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AAPI Almanac

Preferred Language and Asthma among Asian Americans

Cecilia Chen, Doug Brugge, Alice Leung, Andrea Finkelman, Weibo Lu, and Will Rand

Abstract

Little is known about childhood asthma rates and severity in the Asian American population in the U.S. We screened convenience samples of recent Chinese immigrants and longtime Asian Americans using the Brief Pediatric Asthma Screen (BPAS) in Boston Chinatown. Our goal was to conduct an exploratory study that helped develop methodology for researching asthma in Chinese immigrant populations. About 15 percent of the children surveyed were reported to have doctor-diagnosed asthma. Over 18 percent had possible undiagnosed asthma as scored via a modification to the BPAS that was likely to increase responses consistent with undiagnosed asthma. The CDC estimates that 8.7 percent of children have a lifetime diagnosis of asthma. Studies examining asthma in children have consistently found that asthma rates are higher among children living in urban communities of color, which is reflected in this study's findings. The only statistically significant predictor of asthma diagnosis in a logistic regression model was taking the survey in Chinese ($p<0.001$; $R^2=0.62$) suggesting that acquisition of English is an important factor. We note that there are difficulties associated with translation of the word "wheeze" into Chinese and discuss the problems associated with this key term in the BPAS. Finally we report data from a separate survey of housing conditions in Boston Chinatown. Housing conditions known or suspected to aggravate asthma were reported by respondents to be infrequent. More research is needed to distinguish true difference in prevalence from differential diagnosis of asthma.

Introduction

In 2002, 16 million, or 7.5 percent, of adults in the United

States had been diagnosed with asthma (CDC 2004). In 2001, the Centers for Disease Control estimated that 8.7 percent of children had a lifetime diagnosis of asthma (CDC 2001). In addition, it is reported that 4 million children have had an asthma attack in the past twelve months (CDC 2004). However, childhood asthma has been found to occur in lower rates among children in developing as compared to developed countries. A study by the International Study of Asthma and Allergies in Childhood Steering Committee found high prevalence of self-reported asthma symptoms (not directly comparable to diagnosed asthma) in countries like the United States (20-25 percent), Australia (25-35 percent) and the United Kingdom (25-35 percent), but lower prevalence in less developed countries such as Indonesia (<5 percent), China (about 5 percent), and Mexico (<10 percent) (ISAAC 1998).

Asthma rates have been found to be higher among minority children than white children in the U.S. The Asthma Regional Council Report on Childhood Asthma in New England found that rates of asthma among Hispanic (17.5 percent) and Black (17.6 percent) children were higher than among White children (11.4 percent) (New England Asthma Regional Council 2004). Studies examining asthma in children have consistently found that asthma rates are higher among children living in urban communities of color. A study by Findley, et al. in 2003 reported that Puerto Rican children living in East Harlem had higher rates of asthma (35 percent) than the national average (23 percent) (Findley 2003).

Studies of childhood asthma in the United States have largely followed the Black-White paradigm, and only recently have been incorporating the Latino community in studies. For the most part, Asian Americans have not been included in studies on childhood asthma; as a result, there is very little documentation of asthma rates or severity of asthma among Asian American children.

In 2003, a study on asthma prevalence among inner-city Asian American children in Boston noted that those Asian American children who lived in Chinatown had lower rates of asthma than other inner-city children attending the same school. The study found that 12.4 percent of children living in Chinatown reported diagnosed asthma as compared to 21 percent of other children in the survey. Similarly, 14.5 percent of children with an Asian surname were reported to have diagnosed asthma, compared to 22.2 percent of other children (Lee et al. 2003). There are a several pos-

sibilities that could explain these rates: One possibility is that due to limited access to healthcare, Chinatown residents were less likely to be diagnosed by a physicians. Another possibility is that because Chinatown is a predominantly immigrant community, the development of childhood asthma may be somehow related to the length of time in the United States. Another possibility is that Asian American children are less exposed to environmental factors that increase the risk of asthma (Lee 2003).

In 2000, Greater Chinatown was estimated to have a population of approximately 13,000. Roughly 44 percent of the Greater Chinatown residents are Asian or Pacific Islander. Nearly half of the residents are foreign-born, and half of the foreign born residents entered the United States after 1990. Only 3 percent of residents were under eighteen years old. The ability to speak English is closely correlated with age. Elderly residents and children are mostly likely to not speak English well (Liu and Raymond 2004).

While these numbers give a general idea of Chinatown's demographics, studies and reports vary on the boundaries of Chinatown leading to different findings. In 2000, "Core" Chinatown was 69 percent Asian and 65 percent Chinese (personal communication, Greg Perkins, Boston Housing Authority, June 4, 2004). A 2004 study on the Health Status of Asian Boston Residents found that 92 percent of the Chinese residents speak a language other than English at home while only 8 percent speak English at home (Auerbach 2004).

A study conducted in Melbourne, Australia provides reason to believe that the length of time after immigration to a developed country affects asthma prevalence. The study, conducted in 1994, found that Asian immigrants had lower rates of asthma than Australian-born non-Asians and Australian-born Asians (Leung 1994). Using length of time since immigration, the Melbourne study suggested that the development of asthma in children might be related to acculturation.

The study reported here began as a follow-up to Lee's 2003 study on the prevalence of asthma among Asian American schoolchildren. We sought to develop methodology and conduct a pilot study on the relationship between the development of asthma among Asian American children and characteristics that might be indicative of degree of acculturation (language, place of residency, etc.).

Methods

Survey Instrument

The survey consisted of nineteen questions, five of which were the Brief Pediatric Asthma Screen (BPAS) (Wolf 1999). These five questions were used to determine whether or not a child's parent reported that the child had diagnosed asthma, possible undiagnosed asthma or was likely not asthmatic. An affirmative answer to the question, "Has your child ever been diagnosed with asthma by a doctor?" was categorized as "diagnosed asthma." For respondents who answered "no" to the question of diagnosed asthma, the remaining four questions were used to assign a designation. An affirmative answer to the question, "in the *last 12 months*, has your child been to a doctor, an emergency room, or a hospital for wheezing" was categorized as "undiagnosed asthma." If the respondent answered, "yes" to two or more other three questions, the child was also categorized as having possible undiagnosed asthma.

The other three questions were: (1) "Has your child ever had episodes of wheezing (whistling in the chest) in the *last 12 months?*"; (2) "In the *last 12 months*, have you heard your child wheeze or cough during or after active play?"; and (3) "Other than a cold, in the *last 12 months*, has your child had a dry cough at night?" The translators deemed the translation of wheezing difficult, so the surveyor demonstrated wheezing. However, the demonstration more closely resembled "labored breathing."

The survey also asked demographic questions about the child's age, sex, and neighborhood of residence. Parents were asked whether the child was born in the United States, where they had immigrated from if they had immigrated, and how long the child has been in the United States. Another question asked how long the child had lived in Boston Chinatown. One question asked about smoking within the family. We also asked about highest level of education of the parents as a code for socioeconomic status, and about allergies and family history of asthma. The survey was written in English, translated into traditional Chinese characters by bicultural, bilingual Mandarin speaker, and then back translated into English by bicultural, bilingual Cantonese speaker. Written characters for Cantonese and Mandarin are substantially the same. Disagreements were resolved by consultations among the translators.

Data Collection

This project originated as an undergraduate internship-directed study. The data obtained for this study was from an IRB-approved convenience sample. Oral consent was approved because data collection was anonymous. Two surveyors (authors CC and AL) set up in various locations in and around Boston Chinatown to collect surveys. Locations were chosen by trial and error, seeking parents who were willing to stop and take the survey. Poster-board signs and colorful aprons in English and Chinese were used to raise the visibility of the survey team. Collection locations included various residential complexes in Chinatown and events in Chinatown, such as the August Moon Festival and an Annual Banquet. Respondents were also recruited on the street in the business area of Chinatown. The majority of the English respondents were from the festival and banquet, whereas the majority of Chinese respondents were from various street locations and residential complexes.

While the surveyors approached prospective respondents, there was no pressure to take the survey if they expressed disinterest. The study was introduced as the "Chinatown Children's Health Survey" by Tufts University in order to minimize preferential recruitment of families that had asthmatic children. Respondents were required to have at least one child under the age of eighteen and be either the parent or legal guardian of that child. Grandparents and other relatives were not eligible to complete the survey because, in our estimation, they might not be as intimately aware of the child's health history. Respondents were informed that all responses and surveys would remain anonymous, that there was no stipend for completing the survey, and that the results of the survey would be reported back to the Chinatown community.

Respondents were allowed to choose whether to complete the survey in English or Chinese. One author conducted surveys only in English (CC), the other collected surveys primarily in Cantonese and occasionally in Mandarin (AL). Participants had the option of completing the survey themselves or having the questions read to them by the surveyors and answers were recorded by the surveyors. Completed surveys were organized by a numbering system. Each family was assigned a number, and surveys completed for multiple children were assigned a letter to denote that

they were part of a single family. Completed surveys were placed in a sealed envelope at the end of each day and kept in a secure location.

Data Management and Analysis

Data were double entered into MS Access®, and discrepancies between the two entries were resolved by reference to the hard copies of the surveys. Data were imported into SPSS (SPSS Inc., Chicago, Illinois, version 11), where they were analyzed using Chi-squared (or Fisher Exact for small sample sizes) for testing bivariate relationships and logistic regression for exploring multivariate relationships.

Results

The characteristics of the children, as reported by their parents are presented in Table 1. Surveys were completed for 121 children in seventy-one families. Parents of 15 percent of the children in the sample reported a diagnosis of asthma. Parents also reported that 37.8 percent of their children had been diagnosed with allergies. Summation of questions that indirectly assessed asthma (using a "labored breathing" demonstration in place of wheezing for Chinese speakers) showed that 18.6 percent of the children in the survey had possible undiagnosed asthma. Twenty point seven percent of boys were reported to have diagnosed asthma compared to 10 percent of girls. Eight point eight percent of boys were reported to have possibly undiagnosed asthma compared to 28.3 percent of girls. We also found that 20.8 percent of the children were reported to have other family members who had asthma.

Just shy of half of the children (48.7 percent) lived in Boston Chinatown or the adjacent neighborhood of the South End. Only 17.1 percent were not born in the United States, negating the value of analyzing data on length of stay in the U.S. About half (52.1 percent) of the parents chose to take the survey in Chinese. Few households (17.4 percent) had a smoker, and none of the mothers reported smoking during pregnancy. The mean age of the children was just above eight years; about half (49.6 percent) were female and 96.5 percent were Asian, with more respondents not answering the race/ethnicity question (eight missing responses) than for other questions. We offered only an option of choosing "Asian" when answering the race/ethnicity question, and there-

Table 1. Characteristics of children in the study as reported by their parents (N = 121).

	Percentage (Number Valid)
Child diagnosed with asthma	15.0% (120)
Child diagnosed with allergies	37.8% (119)
Child has possible undiagnosed asthma	18.6% (118)
Child's immediate family member has asthma	20.8% (120)
Lives in Boston Chinatown or South End	48.7% (119)
Child not born in the US	17.1% (117)
Parent took survey in Chinese	52.1% (121)
Has a smoker in the household	17.4% (121)
Mother smoked when pregnant with child	0% (121)
Mean age	8.25 years (121)
Female	49.6% (121)
Asian	96.5% (113)
Number of families	71

Table 2. Association between diagnosed and possible undiagnosed asthma and demographic factors in children in the study.

	Have Diagnosed asthma	Have Possible Undiagnosed Asthma	Statistical Significance
Child diagnosed with allergies (N = 44)	29.5%	27.3%	p = 0.25
Child's immediate family member has asthma (N = 24)	29.2%	12.5%	p = 0.14
Lives in Boston Chinatown or South End (N = 58)	6.9%	27.6%	p = 0.001
Child not born in the US (N = 20)	15.0%	15.0%	p > 0.99
Parent took survey in Chinese (N = 62)	4.8%	32.3%	p < 0.001
Has a smoker in the household (N = 21)	14.3%	23.8%	p = 0.63
Female (N = 60)	10.0%	28.3%	p = 0.005
Under 12 years of age (N = 28)	13.3%	20.0%	p = 0.27

fore we could not distinguish self-professed nationality (i.e., Chinese, Taiwanese, etc.).

We assessed differences in diagnosed and possible undiagnosed asthma across all of the variables in Table 1, except for mother smoking during pregnancy and race. Responses to smoking during pregnancy and race were too uniform to allow a comparison. Table 2 shows that in bivariate comparisons, children diagnosed with allergies, children not born in the U.S., and children with smok-

Table 3. Rates of reports (n = 55) of selected housing conditions at one housing development in Boston Chinatown. Many respondents to the asthma survey were approached outside this same development.

	Percentage
Child diagnosed with asthma	17.0%
Child diagnosed with allergies	17.0%
Chinese adult respondents	94.5%
Water leaked in apartment in last year	20.0%
Smelled mold in apartment in last year	9.9%
Apartment is drafty	70.9%
Apartment sometimes or always too hot during last heating season	52.8%
Apartment sometimes or always too cold during last heating season	87.2%
Has small problem with cockroaches	21.8%
Has small problem with mice	1.8%
Uses pesticides a few times a year	21.8%

ing in the household were as likely to have diagnosed asthma as possible undiagnosed asthma. Non-statistically significant trends toward an association were seen with age and family members with asthma. Small sample sizes (<30) limited power to statistically test some of these categories. Living in Boston Chinatown or the South End, parent taking the survey in Chinese, and sex were strongly associated with differences in rates of diagnosed and possible undiagnosed asthma in the sample population. Reanalysis of the data using only one sibling from each family resulted in qualitatively similar statistical findings, suggesting that family membership did not affect the analysis (data not shown).

We considered residence in Chinatown/South End, language the survey was taken in, and sex as predictors of diagnosed asthma in a forward stepwise binary logistic regression. The language in which the survey was taken emerged as the only statistically significant variable in the model ($p<0.001$; $R^2=0.62$). Choosing to take the survey in English was associated with higher likelihood of reporting diagnosed asthma. Residence in Chinatown/South End

(p=0.35) and Sex (p=0.11) were not statistically significant.

A second pilot survey was administered in the same timeframe by a medical student for her public health field experience. This survey assessed housing conditions in a single Chinatown housing development. There was likely some overlap between the two surveys, but we were unable to determine how much. Table 3 shows demographics of the housing survey sample and response rates for key questions. Respondents reported that 17 percent of their children had diagnosed asthma—a rate similar to the overall asthma survey, but below the rate for Chinatown/South End in the asthma screening survey. Allergy rates (also 17 percent) were lower than in the asthma screening. As with the asthma screen, most respondents were Chinese (94.5 percent).

Reported rates of water leaks were 20.0 percent, mold was 9.9 percent, drafty apartments were 70.9 percent, over-heating was 52.8 percent, and under-heating was 87.2 percent. No respondents reported moderate to high levels of pest infestation, but 21.8 percent reported small problems with cockroaches and 1.8 percent reported small problems with mice. Pesticide use was reported by 21.8 percent of respondents.

Discussion

The results of the asthma screening survey demonstrate that proficiency in the English language was the single-most important factor in determining whether Asian American children in our study population were reported to have diagnosed asthma. Prevalence of asthma was found to be higher in Chinatown/South End than other areas in or near Boston, but differences in prevalence were not statistically significant after taking language into account.

Possible undiagnosed asthma was found to be quite high. The Lee et al. study (2003), in contrast, found relatively low rates of possible undiagnosed asthma among Asian American schoolchildren from Boston. These contradictory findings may be explained by the possible role of interpretation of the word "wheezing" as translated into Chinese. In Lee et al. (2003), the survey was self-administered. The survey reported here was administered in person and used a "labored breathing" demonstration in place of "wheezing." In Lee et al. (2003), the survey used the professional term for "wheeze."

The difficulty that the surveyors had with the term "wheeze"

illustrates the problems with translation of the word. We are aware of three Chinese translations of the word "wheeze." Each roughly translates into "whistle" or "difficulty breathing." One translation 喉喘聲 is "a sound from the throat"□喘鳴(聲) is "a sound from difficulty breathing; and 哮鳴音 is the professional expression used in medical books.

A large international study (Crane et al. 2003) has reported a comparison of questionnaire responses with responses to a video that demonstrated wheezing. They found that the video demonstration increased apparent asthma prevalence. Further, they found that language was a significant factor in their analysis. While almost 40 percent of English speakers showed agreement between the written questionnaire and video, less then 20 percent of Chinese speakers showed agreement.

The findings of our survey also point to possible questions about the findings in the Melbourne study (1994), which found lower rates of asthma among Asian immigrants than Australian-born non-Asians and Australian-born Asians. If the findings of our study are accurate, then translation may be a factor in the diagnosis of asthma. It is, therefore, possible that rates of asthma increase post-immigration in part because of increased diagnosis rather than development of asthma *de novo*.

Besides issues of translation, asthma prevalence possibly might be affected by limited access to healthcare. A study by the Henry J. Kaiser Family Foundation noted that in 2001, 28 percent of U.S. citizens were uninsured, compared to 68 percent of resident non-citizens (KFF 2003). In Chinatown 27 percent of residents lived under the poverty line in 2000, which may affect access to healthcare.

We also reported here survey data on housing conditions for a different set of respondents from Boston Chinatown. We did so in the interest of beginning to explore environmental exposures that might lead children of recent immigrants to develop asthma. The housing conditions reported included exposures (such as cockroaches, mice and mold) for which there is evidence of association with developing asthma (IOM 2000). However, it is noteworthy that the rates of these factors in the Chinatown housing development were far lower than for housing developments that have been surveyed in other parts of Boston (Brugge et al. 2003).

While this study provided suggestive findings about asthma

prevalence in Asian American children, it is limited primarily by its size and generalizability. Because responses were from a convenience sample, the results are not generalizable to larger populations. Because we did not measure refusal rates, we cannot rule out selection bias. Another limitation is the small sample size, which allows us to see only particularly robust associations. Finally, because of the difficulty in the translation of the word "wheeze" and the demonstration of wheezing that more closely approximated "labored breathing," there is doubt about whether the English and Chinese surveys are really comparable and whether the validation of the English survey holds up in Chinese. Unlike "wheeze," for which we identified multiple translations, the word "asthma" appears to only have one word: "哮喘".

The results of this study, when compared to the earlier survey (Lee et al. 2003), raise important questions about the true prevalence of asthma in the Chinese immigrant community. The methodological lessons from this study have provided the basis for a follow-up study. This joint-study between Tufts University School of Medicine and the Chinatown-based South Cove Community Health Center included both the BPAS questionnaire and pulmonary function screening during the summer of 2004. The follow-up study also includes the video screening of Crane et al. (2003) that demonstrates wheezing, and we offered various interpretations of the word "wheeze."

This study begins to shed light on an important public health issue concerning Asian American children with asthma. Despite the small sample size and concerns about translation and cultural interpretation, this study suggests that cases of asthma are being missed because Asian American children who have asthma are not being diagnosed. For children who have been diagnosed, a better assessment of the incidence and prevalence of asthma in Asian American children will help to provide better clinical care. In the larger picture if we can understand why some populations develop asthma more than others, it will teach us something about the etiology of asthma.

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