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Evaluation of Risk Factors and a Community Intervention to Increase Control and Treatment of Asthma in a Low-Income Semi-Rural California Community

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Abstract

To better understand risk factors associated with current asthma in a low-income, ethnically diverse population, we analyzed pooled data from the 2004–2006 Behavioral Risk Factor Surveillance System survey conducted in Salinas, CA. We were particularly interested in modifiable risk factors, as the survey was conducted as part of a large community-based intervention that addresses asthma, obesity, and diabetes. We also conducted semi-structured interviews with key informants involved with the clinical, school, and community aspects of the intervention to inform the intervention's progress, and adapt practices and programs to reach those most in need. Of the 4925 adults in this analysis, 51% were Mexican-American and 32% lacked a high-school diploma; 227 women and 84 men had current asthma, and 194 were parents of children with current asthma; prevalences of 7.7%, 4.3%, and 7.0% respectively. Over 20% of women and men with asthma were current smokers and/or exposed to passive smoking, more than 50% reported less than the recommended 60 minutes or more of physical activity per day, and approximately 40% were obese or morbidly obese (42% of women and 36% of men compared to 26% of adults without asthma). Two of the strongest modifiable risk factors associated with current asthma and identified by the stepwise multiple regression models were: could not afford prescription medication(s) in the past 12 months (OR 2.5, $p < 0.001$ for adults with asthma, OR 1.8, $p < 0.01$ for parents of children with asthma) and morbid obesity (OR 3.4, $p < 0.001$ for adults with asthma). Among adults who reported one or more episodes of asthma in the past 30 days, 28% of women and 30% of men had not used a preventive medication, and 48% of women and 57% of men had not used a prescription asthma inhaler (20% had not used either). This study adds to the scarce body of literature on the prevalence of asthma and related risk factors in a predominately Mexican-American, semi-rural community, and illustrates how survey and key informant data can enhance knowledge of local study populations and guide interventions to improve asthma control and treatment.

Keywords

asthma; community intervention; BRFSS; Mexican-Americans; agriculture

Introduction

Few studies have examined risk factors for asthma in federally recognized medically-underserved areas. This is despite evidence that groups in these areas share a number of characteristics with groups at significantly higher risk for asthma. In the United States asthma is a highly prevalent chronic disease with approximately 30.2 million children and adults carrying the diagnosis (1, 2). A disproportionate burden of this asthma prevalence is experienced by ethnic minority populations and groups with low incomes and low educational attainment (3). Given the prevalence and potential risks associated with asthma, it is important to understand local-level risk factors associated with asthma in medically-underserved areas, which may differ from factors identified from U.S. samples and national surveys.

In this paper, we examine risk factors associated with current asthma in a community-based sample drawn from a federally recognized medically-underserved area. Data are from the Behavioral Risk Factor Surveillance System (BRFSS) conducted in Salinas, a semi-rural agricultural community in Monterey County, CA that is one of 23 sites funded by Centers for Disease Control and Prevention (CDC)'s Steps to a Healthier U.S. initiative (4, 5). We were particularly interested in modifiable risk factors that could be used to inform an ongoing 5-year intervention in Salinas that addresses asthma, obesity, and diabetes that is coordinated by the local Monterey County Department of Public Health.

A priority of the intervention is to reach the large, growing Mexican-American population that has low levels of education and is often without adequate health care coverage. To guide the beginning of the intervention, data from the Third National Health and Nutrition Examination Survey were analyzed to gain insight into the prevalence of asthma among Mexican-Americans and risk factors for asthma (6). This analysis found that prevalence of doctor-diagnosed current asthma was 9% for women and 4% for men aged 45–64, and 9% for children aged 14–17. Obesity increased the rate of asthma substantially—Mexican-American adults who were obese were 1.5 to 2.0 times more likely to be asthmatic than those who were not obese. Other studies have also shown a link between asthma and obesity; a study of 6038 primarily Mexican-American adults, aged 40 and over from Los Angeles, CA, found a 50% prevalence of obesity (BMI ≥ 30.0 kg/m²) among the sample population and a significant association between obesity and asthma after adjusting for age and sex ($p < 0.01$) (7).

Other population subgroups shown to be at high risk for asthma and in need of interventions are groups with lower incomes, lower educational attainment, female gender, African-American ethnicity (3, 8–11) and those who have been hospitalized for asthma (12–14). The physical environment also determines exposure to a range of asthma triggers (15–18). Again, these environmental risk factors exist to a greater extent among lower income populations. For example, findings from a home survey conducted with a sample of 644

low-income, Latino households in Salinas, CA showed that compared with representative national survey data from the U.S. Department of Housing and Urban Development, homes in the Salinas sample were more likely to have rodents, peeling paint, leaks under sinks, and much higher residential densities (15), all environmental factors associated with asthma.

Knowledge of modifiable asthma risk factors and their disproportionate prevalence in lower income populations were used to inform the asthma intervention and identify populations most in need. In addition, results of local level survey and key informant data were used to refine the intervention during its initial years. Our primary aims in this paper are to: (1) describe results from the community-based survey that identify sociodemographic, health care access, and other asthma-related risk factors in adults and children, and (2) make evidence-based recommendations to improve the community-based intervention to ensure its practices and programs reach those most in need.

Methods

Data were pooled from the 2004–2006 BRFSS, a cross-sectional health survey developed by the CDC in collaboration with states to monitor the prevalence of risk behaviors and access to health care among the civilian adult population aged 18 and older (19). The BRFSS uses a disproportionate stratified sampling methodology to select respondents who are interviewed by specially-trained interviewers using a Computer Assisted Telephone Interview. The survey data were gathered from one adult per household in Salinas, i.e., women and men in the sample were from different households. Although children were excluded from the BRFSS, parents were asked to report whether or not their children, under the age of 17 years, had asthma. Data on parents of asthmatic children are based on parent's sociodemographic and health care access responses; therefore the children may or may not be from a household where a parent has asthma. The study was approved by the Stanford Institutional Review Board.

Definition of Variables and Statistical Methods

Women and men with current asthma were identified by a positive response to both of the following questions: "Have you ever been told by a doctor, nurse, or other health care professional that you had asthma?" and "Do you still have asthma?" Descriptive statistics including sociodemographic measures, health care access, and asthma risk factors were generated for the entire sample of adults, and parents of children with asthma. Asthma-related measures including age of diagnosis, severity, and knowledge about asthma were analyzed for those with current asthma.

Separate forward stepwise multiple logistic regression models were conducted for adults with asthma and for parents of children with asthma to identify risk factors associated with current asthma. The following predictor variables were entered independently in the models: gender, age, level of education, annual family income, ethnicity, primary language spoken at home, health care insurance coverage, having a personal doctor or health care provider, doctor visited in the past 12 months, could not afford doctor in the past 12 months, could not afford prescription medication in the past 12 months, current smoker, exposure to passive smoke, less than recommended amount of physical activity in a usual week, and body mass

index category (normal, overweight, obese, morbidly obese). These variables were categorized as presented in table 1 except for age that was entered as a continuous variable. All first order interaction terms were also included in the models. No interaction terms were significant at $p = 0.05$ in either the adult or children models, and the final models are presented without interaction terms. The model results are presented in Table 3 as odds ratios with corresponding confidence intervals, p values, and prevalence of asthma.

Salinas Asthma Intervention and Recommendations

The Salinas Asthma Intervention involves a multi-site asthma intervention to increase asthma education and treatment/control activities among providers/teachers, the community, and patients/individuals (5). The intervention is delivered by a large community clinic, non-profit asthma organization, and the Monterey County Health Department. Results from the BRFSS and semi-structured in-person and telephone interviews with key informants (two asthma educators, a program coordinator, and a program administrator) were used to identify needs not currently addressed by the intervention and to generate recommendations to guide the final years of the intervention.

Results

The sample of 4925 Salinas adults in this analysis represents a lower-income, predominantly Mexican-American population; 32% of the adults had not graduated from high-school, 39% reported an annual family income of <\$25,000, and 51% were Mexican-American. Approximately one-quarter of respondents had no health insurance coverage (data not shown).

Among respondents, 227 women and 84 men had current asthma, and 194 were parents of children with current asthma; prevalences were 7.7%, 4.3%, and 7.0% in each of the respective groups. Over 20% of women and men with asthma were current smokers and/or exposed to passive smoking, more than 50% reported less than the recommended 60 minutes or more of physical activity per day, and approximately 40% were obese or morbidly obese (42% of women and 36% of men compared to 26% of adults without asthma) (Table 1).

Table 2 presents factors related to the age of diagnosis, severity, and knowledge of asthma for women, men, and children with current asthma. The age at which asthma was diagnosed was distributed fairly equally across all age groups, with over 50% of women and men being diagnosed before age 30, but almost 10% being diagnosed at age 60 or older. Fifty percent or more of women and men reported one or more episodes of asthma in the past 12 months; 19% of women and 25% of men had asthma symptoms once or more a day in the past 30 days. A substantial number of adults and children missed some work or school because of asthma in the past 12 months, and 8% of women, 11% of men, and 15% of children missed 8 days or more.

Among adults who reported one or more episodes of asthma in the past 30 days, 28% of women and 30% of men had not used a preventive medication, and 48% of women and 57% of men had not used a prescription asthma inhaler (and 20% had not used either). Only 23% of women and 18% of men had ever taken a course to manage their asthma. However,

almost twice as many of the parents of children with asthma had taken a course to manage the asthma in their children (36%).

Two of the strongest modifiable risk factors associated with current asthma in adults and identified by the stepwise multiple regression models were: could not afford prescription medication(s) in the past 12 months (OR 2.5, $p < 0.001$) and morbid obesity (OR 3.4, $p < 0.001$) (Table 3). The prevalence of asthma among adults who were unable to afford prescription medications was 11.7% compared with 5.3% among those who could afford prescription medications; prevalence of asthma among adults who were morbidly obese was 19.2% compared with 5.6% among adults who were of normal weight. The other significant predictors of asthma in the adult model were English language spoken at home, recent doctor visit, and female gender. When the regression model was repeated for the subgroup of adults who reported more than one asthma attack in the past 12 months ($n = 167$), results were similar, with the odds ratios showing similar magnitudes (data not shown). The only exception was that higher education was selected for the model (OR 2.0) instead of English language spoken at home.

The results for children mirrored those for adults for inability to afford prescription medicines; children whose parents were unable to afford prescription medications were significantly more likely to have asthma than those whose parents who could afford medications (OR 1.8, $p < 0.01$). The two other significant predictors of asthma in children were English language spoken at home, and the presence of health insurance.

The Salinas Asthma intervention is described in Table 4, according to the target audience and needs. Based on the results of the survey and key informant interviews, recommendations for the final years of the intervention are proposed. These recommendations are presented in the discussion in detail. Longer-term plans to enhance asthma interventions in Salinas and like communities will ideally include special outreach through the health department, social marketing campaigns, public service announcements, news programs, and other mixed media outlets, to those who do not interact with the health care system because of cost or other barriers.

Discussion

This paper adds to the scarce body of literature on the prevalence of asthma and related risk factors in a predominately Mexican-American, semi-rural community, and illustrates how survey and key informant data can enhance knowledge of local study populations and guide interventions to improve asthma control and treatment.

We found that inability to afford prescription medications was a significant factor associated with current asthma in both adults and children. Unaffordability of medication is one indicator of poverty in this community related to asthma, along with poor housing and environmental pollution, given that inability to afford asthma medications would primarily impact severity rather than prevalence of asthma. Although our survey did not specify what type of medications respondents could not afford (e.g., asthma versus other medications), it is possible that an inability to afford prescription medications contributed to the poor control

of asthma and the high number of missed days of work and school we found among some respondents with current asthma. This finding is consistent with previous evidence that regardless of insurance coverage, low-income adults with chronic conditions face challenges in paying for adequate health care and prescription medications (10, 20). In a recent survey, low-income, uninsured working-age adults with chronic conditions were most likely to have cost-related access problems, with nearly 60% reporting they could not afford all of their prescriptions (20). In 2003, one in two uninsured, nearly 1 in 3 publicly insured, and 1 in 6 privately insured working-age adults with at least 1 chronic condition did not purchase all of their prescription drugs because of cost concerns (20).

Although patients who are seen as part of the Salinas asthma clinic intervention are able to obtain medications because of a clinical program that covers medication expenses, key informants emphasized that physicians who treat lower-income asthmatic patients at other facilities can be reluctant to prescribe asthma medications with steroids because of patients' inability to afford the medications. According to Steps asthma educators, many low-income community members are not able to access health care because they do not have a social security number. Most of the undocumented community members are farm workers who are exposed to pesticides and other asthma-causing toxins in their living and working environment. *Promotoras*, important members of the Steps intervention who are involved in making home visits to raise awareness about asthma triggers, are promising community change agents who have the potential to reach high-risk population groups with low health care access, poor housing conditions, and environmental pollution (21).

Obesity rates in this population reflect the disturbingly high national figures. Prevalence of obesity was slightly higher among women, although excess weight was also a major problem for men. Among women and men with current asthma, 42% of women and 36% of men were obese or morbidly obese. Though the mechanisms underlying the associations between asthma and obesity are not yet clearly established, a growing number of studies have documented the association between obesity and asthma among adults (22–24) and children (6, 11, 25). Other studies have documented a link between poorer asthma control and poorer quality of life (26). The results of our analysis suggest that all components of the current Steps intervention related to weight loss should be continued and enhanced.

It may be particularly beneficial to focus new efforts on expanded outreach to low-income Mexican-American men and women, given their higher rates and risk for obesity-related diseases. Women and men who are morbidly obese will most likely also benefit from more intensive interventions. A greater focus on diet may be beneficial considering that most allergens identified in the clinical population were food items (e.g., milk, chicken, corn, and wheat). Dietary advice could be easily incorporated to enhance the clinic-based asthma intervention. This would be a worthwhile investment, since few in this group reported receiving advice to eat healthy foods and exercise regularly (27, 28). Though milk, chicken, corn, and wheat may be considered healthful, these crops are among the most allergen-causing foods and result in human exposure to pesticides, hormones, and genetically-modified organisms.

In addition to asthma education and awareness, results from the Salinas Steps Asthma Intervention (Table 4) and other clinic and school-based interventions demonstrate promising results for increased asthma prevention and control (29–31). The Steps clinic intervention has dramatically increased the number of patients with an asthma action plan—a primary component of preventive asthma care as recommended by the National Asthma Education and Prevention Program (32). At the beginning of the intervention, out of 40 randomly selected patient charts, only one patient had an asthma action plan. By mid-intervention, out of 92 patients being tracked, 80 had asthma action plans. Asthma action plans are regularly reviewed with patients and they would benefit patients most by improving health literacy on a range of preventive health topics including asthma, obesity, and healthy diets.

There are several limitations to our study. The survey did not capture measures of the home environment, a significant contributor to asthma risk. The data are also based on self-reports and therefore factors such as BMI may be inaccurate (33). Furthermore, the survey did not ask specifically about psychosocial factors, such as depression which may be related to asthma (34) or about what type(s) of prescription medications respondents could not afford. Finally, the findings for this population may not be generalizable to other medically underserved populations that have different demographic profiles. Despite these limitations, the interim findings are useful in refining the Steps community-based intervention. The potential benefits of improving the Steps intervention include increasing asthma control through improved diagnosis, increased control through use of preventive medication, and decreased exposure to asthma triggers.

A strength of our study includes its conduct of a large community-based survey, which was then used to guide development of community-based interventions to address asthma and the associated risk factors. This is a methodology that could be used more commonly. Of the two largest national surveys that include information on asthma (the BRFSS and the National Health and Nutrition Examination Survey), a literature review of articles published in the last 5 years using these data showed that only fifteen articles focused on asthma and only two used survey data to guide future interventions (35, 36). The intervention described herein is different from the two described previously in that it takes place with multiple age groups in various settings throughout the community, including schools, clinics, and homes.

In summary, the Salinas Steps Asthma Intervention supports previously made clinical, policy, and public health recommendations to reduce the disproportionate asthma burden suffered by low-income populations, including improving access to health care, improving asthma management, and reducing exposure to asthma triggers (12, 32, 37). Interventions that increase asthma-related knowledge are a priority area for prevention and treatment considering the high cost of medication and the apparent need for more comprehensive educational initiatives.

According to the 2003 National Asthma Survey, among persons with current asthma, only 70% were taught to recognize early signs of an attack, 49% were told how to change their environment, 40% were given a controller medication, and 27% were given an asthma management plan. Those with less education were less likely to receive information about

assessing their asthma and controlling environmental triggers compared to persons with any college education (38).

Based on results from this and other studies, public health interventions may be best designed to address multiple but related asthma risk factors including access to health care and medications, obesity, and housing conditions. In addition, previously made recommendations are warranted that suggest developing tailored interventions for high-risk, underserved populations. For those living in agricultural regions that are suffering from chronic disease related to the air they breathe, houses they live in, and food they eat, assistance is needed for community-based resource access and in establishing fair labor and living conditions. Our results also support using recommendations based on local-level surveys and feedback from key informants to guide interventions to enhance asthma control and treatment.

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TABLE 1

Sociodemographic, health care access, and asthma risk factors among women, men, and parents of asthmatic children (≥ 17 years of age), BRFSS 2004–2006 Pooled Data, Salinas, California.

	Women/Men never diagnosed with asthma <i>n</i> = 4420	Women with current asthma <i>n</i> = 227	Men with current asthma <i>n</i> = 84	Parents of children with current asthma* <i>n</i> = 194
Sociodemographic characteristics (%)				
Age group				
18–29 years	20.1	15.4	23.8	18.6
30–44 years	35.4	31.3	23.8	53.6
45–59 years	26.6	31.3	26.2	24.7
60–74 years	12.1	15.4	15.5	2.1
75+ years	5.8	6.6	10.7	1.0
Level of education				
<12 years	32.8	27.4	16.9	31.4
12 years	23.7	24.3	32.5	27.3
13–15 years	22.0	28.8	27.7	21.7
16 years	21.5	19.5	22.9	19.6
Annual family income				
<\$25,000	39.5	39.9	28.6	34.4
\$25,000–49,999	25.6	26.9	28.6	25.7
\$50,000	34.9	33.2	42.8	39.9
Ethnicity				
White, non-Hispanic	36.9	47.6	46.4	27.8
Mexican-American	52.6	36.6	22.6	55.7
Other Hispanic	3.8	6.6	13.1	5.7
Other ethnicity	6.7	9.3	17.9	10.8
Primary language spoken at home				
English	58.0	78.4	82.9	63.9
Spanish	41.3	21.2	15.9	36.1
Other language	0.7	0.4	1.2	0.0
Health care access (%)				
No health care insurance coverage	25.2	18.5	15.5	17.0
No personal doctor/health care provider	40.7	22.9	36.9	35.0
No doctor visit/past 12 months	19.5	4.4	15.5	19.6
Needed doctor but could not afford/past year	16.6	27.3	16.7	19.6
Needed prescription medication(s) but could not afford/past year	15.5	33.5	22.6	23.2
Asthma risk factors (%)				
Smoking				
Current smoker [†]	13.0	13.2	17.9	16.5
Passive smoking, anyone smoke inside home	10.9	12.8	13.1	8.2

	Women/Men never diagnosed with asthma <i>n</i> = 4420	Women with current asthma <i>n</i> = 227	Men with current asthma <i>n</i> = 84	Parents of children with current asthma [*] <i>n</i> = 194
Current smoker and/or exposure to passive smoking	20.1	21.1	23.8	21.6
Physical inactivity				
Less than recommended amount of physical activity in a usual week [†]	53.7	63.9	51.2	51.6
BMI (kg/m ²)				
Normal weight: BMI 25.0	34.7	33.8	21.4	34.0
Overweight: BMI > 25.0 29.9	39.6	24.0	42.9	38.8
Obese: BMI 30.0 39.9	22.9	31.1	28.6	22.9
Morbidly obese: BMI 40.0	2.8	11.1	7.1	4.3

^{*} Data based on responses of parents with asthmatic children, and may or may not be from a household where one or both parents have asthma.

[†] Reported smoking at least 100 cigarettes in lifetime and currently smoking cigarettes every day or some days.

[‡] Based on the Institute of Medicine 2002 Dietary Reference Intakes that recommend 60 minutes or more of moderate to vigorous activity daily.

TABLE 2

Asthma age of diagnosis, severity, and knowledge among women, men, and asthmatic children BRFSS 2004–2006 Pooled data, Salinas, California.

	Women with current asthma		Men with current asthma		Children with current asthma*	
	n	%	n	%	n	%
Asthma Age of Diagnosis						
<6 years old	27	11.9	15	17.9	7	
6–18 years old	46	20.3	29	34.5	7	
19–29 years old	52	22.9	5	6.0	7	
30–39 years old	34	15.0	13	15.5	7	
40–59 years old	46	20.3	14	16.7	7	
60 years old	19	8.4	8	9.5	7	
Asthma Severity						
1 asthma episode in past 12 months	125	55.1	42	50.0	7	
How often had asthma symptoms/past 30 days?						
Never	55	24.2	27	32.1	7	
Twice a week	104	45.8	29	34.5	7	
>Twice a week, but not every day	26	11.5	7	8.3	7	
Once or more a day	42	18.5	21	25.0	7	
Days unable to attend work (adult) or school (child) because of asthma/past 12 months						
0 days	149	66.2	60	71.4	114	60.6
1–7 days	57	25.3	15	17.8	46	24.5
8–14 days	9	4.0	3	3.6	12	6.4
>14 days	10	4.4	6	7.2	16	8.5
How many days took prescription asthma medication to prevent asthma attack/past 30 days if reported symptoms/past 30 days? (n = 149) [†]						
Never	31	28.4	12	30.0	7	
1–14 days	28	25.7	12	30.0	7	
15–24 days	9	8.3	4	10.0	7	
25–30 days	41	37.6	12	30.0	7	
How often used a prescription asthma inhaler during attack/past 30 days? (n = 205) [†]						
Never	70	47.6	33	56.9	7	

	Women with current asthma		Men with current asthma		Children with current asthma [*]	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
1–14 times	50	34.0	17	29.3	7	
15–29 times	9	6.1	2	3.5	7	
30 times	18	12.2	6	10.3	7	
Asthma course/class						
Ever taken course/class to manage your or your child's asthma?	52	22.9	15	18.1	69	35.6
Asthma Knowledge						
Breathing secondhand smoke can trigger asthma attacks (women, <i>n</i> = 58; men, <i>n</i> = 33; children, <i>n</i> = 60) [§]						
Agree/strongly agree	54	94.7	30	93.8	56	93.3
Disagree/strongly disagree	3	5.3	2	6.2	4	6.7

^{*} Data based on responses of parents with asthmatic children and may or may not be from a household where one or both parents have asthma.

[†] Data unavailable for children with asthma.

[‡] Data collected for 2005–2006 only.

[§] Data collected for 2006 only.

TABLE 3

Factors significantly associated with current asthma in adults and children, results of forward stepwise multiple Logistic Regression Models *

Predictor variables	Model for Adults			Model for Children		
	Odds ratios (95% CIs)	<i>p</i> value	Asthma prevalence [†]	Predictor variables	Odds ratios (95% CIs)	<i>p</i> value
Could not afford prescription				Language spoken at home		
medication(s)/past 12 months	2.5 (1.9–3.3)	<0.001	11.7	English	2.3 (1.5–3.4)	<0.001
Not afford				Other language	0.0 (0.0–4.9)	0.97
Afford	1		5.3	Spanish	1	
Language spoken at home						
English	3.2 (2.4–4.5)	<0.001	8.4	Could not afford prescription		
Other language				medication(s)/past 12 months		
Spanish	2.2 (0.3–8.2)	0.77	6.2	Not afford	1.8 (1.2–2.6)	<0.01
Gender	1		3.2	Afford	1	
Women				Have insurance		
Men	1.7 (1.3–2.3)	<0.001	7.7	Yes	1.9 (1.2–3.1)	<0.01
BMI Category				No	1	
Morbidly obese	3.4 (2.1–5.4)	<0.001	19.2			
Obese	1.6 (1.2–2.2)	<0.001	8.2			
Overweight	1.0 (0.7–1.4)	0.69	4.8			
Normal weight	1		5.6			
Doctor visit last 12 months						
Yes	1.8 (1.2–3.0)	0.009	7.2			
No	1		2.5			

* The following predictor variables were entered independently: gender, age, level of education, annual family income, ethnicity, primary language spoken at home, health care insurance coverage, personal doctor or health care provider, doctor visited in the past 12 months, could not afford doctor in past 12 months, could not afford prescription medication in past 12 months, current smoker, exposure to passive smoke, less than recommended amount of physical activity in a usual week, and BMI category (normal, overweight, obese, morbidly obese).

[†] Prevalences calculated adjusting for significant factors remaining in final models. Prevalences in adult's model adjusted for: could not afford prescription medicine, language spoken at home, gender, BMI category, and doctor visit. Prevalences in children's model adjusted for: language spoken at home, could not afford prescription medication, and have insurance.

TABLE 4

Description of STEPS funded asthma intervention 2006–2008.

Target audience and needs	Intervention component	Recommendations for final years of intervention
<ul style="list-style-type: none"> Provider/teacher education and awareness 	<ul style="list-style-type: none"> Hold trainings with health providers at a clinic serving primarily low-income Mexican Americans to raise awareness of asthma and improve treatment. Provide schools with asthma action plans via school nurses. Provide education for asthma health aides and parents. Provide 1-hour Continuing Medical Education events for doctors and staff in Salinas clinics and hands-on training for other staff. Train teachers in pre-K-12 Salinas schools covering topics including asthma awareness, readiness for an asthma event, identification of asthma signs/symptoms, and medication delivery. 	<ul style="list-style-type: none"> Provide on-site trainings at schools for staff, teachers, and health aides to promote greater awareness and improve asthma control among students. Fund teacher trainings, currently in high demand. Enhance education efforts with an expanded audience. Include follow-up sessions to each training for knowledge reinforcement. Increase clinician awareness of dietary risk factors for asthma.
<ul style="list-style-type: none"> Community education and awareness 	<ul style="list-style-type: none"> Provide ‘Healthy Homes Training’ for Promotoras (Community Health Educators). Promotoras make home visits to raise awareness and knowledge about asthma triggers focusing on indoor air quality. Develop and distribute bilingual educational materials to network partners (i.e. churches, child care providers, businesses, schools, non-profit organizations, and Steps partners and grantees). 	<ul style="list-style-type: none"> Expand reach to uninsured adults who are at higher risk of asthma but may not have access to health care by using the health department web site, public service announcements, news programs, and other mixed media outlets.
<ul style="list-style-type: none"> Patient education and awareness 	<ul style="list-style-type: none"> Provide asthma education and action plans to asthmatic children and their parents. —Provide education sessions following clinical appointment, at one-month follow-up, and at subsequent visits for minimum of two 20–40 minute sessions. <ul style="list-style-type: none"> —Discuss asthma triggers including environmental exposures at home, school, and outdoors (i.e., smoke, perfume, pets, pollution, and food). —Include brief nutrition education lesson if child is overweight, encouraging consumption of healthy foods. —Develop asthma action plan and diet plan if child is overweight. 	<ul style="list-style-type: none"> Expand reach of asthma education and awareness using health department website, PSAs, news programs, and other mixed media outlets. Tailor nutrition intervention components to severely overweight adults, and add a weight loss component.