2003, CHIS data show that 8% of California adults and children had active asthma, and the highest prevalence of active asthma in California was seen in AIAN: 17% for children and 13% for adults.² CHIS data for 2005/2007 show that 18% of AIAN adults reported a diagnosis of asthma, compared to 15% of non-Hispanic Whites, and 13% for all races. The California BRFSS data from 2005 show that 14% of AIAN-only were ever told they had asthma, compared to 14% for Black-only, 13% for White-only, and 13% for all race/ethnicities total.³ However, CHIS and BRFSS are limited in that they are both telephone surveys, do not oversample the AIAN population, and are often not representative of the rural AIAN population in California.

ALLERGENS IN HOUSING AND THEIR RELATIONSHIP TO ASTHMA

Housing in tribal areas can often be limited, and inhabitants may not have the resources or ability to control their housing conditions.²⁸ According to the 2000 Census 12% of residents on American Indian lands (nation-wide) lack complete plumbing facilities, compared to 1% of the general U.S. population. In California tribal communities, 11% do not have adequately safe sewer systems, 7% do not have adequately safe potable (drinkable) water, and 12% have insufficient solid waste dump sites.²⁹ These factors may contribute to substandard housing conditions, which may influence the development of asthma or asthma morbidity.

Conditions in the home that are known to aggravate asthma include:

- Mold
- Dogs, cats, or other pets with fur or feathers
- Cockroaches
- Mice, rats, and other rodents
- Dust or dust mites
- Smoke from commercial tobacco products
- Wood-burning fireplaces
- Home overcrowding

Mold. Floods, water leaks, or other fluid damage can trap moisture within the home, supporting the growth of various mold species. Mold can also be found in consistently damp places, such as showers,



sinks, kitchens, pillows or mattresses. Dampness in the home and the presence of mold are associated with having asthma or the presence of asthma symptoms.⁴⁻⁹ In 2003, about 15% of 66,580 housing

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units under the management of Indian tribes or Indian housing organizations had resident-reported mold conditions.¹⁰



*Dogs, cats, and other pets with fur or feathers can also aggravate asthma.*¹¹ In California, 31% of AIAN have dogs in the home; 34% have cats in the home.¹²

Cockroaches, Mice, Rats, and Other Rodents.

Structural damage, standing water and exposed food in housing facilitates the entry of cockroaches and rodents into living spaces, both of which are known to aggravate asthma in many individuals.^{11,13-15} In California, 11% of AIAN adults have seen a cockroach in the home, compared to 7% of non-Hispanic Whites.¹⁶

Dust or Dust Mites. Dust particles and dust mites (extremely small bugs often found in carpet and bedding) can aggravate asthma.¹⁷⁻¹⁸

Smoke from commercial tobacco products. Smoking commercial tobacco cigarettes or inhaling commercial tobacco smoke secondhand can also trigger asthma symptoms.¹⁹⁻²⁰ In California, 30.2% of AIAN adults are current smokers, compared to 15.4% of non-Hispanic White adults.²¹ Further, almost 1 of every 5 AIAN in California allow smoking in the home.²²

Wood-burning fireplaces. Smoke from burning wood can also aggravate asthma.²³



Overcrowding. According to the US Census, a home is defined as overcrowded if there are 1 or more persons per room. Overcrowded homes increase the risk for developing viral infections which are known triggers of asthma attacks.²⁴ Furthermore, overcrowding is likely to lead to higher indoor moisture levels in housing due to increased showering, cooking, and laundry.¹⁰ Dust, smoke, dander and other contaminate levels are also higher in overcrowded homes. It is estimated that on tribal lands, 28% of AIAN households are overcrowded, compared to 15% of all AIAN households and a national average for all races of just 5%.²⁵

In summary, the high occurrence of asthma and potential exposure to allergens in the home environment represent one way in which AIAN may experience a greater asthma burden compared to Whites. However, to date, there are very few epidemiological studies examining the association between allergens in housing and asthma in AIAN. In order to investigate this, the California Tribal Epidemiology Center, with support from the California Department of Public Health (CDPH), Environmental Health Investigations Branch, California Breathing Asthma Program, implemented the comprehensive Tribal Asthma Survey Project (TASP).

The specific aims of this study were to:

- 1) Determine the prevalence of self-reported asthma in AIAN adults in California; and
- 2) Examine the relationship between housing conditions and asthma in California AIAN adults.

METHODS

TASP was a statewide cross-sectional survey to examine the prevalence of asthma and collect information on asthma morbidity and related housing conditions for AIAN adults in California.

PROJECT APPROVAL

The project was approved by the California Rural Indian Health Board (CRIHB) Executive Committee on August 9, 2009. Authorization for this project was granted by the CRIHB Institutional Review Board on October 15, 2009.

SURVEY POPULATION

Men and women aged 18 years and older who self-identified as AIAN were eligible to participate in TASP. Participants were excluded if they indicated their self-identified race was not AIAN, they were not at least 18 years of age, or if they had taken the Tribal Asthma Survey at another location or previous event. Participants were recruited from Indian



events such as Pow-Wows, Big Times, health fairs, and community gatherings throughout California over a seven-month period, from October 2009 through May 2010.

SURVEY INSTRUMENT

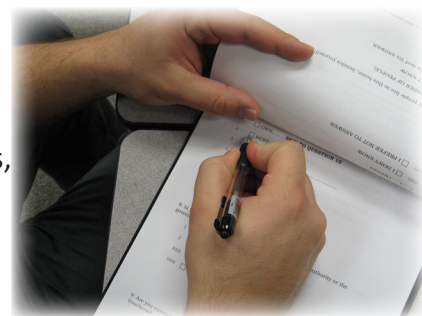
The survey instrument was created by CTEC in collaboration with the CDPH California Breathing staff. The majority of survey questions were derived from previously developed questionnaires used in

Indian country or surveys developed and tested for asthma or housing issues. Survey topics included asthma and asthma symptoms for adults in the home, potential allergens in housing, demographic variables, health conditions, and perceptions of home and community health environments. Questions were also asked about children in the household and their asthma status, and were completed by adults taking the survey.

The final version of the TASP survey consisted of 97 questions. The survey instrument was completely anonymous – names and other personally identifiable information were not included. Most participants completed the survey in about 20 minutes.

SURVEY ADMINISTRATION

Events were chosen according to the likelihood of AIAN populations being present at the events, timeline, geography, and feasibility of the survey being administered at



such an event. Two events were not attended because event organizers deemed a survey would not be appropriate. Other events were either too close in proximity to each other and the overlap of participants was likely (i.e., the California State University Long Beach (CSULB) Pow-Wow and the University of California, Los Angeles (UCLA) Pow-Wow), or did not occur during the project time frame.

While one-on-one interviews were preferred for administering the survey and collecting data, in-person interviews were deemed unfeasible due to staff and time limitations. Thus in order to maximize participation, and since only two staff members were available to administer surveys per event, surveys were self-administered rather than orally-administered by a trained interviewer.

METHODS

INCENTIVES

After turning in a completed survey, participants received a gift card in the amount of \$15 for Target, Safeway Grocery Stores, Vons Grocery Stores, or Shell Gas Station.

HEALTH EDUCATION MATERIALS

Six free health education materials on asthma were available to all TASP participants and event attendees. Two of the health education materials [*Myths about Asthma* and *Guidelines for an Asthma Friendly Home*] were from the California Breathing/Starlight-Starbright Children's Foundation Asthma Tool Kit for Schools, and were adapted to be culturally-competent and Indian-specific. Three of the health education materials were provided by Blue Shield of California [*Asthma Home Checklist*, *Your Asthma Action Plan*, and *Living With Asthma – A DVD*], and one was from the Minnesota Department of Public Health [*Asthma Triggers*].

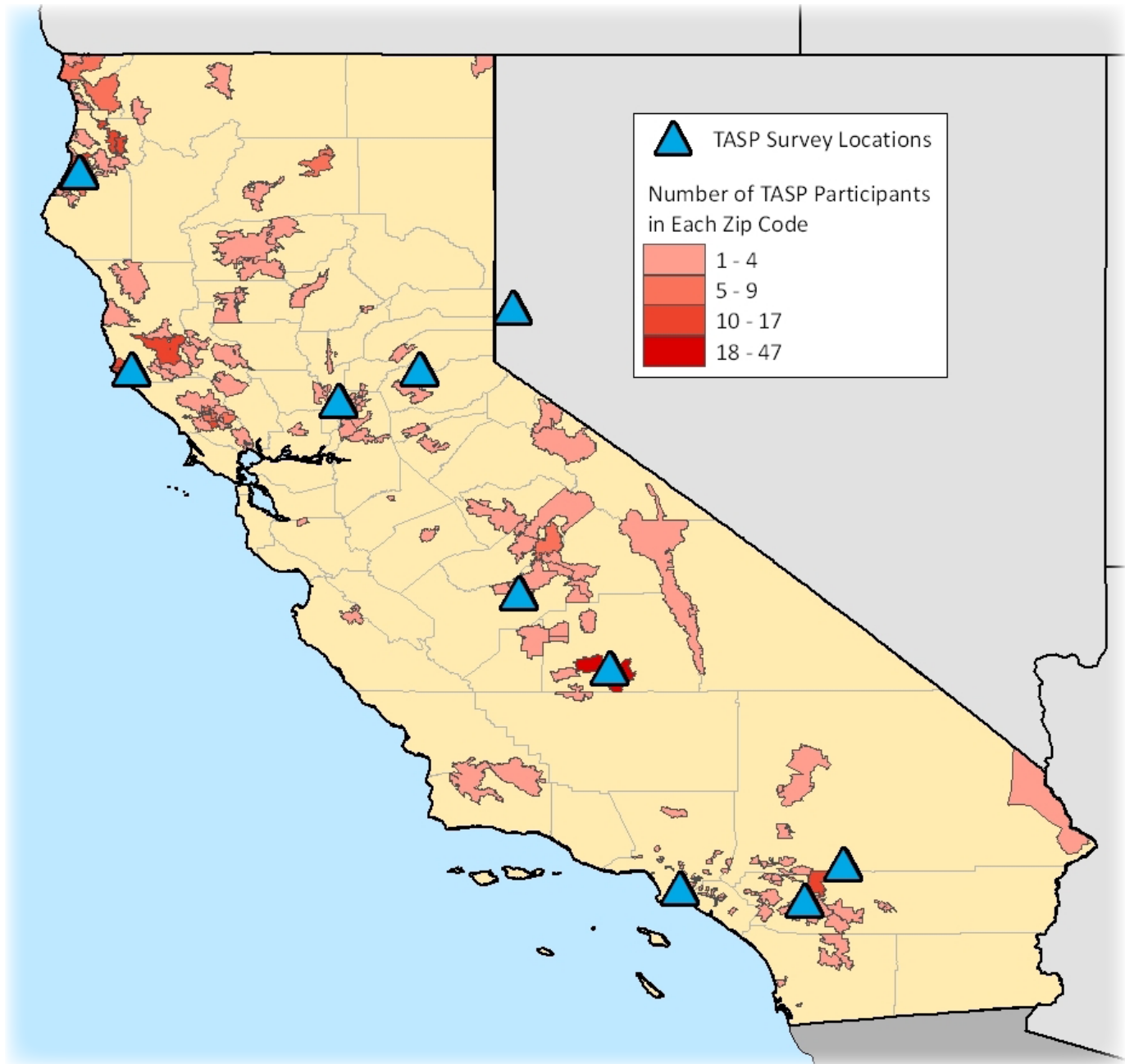


STATISTICAL ANALYSIS

Statistical Analysis Software (SAS) version 9.2 was used to analyze data. To address our first aim, determine the prevalence of self-reported asthma, we included all participants (n=607). Asthma was defined as answering “yes” to the question “Have you ever been told by a doctor or other health professional that you have asthma?” For our second aim, examine the relationship between housing conditions and asthma, we excluded participants who were homeless or living in a van or vehicle (n=588). All statistical models were adjusted for age and smoking status, and stratified by gender. We used prevalence ratios and 95% confidence intervals to determine the strength of the association between housing conditions and asthma.

RESULTS

Over the course of 7 months, TASP staff attended 10 Indian events in locations across the state (see map below). Across these 10 events, a total of 607 surveys were collected, exceeding the original goal of 450.



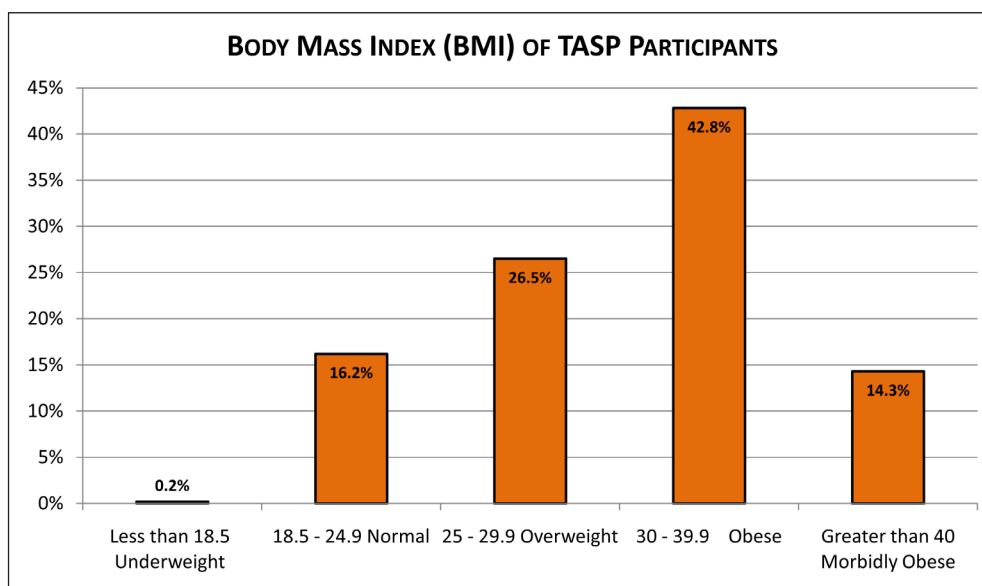
Note: The event in Reno, NV was a California-specific meeting.

RESULTS

CHARACTERISTICS OF THE TASP PARTICIPANTS

The majority of the TASP sample was female (65%) and lived in California (96%). The average age was 42 years, the average Body Mass Index (BMI) was 32 (which is classified as being obese), and 57% reported they had greater than a high school education.^a Of those who reported their smoking habits, 23% were current smokers (n=142), 20% former smokers (n=123), and 49% had never been a smoker (n=297).

Characteristics of TASP Participants	Percent
Female	65%
Living in California	96%
Greater than high school diploma	57%
Currently Employed	49%
Current Smoker	23%



The TASP population demographics were compared to 2000 California Census data. The average per capita income for AIAN statewide in 1999 was \$15,226, while 33% of TASP household incomes in the past year were \$20,000 or less (in 2009/2010). More than half (57.6%) of California AIANs are under the age of 35, whereas the average age of the TASP population was 42 years. Only 22% of the TASP population indicated Hispanic or Latino ethnicity, compared to 46% of California AIAN.

Comparing TASP Participants to California AIAN	TASP	CA AIAN
Labor force: work in management or professional occupations	35%	28%
Labor force: service occupations	21%	18%
Labor force: production, transportation, material moving	7%	14%
Does not have a high school diploma	14%	26%
Has a Bachelor's degree	12%	16%
Hispanic or Latino	22%	46%

CA AIAN Source: Census 2000

^a Mean Age: 42.4 years, standard deviation: 15.6 years. Mean BMI: 32.0, standard deviation: 7.4

RESULTS

HOUSING CHARACTERISTICS OF TASP PARTICIPANTS

Over half of participants (58%) reported they lived in a 1-family house. For TASP participants who lived in a home or apartment (n=588), 29% (n=162) lived on a reservation or Rancheria, and 40% (n=225) were homeowners. Almost half (49%, n=287) had at least one pet with fur or feathers living indoors in the past 6 months. In the past 30 days, 12% (n=66) had seen a cockroach in their home and 15% (n=85) had seen a mouse or rat in the home. Over a quarter of participants (29%, n=157) had smelled mold, and 28% (n=151) had seen mold greater than the size of a dollar bill (not including mold found on food) in their home in the past 30 days. Over 45% (n=245) had experienced water or dampness in their home from broken pipes, leaks, heavy rains, or floods.

Housing Characteristics of TASP Participants	Percent
Lives on a Reservation/Rancheria	29%
Lives in a single family house	58%
Lives in a mobile home/trailer	12%
Homeowner	40%
Renter	53%
<i>Home owned by public housing authority</i>	16%
Used bleach to clean home	70%
Used pesticides or chemicals to kill plant, animal, or insect pests inside the home ¹	28%
Used pesticides or chemicals to kill plant, animal, or insect pests in the yard or garden ¹	35%
At least one pet (with fur or feathers) living in home ²	49%
Seen a cockroach in home ³	12%
Seen a mouse or rat in home ³	15%
Ever experienced water or dampness in home from broken pipes, leaks, heavy rains, or floods	45%
Seen mold in home ³	28%
Smelled mold in home ⁴	29%

Results presented are for participants who lived in a house, duplex, apartment, townhouse, condo, trailer or mobile home (n=588). Missing answers are not included in percentages.

¹ At least 1 time in the past 12 months

² In the past 6 months

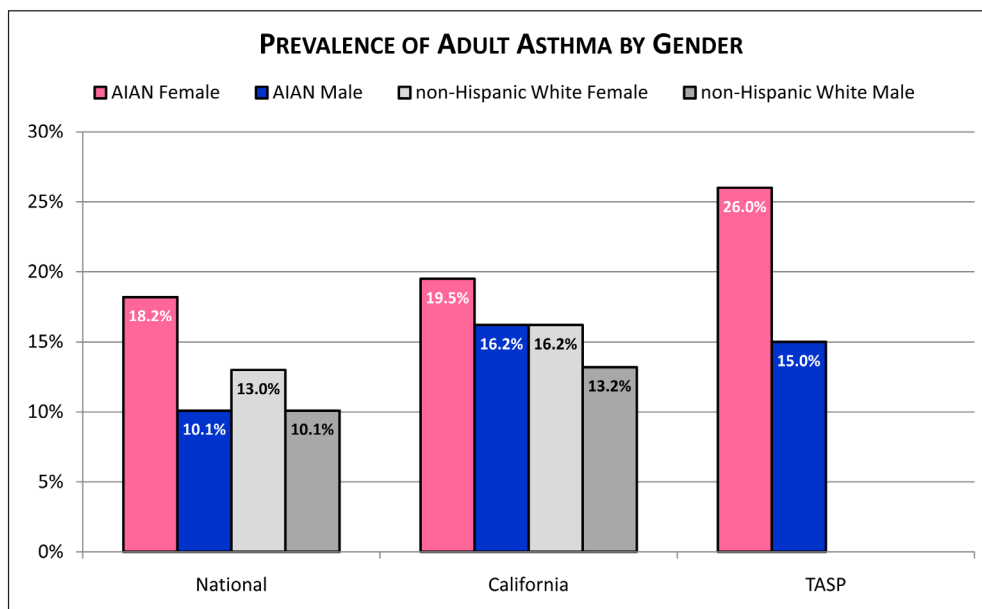
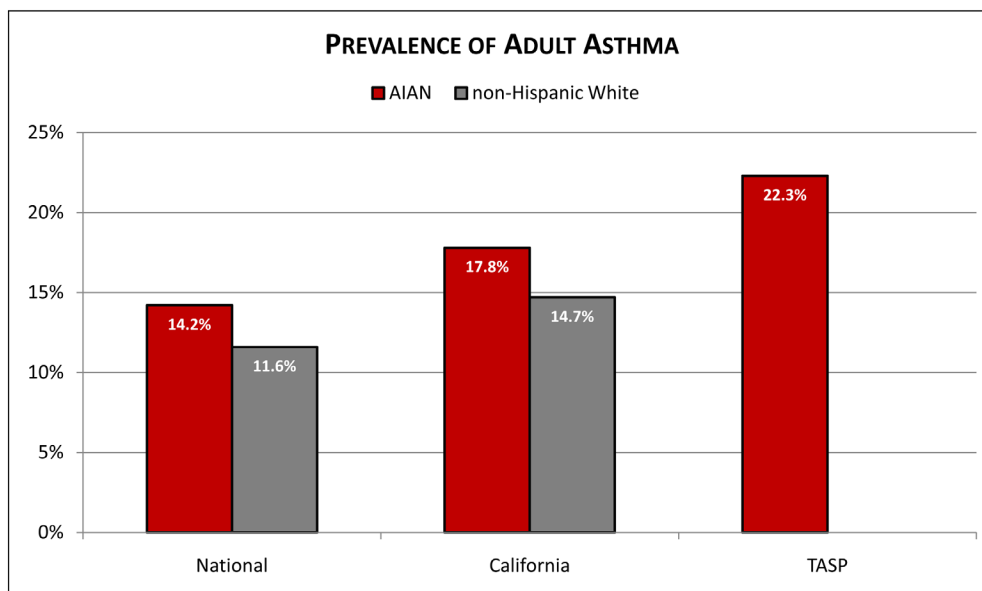
³ In the past 30 days

⁴ In the past 30 days, greater than the size of a dollar bill, not including mold found on food

RESULTS

ASTHMA IN THE TASP POPULATION

The prevalence of asthma for California AIAN is greater than the national prevalence for both AIAN and Whites. From 2004-2008, the national prevalence of asthma was 14% for AIAN and 12% for non-Hispanic Whites. For both AIAN and non-Hispanic White males the prevalence was 10%, respectively; for females it was 18% and 13% for AIAN and non-Hispanic Whites, respectively.³⁰ Of TASP participants, 22% (n=129) had been diagnosed by a doctor or other health professional with asthma; 15% of males and 26% of females.



California data: California Health Interview Survey (CHIS). Years 2005 and 2007. Adults 18+. Any mention of AIAN (self-reported) and non-Hispanic Whites.

National data: National Health Statistics Report, #20, March 2010. Health Characteristics of the American Indian or Alaska Native Adult Population, 2004-2008. Patricia M. Barnes, M.A.; Patricia F. Adams; and Eve Powell-Griner, Ph.D. Non-Hispanic AIAN and non-Hispanic Whites.

RESULTS

Twenty-two percent (n=129) had been diagnosed by a doctor or other health professional with asthma. Of those, 78% were female, the average age was 45, and 76% still had asthma.^b The average age of diagnosis was 27 years.^c For those who had been diagnosed before the age of 18, the average age of diagnosis was 10 years; for those diagnosed when they were 18 or older, the average age of diagnosis was 38 years.^d Half of the participants (50%) reported that their asthma had been made worse by workplace conditions. The average number of days that participants reported symptoms (defined as coughing, wheezing, shortness of breath, chest tightness, or phlegm production without a cold or respiratory infection) in the past 30 days was 9.^e Reporting symptoms of asthma more than 8 days of the past 30 days corresponds to asthma that is not well-controlled. The prevalence of asthma in children under the age of 18 living in a survey participant's home was 21%. Of children who had been diagnosed with asthma, 79% still had asthma. In the past 12 months, 71% of children diagnosed with asthma had symptoms, taken medication, or seen a doctor for their asthma.

Asthma in the TASP Population	Percent
Diagnosed with asthma	22%
<i>Still has asthma</i>	76%
Asthma made worse by smoke, fumes, dust, or chemicals in the workplace	50%
Missed at least one day of work or school due to asthma ¹	17%
Visited emergency room for asthma at least once ¹	23%
Activities limited due to asthma ²	72%
Has asthma and is a current smoker	27%

¹ In the past 12 months

² Reported activities were limited a little, a moderate amount, or a lot, in the past 12 months

Asthma in Children of TASP Participants	Percent
Diagnosed with asthma	21%
<i>Still has asthma</i>	79%
<i>Had symptoms, taken medication, or seen a doctor for their asthma¹</i>	71%

¹ In the past 12 months

POTENTIAL DETERMINANTS OF ASTHMA

After adjusting for age and smoking status, the **prevalence of asthma in women was 1.85 times as high for those who had seen mold greater than the size of a dollar bill (not including mold found on food) in the past 30 days, and 1.52 times as high for those who had smelled a moldy or musty odor in their home in the past 30 days**, compared to those who had not seen or smelled mold in their home.^f The **prevalence of asthma in women was 1.70 times as high for those with pets with fur or feathers in the home in the past six months** compared to those who did not report these pets.^g **Asthma prevalence in women was 1.68 times as high in those with homes where pesticides or chemicals to kill plant, animal or insect pests in the yard or garden had been used at least once in the past 12 months**, compared to those who did not.^h In men, only smelling mold or a musty odor in the home in the past 30 days was associated with asthma prevalence.ⁱ No associations between socioeconomic status and asthma were observed in men or women.

^b Mean age: 44.5 years, standard deviation: 15.4 years.

^c Mean age of diagnosis with asthma: 26.8 years, Standard Deviation (SD): 17.8 years.

^d Mean age of diagnosis with asthma for those diagnosed younger than 18 years old: 9.5 years, SD: 5.5 years. Mean age of diagnosis with asthma for those diagnosed at age 18 or older: 38.0 years, SD: 13.5 years.

^e Average number of days with symptoms of asthma: 9.2, SD: 10.3, Median: 4.0, Mode: 2.

^f Seen mold: Prevalence ratio (PR): 1.85, 95% Confidence Interval (CI): 1.27, 2.68. Smelled mold: PR: 1.52, 95% CI: 1.05, 2.20.

^g PR: 1.70, 95% CI: 1.18, 2.47

^h PR: 1.68, 95% CI: 1.08, 2.60

ⁱ PR: 2.46, 95% CI: 1.13, 5.39

DISCUSSION

The prevalence of asthma in the TASP population was higher than previous estimates for AIAN and other races/ethnicities in both California and nation-wide surveys. Asthma risk factors, such as the presence of pets with fur or feathers, the presence of mold or a musty odor, and outdoor pesticide use were found in many TASP households. The prevalence of work-related asthma was high, as was the occurrence of asthma that was not well controlled. Results of this survey can be used to empower tribes to determine program priorities, direct program planning, and develop new policies and culturally appropriate intervention strategies.

STRENGTHS

Asthma and housing condition data for California AIAN were collected extensively for the first time, providing an important foundation for future research in this field. Results of this study can empower tribes and tribal partners to determine program priorities, direct program planning, develop new policies and culturally appropriate intervention strategies.

Word-of-mouth was a key component in recruiting survey participants. Upon completion of the survey, several people informed their respective networks of the survey and incentive opportunity. A majority of participants were recruited in this manner. However, this is also a potential weakness, as individuals in the same social network may have similar exposures and/or disease status.

The \$15 gift cards proved to be a strong incentive for Indian event attendees to participate in TASP.

Sharing personal stories of asthma and housing conditions. Upon completion of the survey, several participants had anecdotal stories to tell regarding their experience with asthma, whether they, a friend, or a family member had suffered from the condition. Several participants related their experiences with attempting to obtain medical care for their asthma with little success. Many commented that the survey “really made them

think” about asthma and potential housing allergens as precipitators of asthma morbidity.

Free, culturally-specific health education materials on asthma, asthma morbidity, and the home environment were available to all event attendees. Materials were well-received by several event attendees and TASP participants.

LIMITATIONS

The study population was a sample of convenience. California has 108 federally recognized tribes and approximately 50 tribes seeking federal recognition or reinstatement – not all of these tribes were represented in TASP. Convenience samples result in findings that cannot be generalized to the entire population.

Non-California residents were included (n=24; 4%). However, results did not change when non-California residents were removed from analysis. Non-California residents were retained in the sample because there are a small number of reservations in California that extend into Arizona and a small number of Indian communities that are near the borders of Nevada and Oregon.

The time frame of the project. Many California AIAN cultural events happen between the months of May and October. Several events were missed due to the time frame in which funding was available (October – June). In addition to administering the survey, other activities such as creating the survey instrument and entering, cleaning, and analyzing the data took place during the project period between October 2009 and June 2010.

Self-identified AIAN were eligible to participate. Staff administering the survey at cultural events did not require or check tribal enrollment cards or Certificates of Degree of Indian Blood (CDIB) papers from the Bureau of Indian Affairs (BIA). Since approximately 50 tribes in California are not federally recognized and are seeking restoration or recognition, it was likely individuals from these tribes

DISCUSSION

would not have tribal enrollment cards. Additionally, in California, descendants of Indians on the 1852 California Census Rolls are eligible for health care benefits from the Indian Health Service, regardless of their tribal federal recognition status.

RECOMMENDATIONS

Mold is a known trigger for aggravating asthma. In TASP homes, 45% of participants had experienced water or dampness from broken pipes, leaks, heavy rains, or floods. Further, 28% had seen mold in the home and 29% had smelled mold in the home.

Education, training, and policy efforts on controlling mold in the home would be beneficial to this community, as those who had seen or smelled mold in the home were more likely to have asthma than those who had not seen or smelled mold.

Many participants expressed gratitude after completing the survey, explaining it had “opened their eyes” to asthma triggers in their home.

Educational efforts tailored to the AIAN community in California would likely be welcome. **Culturally competent educational efforts focused on having an asthma-friendly home** may assist AIAN community members in reducing home asthma triggers.

Of the TASP population, 29% lived on a reservation or Rancheria and 53% were renters. **Tribal housing policies** can differ from more common housing policies, and because the majority of the community **do not own their home**, occupants potentially have little control over housing structure and repair work. Thus, **outreach efforts to tribal housing authorities and property owners** in Indian communities can also help to promote policy changes in providing asthma-friendly homes.

When asked about asthma symptoms in the past 30 days, the average number of days that respondents reported symptoms (defined as coughing, wheezing, shortness of breath, chest tightness, or phlegm production without a cold or respiratory infection) was 9. Reporting symptoms of asthma more than 8 days in the past 30 days corresponds to **asthma**

that is not well controlled.¹ It is concerning that, on average, asthma is not well-controlled in the TASP population. **Educational efforts directed at health care professionals on asthma management** may benefit the California AIAN population with asthma.

Half (50%) of the TASP participants with asthma reported that their asthma had been caused or made worse by workplace conditions.

Unfortunately, doctors and other health professionals often fail to ask about workplace conditions when caring for adult patients with asthma. There are specific recommendations for doctors when they see an adult patient who has work-related asthma, including advocating to the patient’s employer to modify workplace conditions to make them safer for the patient (for example, eliminating chemicals or cleaning products used, or switching job tasks or locations for the employee). Doctors and health professionals should also help a patient file for workers’ compensation, if this is merited, and reassure patients that it is illegal for employers to take retribution for reporting a work-related illness. **Educational efforts for Tribal Health Program doctors and other health professionals on occupational health problems related to asthma would be beneficial to this community.**

FUTURE RESEARCH RECOMMENDATIONS

While the TASP study had participants throughout California, including several counties with high AIAN populations, and included both rural and urban AIAN, **the study may not be representative of the exceptionally diverse AIAN population in California.** More research is needed on asthma status, asthma morbidity, and housing conditions for California AIAN.

Due to time limitations and funding constraints, TASP was not able to conduct **face-to-face interviews.** While face-to-face interviews may potentially result in respondents being less honest about sensitive questions, they can help increase the number of questions answered correctly, reduce errors associated with skip-patterns, and increase the

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overall quality of survey responses received. Future surveys at tribal events would benefit from face-to-face, rather than self-administered surveys.

Many participants commented after completing the survey about **barriers they faced in receiving effective asthma services**, including methods for controlling their asthma symptoms. Many participants also commented on tribal policies or policies in their housing situation they faced that were beyond their control but could aggravate asthma or allergies (such as cigarette smoke from other apartments and trash being burnt near windows). **Conducting focus groups** to help identify perceived and/or actual barriers in controlling asthma symptoms, receiving effective medical care, and improving housing conditions and/or housing policies could help inform future interventions targeting the prevention of asthma and allergens in housing. Further, advocating for changes at clinics and housing authorities can help encourage the **adoption of policies that are more asthma-friendly**.

THE COST OF ASTHMA

The cost of asthma to the AIAN population in California cannot be accurately estimated with the TASP survey, but days of productivity lost in the workplace as well as potentially preventable hospitalization stays can help direct future analysis for the true cost of asthma. According to CHIS (2007), 29% of AIAN children in California missed at least 1 day of school due to asthma. In the adult TASP population who had been told by a doctor or other health professional that they had asthma (n=131), 17% had missed at least 1 day of school or work in the past 12 months due to asthma. Over 72% of those with doctor-diagnosed asthma reported that their usual activities had been limited due to asthma in the past 12 months. In 2003, one study found that hospitalizations and avoidable hospitalization rates were higher for the AIAN population served by California Tribal Health Programs than the non-Indian general population. After adjusting for age, hospitalizations were 72% higher for men and 52% higher for women, and the

comparable ratios for avoidable hospitalizations were 136% higher for men and 106% higher for women.³² In the TASP population almost 23% had visited the emergency room at least once in the past 12 months for asthma-related reasons. The **loss of productivity in the workplace as well as preventable hospitalizations due to asthma** deserve further research to accurately estimate the true “cost” of asthma in the California AIAN population.

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REFERENCES

1. National Heart Lung and Blood Institute: National Asthma Education and Prevention Program. Expert panel report 3: guidelines for the diagnosis and management of asthma—full report 2007 [Internet]. U.S. Department of Health and Human Services, National Institutes of Health 2007; www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf.
2. Meng YY, Babey SH, Hastert TA, Brown ER. California's racial and ethnic minorities more adversely affected by asthma. Policy Brief UCLA Cent Health Policy Res 2007(PB2007-3):1-7.
3. Behavioral Risk Factor Surveillance System. Ever told has asthma. Multiracial race categorization. Geography: California. 2005(www.cdc.gov/brfss).
4. Strachan D. Damp housing and childhood asthma: validation of reporting of symptoms. British Medical Journal 1988;297:1223-1226.
5. Williamson IJ, Martin CJ, McGill G, Monie RDH, Fennerty AG. Damp housing and asthma: a case-control study. Thorax 1997;52:229-234.
6. Strachan DP, Sanders CH. Damp housing and childhood asthma; respiratory effects of indoor air temperature and relative humidity. J Epidemiol Community Health 1989;43:7-14.
7. Billings CG, Howard P. Damp housing and asthma. Monaldi Arch Chest Dis 1998;53(1):43-49.
8. Dekker C, Dales R, Bartlett S, Brunekreef B, Zwanenburg H. Childhood asthma and the indoor environment. CHEST 1991;100(4):922-926.
9. Maier W, Arrighi H, Morray B, Llewellyn C, Redding G. Indoor risk factors for asthma and wheezing among Seattle school children. Environ Health Perspect 1997;105(2):208-214.
10. United States Department of Housing and Urban Development. Controlling and Preventing Household Mold and Moisture Problems: Lessons Learned and Strategies for Disseminating Best Practices. <http://www.hud.gov/offices/lead/library/hhts/report040105.pdf> 2005.
11. Stevenson LA, Gergen PJ, Hoover DR. Sociodemographic correlates of indoor allergen sensitivity among United States children. J Allergy Clin Immunol 2001;108:747-752.
12. California Health Interview Survey. Questions: Do you allow dogs in the home; Do you allow cats in the home? Adults 18+. non-Hispanic AIAN. www.askchis.com 2003.
13. Rauh VA, Chew GR, Garfinkel RS. Deteriorated housing contributes to high cockroach allergen levels in inner-city households. Environ Health Perspect 2002;110(2):323-327.
14. Cloutier M, Wakefield D, Hall C, Bailit H. Childhood Asthma in an Urban Community. CHEST 2002;122(5):1571-1579.
15. Crain E, Walter M, O'Connor G, Mitchell H, Gruchalla R, Kattan M, Malindzak G, Enright P, Evans R, Morgan W, Stout J. Home and Allergic Characteristics of Children with Asthma in Seven U.S. Urban Communities and Design of an Environmental Intervention: The Inner-City Asthma Study. Environmental Health Perspectives 2002;110(9):939-945.
16. California Health Interview Survey. Question: In the past 12 months, have you seen cockroaches inside your home? Adults 18+. non-Hispanic AIAN and non-Hispanic Whites. www.askchis.com, 2003.
17. Michel O, Kips J, Duchateau J, Vertongen F, Robert L, Collet H, Pauwels R, Sergysels R. Severity of asthma is related to endotoxin in house dust. Respiratory and Critical Care Medicine 1996;154(6):1641-1646.
18. Gent J, Belanger K, Triche E, Bracken B, Beckett W, Leaderer B. Association of pediatric asthma severity with exposure to common household dust allergens. Environmental Research 2009;109(6):768-774.
19. Gilmour M, Jaakkola M, London S, Nel A, Rogers C. How Exposure to Environmental Tobacco Smoke, Outdoor Air Pollutants, and Increased Pollen Burdens Influences the Incidence of Asthma. Environmental Health Perspectives 2006;114(4):627-633.

REFERENCES

20. Boulet L, Lemiere C, Archambault F, Carrier G, Descary M, Deschesnes F. Smoking and Asthma: Clinical and Radiologic Features, Lung Function, and Airway Inflammation. *CHEST* 2006;129(3):661-668.
21. California Health Interview Survey. Question: Current Smoking Status (created from multiple smoking question variables). Adults 18+. non-Hispanic AIAN and non-Hispanic White. www.askchis.com 2005 and 2007.
22. California Health Interview Survey. Question: Which statement best describes the rules about smoking inside your home? Smoking is: 1. never allowed inside, 2. allowed in some places or at some times, 3. allowed anywhere and anytime inside the home. www.askchis.com 2005.
23. Boman BC, Forsberg AB, Järholm BG. Adverse health effects from ambient air pollution in relation to residential wood combustion in modern society. *Scand J Work Environ Health* 2003;19(4):251–260.
24. Folkerts G, Busse W, Nijkamp F, Sorkness R, Gern J. Virus-induced Airway Hyperresponsiveness and Asthma. *Respiratory and Critical Care Medicine* 1998;157(6):1708-1720.
25. Assessment of American Indian Housing Needs and Programs: Final Report. US Department of Housing and Urban Development, May 1996.
26. United States Census Bureau. American Factfinder: Summary File 2, 2000.
27. United States Congress. Federal Register. Vol. 74 (153);40218-40223.
28. National Tribal Healthy Homes Environmental Health Risks in Indian Country Housing http://tribalhealthyhomes.org/about_us.htm.
29. California Tribal Epidemiology Center. American Indian Community Health Profile. www.crihb.org/ctec 2009.
30. Barnes P, Adams P, Powell-Griner E. Health Characteristics of the American Indian or Alaska Native Adult Population: United States, 2004 - 2008. In: Reports. NHS, ed. 20 ed, March 9, 2010.
31. Lutzker LA, Rafferty AP, Brunner WM, Walters JK, Wasilevich EA, Green MK, Rosenman KD. Prevalence of work-related asthma in Michigan, Minnesota, and Oregon. *J Asthma* 2010;47(2):156-161.
32. Korenbrot CC, Ehlers S, Crouch JA. Disparities in hospitalizations of rural American Indians. *Med Care* 2003;41(5):626-36.

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