

## ABSTRACT

Title of thesis: Effects of Birthplace, Language, and Length of Time in the U.S. on Receipt of Asthma Management Plans Among U.S. Adults with Current Asthma

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Approximately 7% of the adult population in the United States suffers from asthma and only 32% of those adults have an asthma management plan, which is an important component in asthma management. Racial/ethnic minorities have higher rates of asthma and lower rates of good asthma management. There is a lack of research in examining how foreign birth and other proxy measures of acculturation may affect long term management of asthma. Using data from both the 2002 and 2003 National Health Interview Survey, this secondary data analysis examined the relationship between the receipt of asthma management plans among 18-64 year old adult asthmatics by birthplace, length of time in the U.S., and language of interview. Hispanic/Latino participants who spoke English during the interview had a 3.43 times greater odds of having an asthma management plan when compared to those who spoke Spanish (95% CI: 1.97-5.98).

Effects of Birthplace, Language, and Length of Time in the U.S. on Receipt of  
Asthma Management Plans Among U.S. Adults with Current Asthma

By

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## Chapter 1: Introduction

Asthma is an inflammatory disease of the lungs that affects many people in the United States (U.S.) and around the world. In 2007, 16.1 million non-institutionalized adults had current asthma, or 7.3% of the U.S. adult population (1). In 2006, asthma accounted for 1,770,000 emergency department visits; 489,000 hospitalizations; and 3,884 deaths (2). Costs of asthma to the U.S. economy in 2006 were over \$14 billion dollars with \$9.7 billion directly associated with medical care costs (2). From 1980 to 1996, asthma prevalence increased by 73.9% (3). In 2003, asthmatic adults missed 10.1 million days of work and asthmatic children missed 12.8 million days of school (4).

Although overall asthma prevalence has not changed significantly in the past ten years, prevalence rates among racial/ethnic minority populations have continued to increase (3). African Americans have a higher prevalence of current asthma than whites, although this gap is bigger among children than in adults. Also, current asthma prevalence is higher in both children and adults living below the federal poverty level, and those residing in the Northeast (5). In a National Heart Lung and Blood Institute Workshop focused on reducing disparities in asthma prevalence, Strunk et al (6) reported that African Americans were 3 times more likely to be hospitalized and 4 times more likely to die from asthma when compared to their white counterparts. Hospital emergency department (ED) visits for asthma among 5-64 year old children and adults

decreased to 57.4 per 10,000 in 2004-2006, with blacks having rates that were four times that of whites (181.3 vs. 40.4 per 10,000). However, whites and blacks with current asthma were equally likely to report an attack during the previous year (5).

Overall, Hispanic/Latinos have lower asthma prevalence than Non-Hispanics, however, Puerto Ricans have the highest asthma prevalence compared to all other racial/ethnic groups (7). Combining data from 1982-1984, Carter-Pokras et al found that Puerto Rican children had the highest prevalence of asthma and that trend is still seen today (8). During 2001-2003, asthma prevalence for Puerto Ricans was 14.5%, while asthma prevalence for Mexican-Americans was 3.9% (5, 9, 10). Asthma mortality is also higher among Hispanic/Latinos when compared to non-Hispanic whites and varies greatly by Hispanic/Latino subgroups (7).

Research shows that there are many risk factors for the development of asthma. In a review of the epidemiology of asthma, Lugogo (3) reports some potential risk factors for asthma such as income level, and environment. Cabana et al. (2007) also describes disparities in quality of asthma care as a myriad of factors that include health care access and other social barriers(11). Possible sources of racial and ethnic disparities in asthma care include structural issues (access to health care professionals), process of care at the organization level (“navigating the system”), and process of care at the individual level (“interaction with the health-care provided”), (11).

Seeing the negative impact asthma is having on our nation’s health, several initiatives were established. Healthy People 2010, operated by the Department of Health and Human Services, focused eight objectives on asthma. Some of those objectives

include reducing asthma deaths, reducing hospitalizations in asthma, reducing hospital emergency department visits for asthma, and reducing activity limitation among persons with asthma.

The National Heart Lung and Blood Institute established the National Asthma Education and Prevention Program (NAEPP) in 1989 to address the asthma epidemic they saw coming. This program was established to work with many organizations to educate patients, health professionals and other stake holders. Their ultimate goal is “to enhance the quality of life for patients with asthma and decrease asthma-related morbidity and mortality (12).” One of its major contributions to asthma research and management are diagnosis and management guidelines for physicians and other health care professionals. These guidelines, called Guidelines for the Diagnosis and Management of Asthma, were first published in 1991 with subsequent updates and publications in 1997, 2002 (update on selected topics) and 2007.

These guidelines provide best practices to physicians and health professionals in the diagnosis and management of asthma. The NAEPP described four main components essential to proper long term asthma management: assessing and monitoring asthma severity and control, education for a partnership in care, control of environmental factors and co morbidities, and medications (13). From these four main components, specific patient skills were developed. These patient skills include taking medication correctly, identifying and avoiding environmental exposures, self-monitoring, using a written asthma action plan or management plan, and seeking medical care as appropriate (13).



The NAEPP recommends that people who have moderate or severe asthma, a history of severe exacerbations, or poorly controlled asthma have an asthma management plan to monitor their asthma daily. The asthma management plan should at least have instructions for daily management and actions to manage worsening symptoms (13). More specifically, a complete written management plan should have instructions on when to increase treatment, how to increase treatment, for how long, and when to seek medical help (14). Research shows that having an asthma management plan decreases morbidity, hospital admissions, and emergency department visits due to asthma (14, 15). It also improves asthma medication adherence and quality of life (16, 17).

In 1999, the Department of Health and Human Services issued an Action Against Asthma Strategic Plan for the Department of Health and Human Services. The four main goals or priority areas were: determine the causes of asthma and develop interventions to prevent its onset, reduce the burden for people living with asthma, eliminate the disproportionate burden of asthma in minority populations and those living in poverty, and track the disease and assess the effectiveness of asthma intervention programs (18).

#### Racial/Ethnic disparities in asthma management

Although the United States has made major strides to combat this asthma burden through management guidelines and asthma surveillance initiatives, disparities persist in prevalence and asthma management education. Asthmatic patients who have been taught proper use of inhalers, have an action plan, and have gone through asthma management programs, have a better quality of life than other asthmatic patients (19-21). In studies focusing on children, proper education in management skills has led to fewer days out of

school, fewer days of limitation, fewer visits to the Emergency Department (ED) and many other benefits (22). Adults have also seen benefits of good asthma education. In a two year follow up of an asthma management program, the authors saw fewer hospitalizations, better quality of life, and a reduction in days missed from work and other activities, (19).

Asthma education, as described by the NAEPP, is a very important component to good asthma management but we see disparities in knowledge about asthma and how to control it. Using data from the 2003 National Health Interview Survey (NHIS), Piper et al, found that black and Hispanic/Latino children were less likely to have an asthma management plan; those without an asthma management plan were more likely to have asthma episodes (23). Among children, race/ethnicity and language have been linked to disparities in asthma management education. Inkelas et al (2008) found that race/ethnicity was negatively associated with 4 of the 6 process measures used to determine asthma management education level. Racial/ethnic minorities were less likely to have been taught what to do during an episode, how to recognize early signs, how to use a peak flow meter, and been advised to change the home environment (24).

### Acculturation and Disparities in Health among Foreign Born Persons with Asthma

Acculturation is the multidimensional process in which foreign born individuals assimilate to the dominant culture in which they live (25). Over the history of this concept many scales have been developed to try to assess its actual effect on the health of immigrant populations. These scales attempt to assess acculturation using many different

constructs such as engaging in culturally specific behaviors, proficiency in language (English or other languages), cultural identity, and adoption of specific cultural values (25). Shorter proxy measures such as birthplace, length of time in country and language have also been used to assess the effects of acculturation on health and have been repeatedly found to be important predictors of health care status and health care access and utilization(26). Although there are some limitation to using these shorter proxy measures instead of comprehensive acculturation scales, research has shown that they are useful when using a comprehensive acculturation scale is not practical (27). Asthma prevalence has been shown to vary by birthplace, with higher rates for those born in the United States. For example, Black immigrants in a Boston community had a significantly lower prevalence of asthma than their U.S. born counterparts (28). Similarly, U.S. born Mexican-Americans in the 1997-2001 NHIS had a higher prevalence of asthma than foreign born Mexicans (29). Although foreign born persons usually report better overall health status, they have lower rates of health screenings and overall health care access and utilization (30-32). For example, Goel found foreign born Asian/Pacific Islanders and Hispanic/Latinos were less likely to receive fecal occult blood tests, and breast and cervical cancer screening (31).

Language also may pose a barrier to health care, and may contribute to health disparities seen in the U.S. The National Asthma Survey found Latino children with Spanish speaking parents had the least control over their asthma (24). Process of care measures varied--only 41% of the sample said they ever had an asthma management plan with significantly lower rates for those who were interviewed in Spanish. Those who

were interviewed in Spanish had a lower odds of being taught what to do during an attack (OR: 0.4; 95% CI: 0.2-0.6), and being advised to change home environment (OR: 0.5; 95% CI: 0.3-0.8). Previous work has shown that immigrants and people who speak languages other than English are less likely to have health insurance or access health care services(33, 34).

Length of time was associated with increased obesity and changes in health behavior among foreign born as they their time in the U.S. increased. Goel et al saw that among immigrants who were here longer than 10 years there was a greater chance of being overweight or obese. This study, using the 2000 National Health Interview Survey found that the prevalence of obesity in foreign born individuals who were here less than a year was 8% while those who were here more than fifteen years was 19% (35).

Carrasquillo et al, using data from the 1998 supplement to the Current Population Survey, found that immigrants had a greater chance of having health insurance the longer they have been in the country (36). Only 3.0% of foreign born U.S. citizens who were here less than a year had health insurance while 67.5% of all foreign born U.S. citizens who were here more than 15 years had health insurance (36).

Though there are many articles examining associations between foreign birth and other health outcomes, there seems to be a lack of information regarding the effects of birthplace, language, and length of time in the U.S. on asthma management education for adults. This study has begun the preliminary work to examine associations between asthma management education (i.e., having an asthma management plan) among asthmatic adults and birthplace, length of time in the U.S., and language.

## Potential Confounders and Effect Modifiers

Few studies have examined asthma management by birthplace (37), but other studies assessing asthma management by race/ethnicity have controlled for a variety of different variables, such as age, sex, education, income and asthma related healthcare visits. Erikson et al (38) assessed the relationship between race and asthma management among patients in an integrated managed care organization by age, sex, educational attainment, income, and marital status. They also assessed several aspects of asthma management. They collected information on asthma severity using a previously validated 13-item asthma severity score that included frequency of asthma symptoms, history of hospitalization and the use of corticosteroids and other asthma medications (this score includes questions not included in the NHIS). Erickson et al (38) also collected information on preventative care, ambulatory care, urgent care visits, and emergency health care utilization for asthma. Erikson found that Black race was associated with a greater risk of emergency department visits and hospitalizations despite all of the participants having the same kind of insurance and controlling for other socio-demographic characteristics and differences in asthma therapies (38). In another study examining the association between race, sex and asthma care in participants with managed care, Krishnan et al (39) also found disparities between white and blacks. He found that fewer African Americans, when compared to whites, reported having asthma care consistent with NAEPP asthma guidelines for medication use, self-management education, avoiding triggers, and specialist care. Variables in this analysis included race,

sex, age, college education, employment status, smoking status, age of asthma onset, duration of asthma disease, and history of allergies.

Smith et al (40) found racial/ethnic differences in asthma prevalence among children living below the federal poverty line (FPL) or within 100% of the federal poverty line. Using the 1997 NHIS, the authors assessed race/ethnicity, income-to-FPL-ratio, child's gender, age, education of most highly educated parent, number of children in the home, number of adults in the home, residence in a "Metropolitan Statistical Area" region of the U.S., and health insurance (40). Smith et al (2005) found that non-Hispanic black children were at higher odds of developing asthma (OR: 1.2; 95% CI: 1.03-1.40). When examining families who had incomes less than half the FPL, children in non-Hispanic black families had a 1.99 (95% CI: 1.09-3.64) greater odds of having asthma when compared to children in non-Hispanic white families.

Previous studies have also shown asthma prevalence and asthma management to vary by age and sex. A 2007 Morbidity and Mortality Weekly Report (MMWR) on asthma management education found that 18-34 year olds were more likely than adults older than 65 years of age to have been taught how to respond to an asthma attack and been advised to change their environment (41). A greater proportion of 35-64 year olds, when compared to persons who were 65 years old or older, had been taught to recognize early signs of an asthma attack (41). Older adults (>65 years) were more likely to have an asthma management plan (41). Asthma prevalence is greater for women than men (42). Also, among the asthmatic population, women are more likely to have an asthma management plan than men (41).

Studies that have assessed birthplace and various issues in health and health care have controlled for several other factors. Using the 2000 NHIS, Goel et al (35) found that among immigrants, those who lived in the U.S. longer tended to have obesity rates that rival those who were born in the U.S. Variables of interest included body mass index (BMI), race/ethnicity, foreign birth (defined as birthplace either in a U.S. territory or outside of the U.S.), sex, marital status, illness burden, measures of access to health care, health behaviors, education, and household income (35). Data from the 2000-2002 NHIS show that Hispanic/Latino women were less likely to have health insurance and a usual source of care (43). Variables used in this report included ethnicity, health insurance status, having a usual place to go for health care, experiencing unmet medical needs due to costs, and contact with a health care professional. Research also shows that immigrant black men, although they have better self reported health status, have lower rates of health insurance coverage and usual source of care (30).

## Research Questions and Hypotheses

This study explored the potential effects of birthplace, language of interview, and length of time in the U.S (proxy measures of acculturation) on the receipt of asthma management plans among 2002-2003 National Health Interview Survey adult participants. The association between these measures of acculturation and the receipt of an asthma management plan was assessed by the following questions:

1. Are there differences in the receipt of asthma management plans between foreign born and U.S born individuals (a) among all current asthmatics, and (b) for

Hispanic/Latinos from Mexico, Puerto Rico, Dominican Republic, Central and South America (Latin America)?

H0: Foreign born individuals will be as likely to report having received an asthma management plans as U.S born individuals.

H1: Compared to U.S born individuals, foreign born NHIS respondents will be less likely to report having received an asthma management plan.

2. Among foreign born individuals, are there differences in the receipt of asthma management plan by length of time in the U.S. among (a) all foreign born, and (b) Latin American immigrants?

H0: Length of time in the U.S. is not associated with receipt of an asthma management plan

H1: Length of time in the U.S. is associated with receipt of an asthma management plan. More specifically, as length of time in the U.S. increases among foreign born participants, the percentage of receiving an asthma management plan will also increase.

3. Among Hispanic/Latinos, are there differences in the receipt of asthma management plans by language of interview (English, Spanish) among (a) all Hispanic/Latinos, and (b) Latin American Immigrants?

H0: Among Hispanic/Latinos, language of interview is not associated with receipt of an asthma management plan.

H1: Among Hispanic/Latinos, language of interview is associated with receipt of an asthma management plan



## Chapter 2: Methods

Data were collected from the 2002 and 2003 National Health Interview Survey (NHIS) public use files. These two years were chosen because these were the two most recent years with a question regarding receipt of an asthma management plan, my dependent variable of interest. NHIS is a nationally representative survey conducted by the National Center for Health Statistics since 1957. It collects data on a broad range of health topics via personal household interviews. This hour-long survey includes two sections: Core Questions and Supplements. The Core section includes several sections pertaining to the household, family, sample adult and sample child and is largely unchanged from year to year. For each family, the NHIS collects information on one randomly chosen adult and child, and subsequently, asks more detailed information on health status, health care services and health behaviors. The survey also has a supplemental section in which questions that are sponsored by sources outside of the National Center for Health Statistics (NCHS) are asked. The supplement varies from year to year and focuses on a myriad of health topics.

Data from the Household, Person and Sample Adult sections of the 2002 and 2003 National Health Interview Survey were merged to create the sample data set.

**Study Population:**

The total number of completed sample adult interviews in 2002 was 31,044 and in 2003, 30,852. The overall response rates for the household in 2002 and 2003 were 89.6% and 89.2%, respectively. To calculate the sample adult response rate, NCHS employs two methods (44). A conditional response rate is first calculated by dividing the number of interviewed adults by the number of eligible sample adults. This does not take into account household or family response rates. The conditional response rates were 84.4% in 2002 and 84.5% in 2003 (44, 45). The final response rates (2002: 74.3%; 2003: 74.2%) take into account the household and family response.

For this study, an analytic sample of asthmatic respondents was selected by using all adults who answered “yes” to the two questions that establish current asthma diagnosis in the sample adult questionnaire. Each respondent was asked the initial question: “Have you ever been told by a doctor or other health professional that you had asthma?” Only those who answered yes to the first question were asked a follow-up question: “Do you still have asthma?” (44). Although these particular questions have not been tested for validity a 1993 review of asthma questionnaires reported that self-report of asthma is accurate when compared to a clinical diagnosis of asthma. A mean sensitivity of 68% (range: 48%-100%) and a mean specificity of 94% (range: 78%-100%) was reported (46). Adults were excluded from analyses if data were missing on asthma diagnosis, or any independent variables. The un-weighted frequencies for adults who reported that they have been diagnosed with asthma in their lifetime was 3,327 (2002) and 3,054 (2003); a total of 4211 for 2002 and 2003 adults said that they still have asthma

(current asthma), (44, 45). This analysis only includes those who reported they currently had asthma and received an asthma management plan.

### Dependent Variable

In this study, asthma management education was assessed by the prevalence of receiving an asthma management plan among my sample population. The receipt of an asthma management plan was ascertained with the following question:

“An asthma management plan is a printed form that tells when to change the amount or type of medicine, when to call the doctor for advice, and when to go to the emergency room. Has a doctor or other health professional EVER given you an asthma management plan?”

This dichotomous variable was evaluated to find any disparity in asthma management by birthplace, language of interview, and length of time in the U.S. for foreign born individuals.

### Independent Variables

See Appendix B for a full variable list.

#### Birthplace (place of Birth)

Nativity status was derived from answers to a question about the participant's place of birth: “In what country were you born?” Participants had the option of giving the specific country they were born in, but this information is not readily available on the public use datasets. National Center for Health Statistics (NCHS) recodes all answers to that question into a variable called GEOBIRTH. This variable classifies people into 3 categories: 1) born in one of the 50 states or the District of Columbia; 2) born in a U.S. territory; 3) or not born in the U.S. or a U.S. territory (44). To analyze the sample

population, U.S. territories and foreign born were combined to increase the sample size and allow for analysis. In analyzing the Hispanic/Latino subpopulation, birthplace was categorized in three variables because of the importance of examining territories separately for the Hispanic/Latino population, namely for the Puerto Rican population.

#### Length of Time in the United States

This variable is found in the person-level file. Respondents who were not born in one of the 50 states or the District of Columbia were asked to estimate how many years they have been in the United States using the question, “About how long have you been in the United States?” The information was recoded into a variable that indicates how long the respondents lived in the United States: less than 1 year, 1-4 years, 5-9 years, 10-14 years, and 15 years or more. This variable was further collapsed into two categories: less than 5 years, and 5 or more years to look at the differences that may arise among the population. The 1996 welfare reform act, the Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA), made more legal immigrants ineligible for public health services (i.e., Medicaid) in the first five years of living in the United States (47).

#### Language of Interview

Language of Interview was ascertained from the person-level file of the survey documentation. The question is “In which language was the interview conducted?” with responses limited to the following: English; Spanish; English and Spanish; other; and not ascertained. For purposes of this study, language of interview was categorized as English or Spanish. All other categories were excluded. Spanish is the only other language

provided outside of English. The Computer-Assisted Personal Interview (CAPI) questionnaire computer used by the field representatives has a function that allows the representatives to toggle between English and Spanish versions of all questions as they please. Only bilingual field representatives are allowed and trained to conduct the interview in Spanish.

#### Race/Ethnicity

The NHIS has separate questions to ascertain race and ethnicity. Ethnicity was ascertained with two questions:

- “Do/Does {you/name} consider {yourself/himself/herself} Hispanic/Latino? And
- “Please give me the number of the group that represents your Hispanic Origin or ancestry.”

A card with several Hispanic/Latino subgroups was given to the respondent that corresponds with numbers the interviewer enters into the question answer field.

Race was ascertained by two questions:

- “What race {does/do} {name/you} consider {himself/herself/yourself} to be?
- “Which one of these groups, that is (FR: READ GROUPS) would you say BEST represents {your/name’s race}?”

The first question was asked of all respondents but the second question was asked if the person answers with more than one race category. Race was categorized differently in several variables, but for this analysis the variable that categorizes respondents as white, black, American Indian/ Alaska Native (AIAN), Asian only, and multiple race was used. The Hispanic/Latino ethnicity (hispan\_i) and race (racerp\_i in 2002; racerpi2 in 2003) variables were combined to create a variable that combines race and ethnicity. The variable categories were the following: non-Hispanic White, non-Hispanic Black,

Hispanic, Other Non-Hispanic. Hispanic/Latino included: Multiple Hispanic, other Spanish, other Latin American, and type not specified. Other Non-Hispanic included Asian, American Indian/Alaska Native.

Hispanic/Latino ethnicity was also recoded in another variable (hispan) as Puerto Rican, Mexican (included Mexican Americans), Cuban, Dominican, Central and South American, and other Hispanic (Appendix B).

#### Age

To ascertain age, the NHIS survey uses the question: “How old is {sample adult name}?” Age was then verified by asking the date of birth of the sample adult. The age was calculated and verified and the final response is available in the analytic file. This variable was reported as a continuous variable and then was recoded into 10 year categories. To avoid the potential addition of COPD individuals misdiagnosed as asthma, age was restricted to 18-64 years. Research shows that misdiagnosis increases after the age of 60 and significantly increases after the age of 65 (48).

#### Sex

Sex was classified dichotomously as female or male. Sex is found in the sample adult survey section and was assessed by the question: “Is {sample adult name} Male or Female?” The variable is SEX.

#### Health insurance status

To assess health insurance status, the variable NOTCOV was used. This variable classifies people as being covered by insurance or not being covered by insurance at the time of the interview (44). Health insurance status is found in the person section of the

NHIS and was assessed by the question: “Are {you/Is anyone} covered by any kind of health insurance or some other kind of health care plan?”

#### Education

For this study, education was categorized as less than a high school diploma, high school diploma or GED, some college, and Bachelor’s degree or higher (49). Education is found in the person file and was assessed by the question (variable name: EDUC): “What is the highest level of school {you/subject name} {have/has} completed or the highest degree {you/subject name} {have/has} received? Please tell me the number from the card”. The respondent was required to give the number corresponding with the grade of completion given on the show card. This question was asked of every person in the family.

#### Usual Source of Care/Type of care

Usual source of care was assessed using the survey question: “Is there a place that you usually go to when you are sick or need advice about your health?” It was categorized as yes; there is no place; there is more than one place; refused; and don’t know. For purposes of this study, “there is more than one place,” “refused,” and “don’t know” was treated as missing data and not used in analysis. Another variable to assess the type of usual care people use for preventative care was also used. This variable categorized individuals as having no preventative care, using a doctor’s office/HMO, clinic or health center, or emergency room.

#### Asthma Control

To assess asthma control, the survey question “During the past 12 months, how many days were you unable to work because of your asthma?” was categorized as not missing any days of work, and missing 1- 365 days of work due to asthma.

## Income

Though poverty status would be a more detailed measure, NCHS reports a 26% weighted non-response rate for that variable so this analysis will use income to assess financial status. The non-response rates for income were a little smaller for the income variable. In 2003 7% of the sample adult population provided no information on income and 15% only said their income was either less than or more than \$20,000 (49). This variable was categorized as less than \$20,000, \$20,000- \$54,999, and \$55,000 or more. With the income categories, we can look for a gradient in asthma management education by income levels.

## Statistical Analyses

To analyze this dataset, the Household, Person and Sample adult components were merged to obtain all study variables. In the preliminary analyses, frequency distributions and univariate analyses were conducted to examine the data for associations between the receipt of asthma management plans and the measures of interest and socio-demographic detail. Variables were also analyzed for association between asthma management plans and birthplace, length of time in the U.S. and language of interview. All variables that were significantly associated with asthma management were then tested for significance with birthplace, language of interview, and length of time in the U.S.



Multivariate analysis was conducted to further evaluate the relationship between birthplace, language of interview, and length of time in the U.S. and the receipt of an asthma management plan with and without the previously described independent variables. The variables that were significant at the  $p=0.1$  level were added to the logistic regression models testing for associations with the receipt of an asthma management plan and birthplace, language and length of time. For some of the models, significant variables were removed because of inadequate sample size and empty cells of data. Dummy variables were created (see Appendix C for list). All analyses incorporated the sample weight and survey design measures to ensure correct interpretation of the data used.

To estimate the power to detect a difference in asthma management between immigrant asthmatic adults and U.S.-born asthmatic adults, I have used an online power calculator for two samples (50) (URL: [http://www.dssresearch.com/toolkit/spcalc/power\\_p2.asp](http://www.dssresearch.com/toolkit/spcalc/power_p2.asp)). For these calculations, I used the percentages of U.S. born adults and Foreign born adults who reported having an asthma management plan in this sample population. Using the un-weighted totals of current asthmatic adults from the 2002 and 2003 NHIS, I would have 12.2% power to detect a difference at the .05 level, using a two-tailed test (Table 1). In this instance,  $p_1$ = percentage (32%) of U.S. born adults with asthma management plan;  $p_2$ = percentage (30%) of foreign born adults with asthma management plan;  $n_1$ =number of U.S. born current asthmatic adults (3,828); and  $n_2$ = number of foreign born current asthmatic adults (380). This is a low power; however this paper is just a hypothesis generating

exploration of the data. Given my low power for analysis, analysis of potential effect modifiers could not be conducted.

The two percentages for each population were quite similar and the number of foreign born current asthmatic adults was quite small, which makes the chance of detecting a difference at a  $p=0.05$  level very difficult. By just increasing the sample size by ten-fold we see a great increase in power (71%) (Table 1). Also when using the weighted sample sizes we have a 100% power to detect differences at an  $\alpha=0.05$  level. It is important to note that the power calculation equation is based on using a simple random sample so using the weighted sample size would be inaccurate.

Table 1. Power calculation to detect a difference in receiving an asthma management plan between U.S. born and foreign born current asthmatic adults ( $\alpha=.05$ )

	Un-weighted Sample Size	10-fold increase of Un-weighted Sample Size	Weighted sample Size
n1	3,828	38,280	12,784,209
n2	380	3,800	1,003,983
Power	12.2%	71.%	100%

## Chapter 3: Results

Description of Population: Asthmatic Adults Among NHIS 18-64 year old adult respondents in 2002-2003, 10.2% reported ever having asthma (n=6,381) and 6.8% of the population reported currently having asthma (n=4,211). Table 2 presents socio-demographic data for those adults who reported having current asthma.

Only 18.5% of current asthmatic adults in 2002-2003 were 18-24 years of age, most were female (65.2%) and non-Hispanic White (75.1%). Only 5.7% of the population were Hispanic/Latino. Most current asthmatic adults had received at least their High School diploma/GED (32.7%) or reported having some college education (38.8%) (Table 2). Most current asthmatic adults had a household income of more than \$20,000 per year (39.1%, \$20,000-54,999; 36.5%, \$55,000 or more). Eighty-six percent of current asthmatic adults had some type of health insurance (86%) and 91% had a usual place of care (Table 2). However, about half (51.3%) of current asthmatic adults reported not having a place they regularly go to for preventative care. A small percentage of current asthmatic adults reported missing work (5.3%) or visiting the emergency room (24.6%) in the past 12 months due to asthma (Table 2). Most current asthmatic adults reported being born in the United States (92.7%) and spoke English during the interview (98.7%). Of those who were born outside of the United States (50 states and District of Columbia), 90.4% had been in the U.S. for at least five years (Table 2).

Table 2. Socio-demographic, healthcare access, and utilization characteristics of Current asthmatic adults (n=4,211)

Characteristics	Current asthmatics (%)
Age in years	
18-24	18.5
25-44	42.3
45-64	39.2
Sex	
Male	34.8
Female	65.2
Race/Ethnicity	
Non-Hispanic White	75.1
Non-Hispanic Black	9.4
Hispanic	5.7
Other non-Hispanic	4.1
Household Income in dollars	
\$0-19,999	24.4
\$20,000-54,999	39.1
\$55,000 or more	36.5
Education	
Never attended- 11 <sup>th</sup> grade	3.0
High School graduate/GED	32.7
Some college/AA degree	38.8
Bachelors degree, Masters, PhD, professional degree	25.5
Health Insurance Coverage	
Covered	85.9
Not covered	14.1

Table 2 (continued)

Characteristics	Current asthmatics (%)
Usual place of Care	
Yes, I have a place	91.4
No, I have no place	8.6
Type of Place for Preventative care	
No preventative care	51.3
Clinic or health center	13.2
Doctor's office/HMO	30.5
Emergency Room	4.9
Missed work	
Missed 1-365 days	5.3
Missed no days	94.7
Emergency Room Visits	
Yes, visited ER	25.8
No, did not visit ER	74.2
<b>Main Independent Variables</b>	
Birthplace	
U.S. 50 states and D.C.	92.7
U.S. Territories	1.1
Foreign born	6.2
Language of Interview	
English	98.7
Spanish	1.3
Length of Time in the U.S. †	
< 5 yrs	9.6
≥ 5yrs	90.4

† Length of time in the U.S. includes only those who are foreign born

## Description of Population: Hispanic/Latino Asthmatic Adults

In the Hispanic/Latino subpopulation (Table 2a), most current asthmatic adults were 25-44 years of age (47.7%), female (64.2%), and Mexican or Mexican American (49.1%). Most of the population reported having a household income of \$0-54,999 per year. Most of the population attended some college or have an Associate's degree (45.0%). Most of the population reported having some kind of health insurance (76.2%) and having a usual place of care (85.9%) though most report having no place for regular preventative care (65.7%). A small percentage of the population reported missing work (7.4%). Thirty-seven percent (37.0%) of the population reported visiting the emergency room in the past 12 months because of asthma (Table 2a).

In the Hispanic/Latino population only 60.8% of the population report being born in the U.S. 50 states and D.C. (Table 2a). Among the Hispanic/Latino population, 25.9% reported being born in a U.S. territory as compared to only 1.08% of the general population. A higher proportion of adults completed the interview in Spanish among Hispanic/Latinos (22.1%) than the general population (Table 2a). The majority of Hispanic/Latino adults who were born outside of the U.S. 50 states and D.C. were in the U.S. for five or more years (93.0%).

Table 2a. Socio-demographic, healthcare access, and utilization characteristics of current Hispanic/Latino asthmatic adults (n=530)

Characteristics	Current asthmatics adults (%)
Age in years	
18-24	21.2
25-44	47.7
45-64	31.1
Sex	
Male	35.8
Female	64.2
Ethnicity	
Puerto Rican	26.6
Mexican	49.0
Cuban	4.6
Dominican	2.3
Central or South American	12.2
Other Hispanic	5.3
Household Income in dollars)	
\$0-19,999	34.5
\$20,000-54,999	36.3
\$55,000 or more	29.2
Education	
Never attended- 11 <sup>th</sup> grade	8.5
High School graduate/GED	32.0
Some college/AA degree	45.0
Bachelors degree, Masters, PhD, Professional Degree	14.5

Table 2a (continued)

Characteristics	Current asthmatic adults (%)
Health Insurance Coverage	
Covered	76.2
Not covered	23.9
Usual place of Care	
Yes, I have a place	85.9
No, I have no place	14.1
Missed work in last 12 months	
Missed 1-365 days	7.4
Missed no days	92.6
Emergency Room Visits in past 12 months	
Yes, visited ER	37.0
No, did not visit ER	63.0
Main Independent Variables	
Birthplace	
U.S. 50 states and D.C.	60.8
U.S. Territories	25.9
Foreign born	25.9
Language of Interview	
English	77.9
Spanish	22.1
Length of Time in U.S. †	
< 5 yrs	7.8
≥ 5yrs	93.0

† Length of time in U.S. includes only those who are foreign born



## Receipt of Asthma Management Plan among Current Asthmatic Adults

One third (32%) of adults with current asthma reported having an asthma management plan (Table 3). Crude odds ratios were used to describe the population of current asthmatic adults who have an asthma management plan (Table 4).

Age was a significant predictor of having an asthma management plan with 35.2% of all 45-64 year olds, 30.8% of 25-44 year olds, and 24.2% of 18-24 year olds with asthma reporting the receipt of an asthma management plan (Table 3). Being older increased the odds of having an asthma management plan with 25-44 year olds having a 1.39 (95% CI: 1.07-1.81) greater odds and 45-64 year olds having a 1.70 (95% CI: 1.28-2.25) greater odds of having an asthma management plan than those who were 18-24 years of age (Table 4). Women (33.2%) had a 1.27 times greater odds of having an asthma management plan when compared to men (95% CI: 1.07-1.50). Those with a household annual income of \$55,000 or more had a significantly greater chance of having an asthma management plan than those who had less than \$20,000 (OR: 1.36; 95% CI: 1.10-1.68) (Table 4). Current asthmatic adults had a greater odds of having an asthma management plan if they went to a doctor's office (OR: 2.3; 95% CI: 1.54-3.43), or an Emergency Room (OR: 2.4; 95% CI: 1.06-5.55) for preventative care than those who reported having no place of preventative care (Table 4). Those who had health insurance coverage had a 1.63 times greater odds of having an asthma management plan than those without coverage (95% CI: 1.29-2.07) (Table 4). Those who had a usual place of care had a 1.75 (95% CI: 1.29-2.36) greater odds of having an asthma management plan. Current asthmatic adults who reported going to the emergency room because of their asthma

within the last 12 months were 1.83 (95% CI: 1.47-2.28) times more likely than those who did not visit the emergency room to have an asthma management plan (Table 4).

Table 3. Receipt of asthma management plan among current asthmatic adults by socio-demographic, health care access and utilization characteristics

Characteristics	Current Asthmatic adults (%) (n=4,211)	Hispanic Subpopulation (%) (n=530)
Age in years		
18-24	24.2	29.0
25-44	30.8	24.1
45-64	35.2	28.5
Sex		
Male	28.2	18.7
Female	33.2	33.7
Race/Ethnicity		
Non-Hispanic White	31.7	N/A
Non-Hispanic Black	31.5	N/A
Hispanic	28.4	N/A
Other Non-Hispanic	34.2	N/A
Ethnicity		
Puerto Rican	N/A	33.0
Mexican	N/A	25.3
Cuban	N/A	29.0
Dominican	N/A	42.3
Central and South American	N/A	27.0
Other Hispanic	N/A	31.7
Household Income in dollars		
\$0-19,999	27.6	32.2
\$20,000-54,999	31.4	21.9
\$55,000 or more	34.1	26.6
Education		
Never attended- 11 <sup>th</sup> grade	34.7	45.2
High School graduate/GED	27.1	27.3
Some college/AA degree	32.9	28.2
Bachelors, Master, PhD, other professional degree	38.2	27.5
Health Insurance Coverage		
Covered	32.9	31.3
Not covered	23.1	20.0

Table 3 (continued)

Characteristics	Current Asthmatic adults (%)	Hispanic Subpopulation (%)
Usual place of Care		
Yes, I have a place	32.3	30.3
No, I have no place	21.4	15.8
Type of Place for Preventative care		
No preventative care	18.6	13.4
Clinic or health center	24.5	45.6
Doctor's office/HMO	34.5	47.1
Emergency Room	35.7	46.9
Missed work		
Missed 1-365 days	35.0	22.9
Missed no days	31.3	27.1
Emergency Room Visits in past year		
Yes, visited ER	47.1	44.6
No, did not visit ER	32.7	29.2
Main Independent Variables		
Birthplace		
US 50 states and DC	31.6	30.4
US Territories	27.2	27.0
Foreign born	30.7	24.7
Language of Interview		
English	31.6	29.3
Spanish	25.6	25.8
Length of Time†		
< 5 yrs	23.6	13.8
≥ 5yrs	30.9	26.6

† Length of time in the U.S. includes only those who are foreign born

Several predictors usually found to be associated with asthma management (race, education, missing days or work) were not found to be statistically significant in my analysis (Table 3; Table 4). Race, surprisingly, was not a significant predictor of having an asthma management plan. Percentages of those with asthma management plans were low for all racial/ethnic categories ranging from 31.5% (non-Hispanic Black) to 34.2% (Other non-Hispanic) (Table 3). Hispanic/Latinos had the lowest percentage of asthma management plans at 28.4%. Although a greater percentage of people without a High School diploma (34.7%) had an asthma management plan than those who had a diploma (27.1%) or some college (32.9%) education was not a significant predictor of having an asthma management plan (Table 3). Although not significant, current asthmatic adults who missed 1 or more days of work within the past year had a greater odds of having an asthma management plan (OR: 1.18, CI: 0.72-1.93) when compared to those who did not miss any days of work (Table 4).

Table 4. Univariate analysis of the association between having an asthma management plan and socio-demographic characteristics

Characteristics	Sample Population OR (95% CI)	Hispanic Subpopulation OR (95% CI)
Age in years		
18-24	reference	reference
25-44	1.39 (1.07-1.81)	0.778 (0.43-1.41)
45-64	1.70 (1.28-2.25)	0.973 (0.50-1.91)
Sex		
Male	reference	reference
Female	1.27 (1.07-1.50)	2.20 (1.26-3.85)
Race/Ethnicity		
Non-Hispanic White	reference	N/A
Non-Hispanic Black	0.99 (0.80-1.24)	N/A
Hispanic	0.86 (0.67-1.10)	N/A
AIAN/Asian/other Non-Hispanic	1.12 (0.78-1.62)	N/A
Ethnicity		
Puerto Rican	N/A	reference
Mexican	N/A	0.690 (0.45-1.02)
Cuban	N/A	0.829 (0.38-1.80)
Dominican	N/A	1.494 (0.41-5.45)
Central or South American	N/A	0.753 (0.41-1.37)
Other Hispanic	N/A	0.945 (0.47-1.91)
Household Income in dollars		
\$0-19,999	reference	reference
\$20,000-54,999	1.20 (0.99-1.46)	0.589 (0.34-1.01)
\$55,000 or more	1.36 (1.10-1.68)	0.760 (0.37-1.58)

OR= Odds Ratio, CI= Confidence Interval

Table 4 (continued)

Characteristics	Sample Population OR (95% CI)	Hispanic Subpopulation OR (95% CI)
Education		
Never attended- 11 <sup>th</sup> grade	reference	reference
High School graduate/GED	0.700 (0.46-1.06)	0.455 (0.21-0.98)
Some college/AA degree	0.921(0.60-1.41)	0.475 (0.23-1.00)
Bachelors, Masters, PhD, professional Degree	1.16 (0.76-1.78)	0.459 (0.18-1.16)
Health Insurance Coverage		
Covered	1.63 (1.29-2.07)	1.82 (1.06-3.13)
Not covered	Reference	reference
Usual place of Care		
Yes, I have a place	1.75 (1.29-2.36)	2.31 (1.08-4.97)
No, I have no place	reference	reference
Type of Place for Preventative care		
No preventative care	reference	reference
Clinic or health center	1.42 (0.75-2.68)	5.44 (2.02-14.61)
Doctor's office/HMO	2.30 (1.54-3.43)	5.76 (1.51-21.98)
Emergency Room	2.40 (1.06-5.55)	5.72 (0.46-71.29)
Missed work		
Missed 1-365 days	1.18 (0.72-1.93)	0.797 (0.24-2.67)
Missed no days	reference	Reference
Emergency Room Visits		
Yes, visited ER (p<.0001)	1.83( 1.47-2.28)	1.95 (1.12-3.41)

OR= Odds Ratio, CI= Confidence Interval

## Receipt of Asthma Management Plan among Hispanic/Latino Asthmatic Adults

Among the Hispanic/Latino population, women with current asthma (33.7%) were more likely than men (18.7%) to have an asthma management plan (OR=2.20), (Table 3). Hispanic/Latinos who were covered by some kind of health insurance (31.3%) and had a usual place of care (30.3%) were more likely than those without health insurance and a usual place of care to have an asthma management plan. Those covered by some kind of insurance had 1.82 greater odds of having an asthma management plan. Those with a usual place of care had a 2.31 (95% CI: 1.08-4.97) greater odds of having an asthma management plan. Type of usual place for preventative care was a strong indicator for having an asthma management among Hispanic/Latino asthmatic adults. Those who reported going to a clinic (OR: 5.44; 95% CI: 2.02-14.61) or a doctor's office (OR: 5.76; 95% CI: 1.51-21.98) had a greater odds of having an asthma management plan when compared to those without a usual place for preventative care. Those who visited an emergency department in the last 12 months were also more likely to have an asthma management plan (OR: 1.95; 95% CI: 1.12-3.41).

Surprisingly age, income, race/ethnicity, and education were not significant predictors of having an asthma management plan in the Hispanic/Latino population (Table 3; Table 4). Only 29.01% of 18-24 year olds, 28.5% of 45-64 year olds, and 24.14% of 25-44 years olds reported having an asthma management plan and though not a significant predictor the odds show a slight advantage to being younger (Table 3). These percentages are also lower than those reported by the general population. Those reporting a household income of less than \$20,000 had the highest percentage of asthma

management plans (32.2%) (Table 3). Although not significant, Hispanic/Latino asthmatic adults who reported an income of \$20,000-54,999 had a 41% lower odds of having an asthma management plan (OR: 0.589; 95% CI: 0.343-1.013) and those who reported an income of \$55,000 or more had a 24% lower odds of having an asthma management plan (OR: 0.76; 95% CI: 0.365-1.58) when compared to those who reported having an annual income of less than \$20,000 (Table 4). Dominicans (42.3%) had the highest percentage of those having an asthma management plan while Mexicans (25.3%) had the lowest percentage (Table 3). Among the other Hispanic/Latino ethnicities, 33.0% of Puerto Ricans, 31.7% of other Hispanics, 29.0% of Cubans, and 27% of Central and South Americans reported having an asthma management plan (Table 3). These percentages were not found to be statistically different. Also those who do not have their high school diploma had higher percentages of asthma management plans (45.2%), there was an extremely wide confidence interval associated with that percentage (95% CI: 29.8-60.7). The odds reflect the same findings (Table 4). Though not significant, when compared to those having less than a high school diploma, all other education categories had lower odds of having an asthma management plan.

#### Association between receipt of asthma management plan and birthplace, length of time in U.S. and language of interview

There were no statistically significant findings when examining the univariate analysis of the association between receiving an asthma management plan and birthplace, length of time in the U.S., and language of interview. There were some trends of being of some advantage if you were born in the U.S. or D.C., lived in the U.S. longer, and/or



spoke English during the interview (Table 5). After controlling for variables significantly associated with receiving an asthma management plan (age, sex, income, education, insurance, usual place of care, and visits to the emergency room in most models), similar trends were seen for both birthplace and length of time in the U.S. (Tables 6-9). There was a significant association between language of interview and the receipt of an asthma management plan (Table 9).

Table 5. Univariate analyses of having an asthma management plan by birthplace, language of interview, and length of time in U.S.

Variable	Current Asthmatics OR (95% CI)	Hispanic Current asthmatics OR (95% CI)
<b>Birthplace</b>		
U.S. 50 states and D.C.	1.04 (0.78-1.40)	1.33 (0.77-2.29)
U.S. territories	0.84 (0.45-1.58)	1.12 (0.54-2.34)
Foreign born	reference	reference
<b>Language of Interview</b>		
English	1.35 (0.76-2.39)	1.19 (0.64-2.23)
Spanish	reference	reference
<b>Length of time in the U.S. †</b>		
< 5 yrs	reference	reference
≥ 5yrs	1.45 (0.50-4.24)	2.28 (0.98-5.30)

† Length of time includes only those who are foreign born  
OR= Odds Ratio, CI= Confidence Interval

#### Birthplace: Current Asthmatics

In the univariate analysis there was a trend in which those who were born in the 50 states or D.C. have a 4% greater odds of having an asthma management plan (OR: 1.04; 95% CI: 0.78-1.40) while those born in the U.S. territories have a 16% lower odds

of having an asthma management plan (OR: 0.841; 95% CI: 0.45-1.58) (Table 5). After adjusting for age, sex, income, education, insurance, usual place of care and visits to the emergency room due to asthma, current asthmatic adults who were born in the U.S. 50 states or D.C. had a 1.18 (95% CI: 0.81-1.72) greater odds of receiving an asthma management plan (Table 6).

Table 6. Multivariate Logistic analysis of the odds of receiving an asthma management plan by birthplace among current asthmatic adults

	Odds Ratio	95% Confidence Interval
<b>Birth place*</b>		
U.S. 50 states and D.C. (p=0.099)	1.18	0.812-1.72
Foreign born and U.S. territories	reference	

\*Model = age, sex, income, education, insurance, usual place of care, and visits to the emergency room

#### Birthplace: Hispanic/Latino Population

Although not significant, Hispanic/Latino asthmatic adults who were born in the U.S. 50 states and D.C. (OR: 1.33; 95% CI: 0.77-2.29), and those born in U.S. territories (OR: 1.12; 95% CI: 0.55-2.34) seemed to have a greater odds of having an asthma management plan than those born in other countries (Table 5). After controlling for age, sex, income, education, insurance, usual place of care and visits to the emergency room due to asthma the trend persisted. Among Hispanic/Latino current asthmatic adults those who were born in the U.S. or D.C. had a 1.98 greater odds of receiving an asthma

management plan (95% CI: 0.74-5.31) when compared to foreign born Hispanic/Latino current asthmatics (Table 7). Hispanic/Latinos had a 0.46 lower odds of receiving an asthma management plan when compared to foreign born Hispanic/Latino current asthmatic adults (Table 7).

Table 7. Multivariate Logistic analysis of the odds of receiving an asthma management plan by birthplace among current Hispanic asthmatic adults

Birthplace	Odds Ratio	95% Confidence Interval
U.S. 50 states and DC (p=0.11)	1.98	0.741-5.312
U.S. territories (p=0.27)	0.460	0.116-1.83
Foreign born	reference	

\*Model = age, sex, income, education, insurance, usual place of care, and visits to the emergency room

## Length of Time in the U.S.: Current Asthmatics

In the univariate analysis, foreign born participants, who lived in the U.S. more than five years had a 1.45 times greater odds of having an asthma management plan than those who lived in the U.S. less than 5 years (95% CI: 0.50-4.24) (Table 5). The magnitude of the trend increased when the model controlled for sex, age, income, education, insurance coverage, usual place of care, and emergency room visits. Although not significant, foreign born individuals who were in the U.S. five years or more had a 4.3 greater odds of having an asthma management plan than those who were here less than five years (Table 8). Those who were born in a U.S. territory had 70% lower odds of having an asthma management plan (Table 8). Age, sex, and education were the only variables controlled for in this model because of low sample size and empty cells of data.

Table 8. Multivariate Logistic analysis of the odds of receiving an asthma management plan by length of time in the US among the current asthmatic adult population

Length of time	Foreign born* (95% CI)	US Territories ** (95% CI)
< 5 yrs	reference	reference
≥ 5yrs	4.3 (0.63-29.6)	0.30 (0.042-2.08)

\*model= sex, age, income, education, insurance, usual place of care, emergency room visits

\*\*model = age, sex and education

OR= odds ratio, CI= Confidence Interval

### Length of time in the U.S.: Hispanic/Latino Population

It seems that participants who were foreign born may have a greater odds of having an asthma management plan once they have been here five or more years among the Hispanic/Latino population (OR: 2.28; 95% CI: 0.98-5.30) (Table 5). A model could not be accurately fit when restricting analysis to the Hispanic/Latino population because of low sample size and empty cells of data.

### Language of Interview among the Hispanic/Latino Population

In the univariate analysis, those who spoke English throughout the interview had a 35% greater odds of having an asthma management plan when compared to those who spoke Spanish throughout the interview (OR: 1.35; 95% CI: 0.76-2.40) (Table 5). This estimate may be unstable, as seen with the confidence interval, because of such small numbers of Spanish speaking participants in the survey. Only 1.34% of current asthmatic adults in this sample spoke Spanish during the interview. When just looking at the Hispanic/Latino population we see a similar trend (OR: 1.19; 95% CI: 0.64-2.23).

In the multivariate analysis, when examining the effects of language on the receipt of an asthma management plan among the Hispanic/Latino population, there were some significant results (Table 9). In a model controlling for sex, education, insurance, emergency department visits, birthplace and length of time in the U.S., Hispanic/Latino participants who spoke English during the interview had a 3.43 times greater odds of having an asthma management plan when compared to those who spoke Spanish (95% CI: 1.97-5.98) .

Table 9. Multivariate Logistic analysis of the odds of receiving an asthma management plan by language of interview among current Hispanic/Latino asthmatic adults

Language of Interview	Hispanic Population * (95% CI)	Hispanic Immigrant population (US territories) ** (95% CI)	Hispanic Immigrant Population (Foreign born) ** (95% CI)
English	3.434 (1.97-5.98) †	1.46 (0.061-34.72)	3.84 (0.41-36.17)
Spanish	Reference	Reference	Reference

\*model = sex education, insurance, usual place of care, emergency room visits, birthplace, length of time in the US

\*\*model = sex, education, insurance, usual place of care, emergency room visits

† (p<.001)

When restricting the analysis to Hispanic/Latino immigrants, there were similar trends but no statistically significant results. Hispanic/Latinos who were born in a U.S. territory and spoke English during the interview showed 1.46 greater odds of having an asthma management plan when compared to those who spoke Spanish during the interview. Hispanic/Latinos who were born in a foreign country and spoke English during the interview had a 3.84 times greater odds of having an asthma management plan than those who spoke Spanish during the interview (95% CI: 0.41-36.17).

## Chapter 4: Discussion

Preliminary analysis showed some surprising results. Unlike much of the published research, those who had less than a High School diploma, and reported an income less than \$20,000 had higher percentages of having an asthma management plan (32.2%), (38, 41). Possible reasons for this finding could be that those with less education or lower incomes frequent community clinics for care or use public insurance and assistance programs. Those with lower education and lower income may be more likely to go to a community clinic, where there have been efforts to standardize asthma care (51).

These data also show that current asthmatic adults who reported visiting the emergency room due to asthma, had 1.83 times greater odds of having an asthma management plan than those who reported not visiting an emergency room. While initially surprising, we cannot assess which came first, the emergency room visit or the asthma management plan. The participants who reported going to the emergency room may have been referred to a primary care provider or clinic that provided them with an asthma management plan. Also having an asthma management plan and having to visit the emergency room could be a function of asthma severity. Those who have more severe asthma could be more likely to have an asthma management plan and also end up in the emergency room more often than those who have less severe asthma (15, 20, 52). To assess the role of asthma severity in explaining these findings, an asthma severity scale may be used.

The multivariate analysis yielded mostly non-statistically significant results except for language of interview. When examining birthplace, there was some trend showing that being born in the U.S. or D.C. was associated with having an asthma management plan. Although not significant, current asthmatic adults born in the U.S. had a 1.18 times greater odds of having an asthma management plan (95% CI: 0.812-1.72). In the Hispanic/Latino population, those born in the U.S. had a 1.98 greater odds of having an asthma management plan when compared to those who were foreign born (95% CI: 0.741-5.31)

Extensive literature review did not find any articles that look directly at the connection between birthplace and having an asthma management plan. One article found that Hispanic/Latino children were less likely to receive an action plan after a hospital discharge due to asthma when compared to white children (53). A few other articles showed that those who were born outside of the U.S were less likely to have good disease management (31, 54).

When analyzed by length of time in the U.S., foreign born current asthmatic adults had 4.3 times greater odds of having an asthma management plan if they had lived in the U.S. for at least 5 years when compared to those who lived in the U.S. less than five years. Though not statistically significant, these results have great practical significance. These results show that time in the U.S. may have some affect on the receipt of an asthma management plan. Although I could not control for many known confounding variables (i.e., type of place of care, receipt of preventative care, asthma



severity), because of sample size, it seems as though just being foreign born may give a person a disadvantage to receiving an asthma management plan.

Research focusing on other chronic diseases and their long term management have also found similar disadvantages that could not be explained by health care access and related factors. For instance, Sanghavi et al found that birthplace was a major factor in receiving cancer screening for many immigrant populations (35). Several other authors have found similar results when examining quality of care, health status, and several other chronic diseases. Huang et al found that children in immigrant families were less likely to use health care services and had lower health status (55). Abe-Kim found that, although mental health care use was low for all Asian Americans when compared to non-Hispanic whites, foreign born Asian Americans used mental health services the least (56).

Language of interview was the only variable that yielded a significant result. Among the Hispanic/Latino population, current asthmatic adults who spoke English had a 3.4 times greater odds of having an asthma management plan than those who spoke Spanish after controlling for length of time in the U.S., birthplace and other significant predictors of asthma management. These findings suggest that language poses a barrier to receipt of an asthma management plan. Communication barriers may be an issue to proper care(36, 57). In this analysis, I was not able to further assess the role of patient-provider communication factors. Also, research shows that those with limited English proficiency are less likely to get the preventative care that is needed when one has asthma (47, 57). Studies show that those who speak Spanish, or a different language other than

English, have poorer asthma management practices. Chan et al found that Latinos who spoke Spanish had lower rates of asthma management practices and knowledge when compared to their non-Hispanic white counterparts (58). What made the Chan study more interesting was that when English speaking Latinos were compared to non-Hispanic whites, asthma management practices were also lower but non-significant. Chan et al showed that language may compound the affects of lower asthma management knowledge (58).

These findings suggest that birthplace, length of time in the U.S., and language may have an effect on receipt of an asthma management plan among current asthmatic adults. Although language was the only significant finding, all three factors show consistent trends suggesting further study is needed. Much research focuses on racial/ethnic disparities in proper asthma management but less is known regarding the why these disparities exist (59, 60). Although this sample proved too small for specific analysis on different Hispanic ethnicities, results hint towards differences in the receipt of asthma management plans. To further explore this idea of foreign birth, length of time in the U.S. and language of interview affecting the receipt of an asthma management plan, future studies could benefit from using a data set with a larger number of immigrants. It would be interesting also to see if we see the same trends in other immigrant populations (i.e., Asian, African, Caribbean, European) as we see in the Hispanic/Latino population.

Studies show that immigrants are usually at an advantage when it comes to disease occurrence and overall health status. Lucas et al found that foreign born non-Hispanic black men had a lower odds of reporting fair to poor health status, lower odds

of smoking, and greater odds of doing some type of physical activity and having health insurance when compared to U.S. born non-Hispanic black men (30). Although immigrants are usually healthier, once they acquire a chronic disease their outcomes are usually worse than their U.S. born counterparts. As seen in this study, U.S. born participants tended to have a greater odds of having an asthma management plan. Faramond showed that Spanish speaking Hispanics had the lowest control of cardiovascular disease risk factors. When adjusted for age and gender Spanish speaking Hispanics had significantly higher systolic blood pressures, LDL cholesterol and fasting glucose (61). Health screenings for cancer and other preventative care outcomes are also lower for the foreign born population in the U.S. (25, 33). This preliminary study showed similarities in trends by birthplace, length of time in the U.S., and language of interview and its effects on disease management. Although there is much controversy surrounding the underlying constructs of these proxy measures of acculturation, this preliminary study shows that these particular measures of acculturation can affect the health outcomes of foreign born individuals (26, 27).

### Strengths

There are several strengths in using the National Health Interview Survey. It is a large nationally representative study which oversamples African Americans and Hispanic/Latinos, and provided enough diversity to answer my research questions. This survey covers a myriad of health topics and also collects socio-demographic information on many levels. Self-reported asthma diagnosis has been tested for validity and reliability, and the specific questions used in this survey are used in other surveys (e.g.,

National Asthma Survey). The NHIS data are also publicly available. The large and nationally representative nature of this survey also strengthens its generalizability.

### Limitations

The NHIS is a cross-sectional study and many of the same limitations that apply to this type of design apply here. In cross-sectional studies, all information is collected at one point of time. We have no information on when a person was diagnosed with asthma, so we have no idea how long they may have had the disease. Greater length of time since diagnosis is likely tied to greater opportunities to obtain asthma management education. Causality cannot be established because temporality cannot be ascertained. For instance, in this study those who visited the ER had a greater odds of having an asthma management plan. Because temporality could not be ascertained, there is no way of knowing which came first, the ER visit or the asthma management plan.

This survey relies on self-reported data raising issues such as memory of the participant, understanding of the materials doctors gave them, and getting correctly diagnosed for asthma. Participants may have received the asthma management education the survey assesses, but may not have understood what they were given or how it is to be used. Also participants may not remember that their doctors gave them the information. Another issue could arise in the terminology used. Doctors may have used different terminology than that used in the survey. Also because this survey depends on a previous diagnosis of asthma by a health professional, undiagnosed asthmatic adults are excluded. These issues of memory and knowledge may lead to recall bias in participants when ascertaining their receipt of an asthma management plan. Some participants who truly do

not have an asthma management plan may have reported they did and vice versa. This misclassification of the outcome (having an asthma management plan) may have affected the results of this study. If participants reported having an asthma management plan, when in actuality they did not, this over-reporting could have caused an underestimation of the true relationship between the exposure and outcome variables. The fact that language was still a significant predictor of having an asthma management despite this potential bias shows that communication barriers are a very important factor in proper asthma and health care quality.

As expected with the low power (12.2%), sample size was the major issue in this analysis. Deeper exploration of the associations between having an asthma management plan and my variables of interest was not possible due to the relatively low sample size. Multivariate analysis of the data by specific Hispanic/Latino ethnicities (i.e., Mexican, Puerto Rican) and some of the multivariate analysis had to be simplified because of the lack of adequate sample size and empty cells. Type of place of care, although it had a strong association with having an asthma management plan, had to be removed from all of the models because of empty cells of data. Also many other variables had to be removed from some of the multivariate analyses because of the inadequate numbers. Further exploration of birthplace, length of time in the U.S., and language may be possible in a dataset with a larger number of immigrants. One example could be the National Asthma Survey, which sampled four states including California.

## Implications

Although this is only a preliminary study of the potential effects of foreign birth, length of time in the U.S. and language of interview on the receipt of an asthma management plan, this study has the potential to begin a research focus in areas not heavily studied. Though foreign birth and length of time in U.S. were not significantly associated with disparities in the receipt of an asthma management plan, the practical significance of these results implores us to search deeper using richer data sources. These associations show us that racial/ethnic disparities in the receipt of an asthma management plan are a much more complex issue than once thought, and policies should be put in place to help with that issue. Particularly with language barriers, laws that protect limited English proficient persons should be enforced, and culturally competent care should be reinforced. More emphasis on patient education in management programs and well care visits may be needed to truly combat disparities in asthma management education (62).

Research focusing on asthma management, and management of other chronic diseases among the foreign born, may also lead to more targeted and focused programs to increase proper management and screening and ultimately decrease the detrimental effects of improper management of disease. Disparities in health care access and utilization are a very intricate issue with many factors. Research that gives us the information to make better decisions about our nation's health will help the total nation in the long run. With this current push for national health care reform, immigrants cannot be forgotten and more research examining the unique circumstance immigrants live in is

definitely needed. Efforts to improve the health in the nation should include every single person in this nation.

## Appendices



Appendix A: Example of Asthma management Plan for Adults.

FIGURE 5. SAMPLE ASTHMA ACTION PLAN—ADULT

**ENGLISH**

## My Asthma Action Plan


Patient Name: \_\_\_\_\_  
 Medical Record #: \_\_\_\_\_  
 Physician's Name: \_\_\_\_\_ DOB: \_\_\_\_\_  
 Physician's Phone #: \_\_\_\_\_ Completed by: \_\_\_\_\_ Date: \_\_\_\_\_

Long-Term-Control Medicines	How Much To Take	How Often	Other Instructions
		_____ times per day <b>EVERY DAY!</b>	
		_____ times per day <b>EVERY DAY!</b>	
		_____ times per day <b>EVERY DAY!</b>	
		_____ times per day <b>EVERY DAY!</b>	
Quick-Relief Medicines	How Much To Take	How Often	Other Instructions
		Take <b>ONLY</b> as needed	NOTE: If this medicine is needed frequently, call physician to consider increasing long-term-control medications.

Special instructions when I feel  *good*,  *not good*, and  *awful*.

**GREEN ZONE**


**I feel good.**  
 (My peak flow is in the GREEN zone.)



**YELLOW ZONE**

**I do not feel good.**  
 (My peak flow is in the YELLOW zone.)  
 My symptoms may include one or more of the following:


- Wheeze
- Tight chest
- Cough
- Shortness of breath
- Waking up at night with asthma symptoms
- Decreased ability to do usual activities



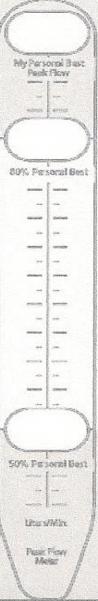
**RED ZONE**

**I feel awful.**  
 (My peak flow is in the RED zone.)  
 Warning signs may include one or more of the following:

- It's getting harder and harder to breathe
- Unable to sleep or do usual activities because of trouble breathing



**Danger! Get help immediately!**



**PREVENT** asthma symptoms everyday:

- Take my long-term-control medicines (above) every day.
- Before exercise, take \_\_\_\_\_ puffs of \_\_\_\_\_
- Avoid things that make my asthma worse like: \_\_\_\_\_

**CAUTION.** I should continue taking my long-term-control asthma medicines every day AND:

- Take \_\_\_\_\_

If I still do not feel good, or my peak flow is not back in the *Green Zone* within 1 hour, then I should:

- Increase \_\_\_\_\_
- Add \_\_\_\_\_
- Call \_\_\_\_\_

**MEDICAL ALERT! Get help!**

- Take \_\_\_\_\_ until I get help immediately.
- Take \_\_\_\_\_
- Call \_\_\_\_\_

Call 9-1-1 if you have trouble walking or talking due to shortness of breath or lips or fingernails are gray or blue.

Adapted and reprinted with permission from the Regional Asthma Management and Prevention (RAMP) Initiative, a program of the Public Health Institute, to include terms used in the EPR—3: Full Report 2007.

Source: <http://www.calasthma.org/uploads/resources/actionplanpdf.pdf>; San Francisco Bay Area Regional Asthma Management Plan, <http://www.rampasthma.org>

Guidelines for the Diagnosis and Management of Asthma

Taken from the NAEPP Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma, pg 20(13)

Appendix B: Variable List

Variable	Variable Name	New name	Where to find	Type	Description	Categories
Lifetime asthma	AASMEV	Evrsthm	samadult	Categorical	Categorized dichotomously	Yes =1 No =2 Missing unknown, refused unascertained
Current asthma	AASSTILL	Astill	samadult	Categorical	Categorized dichotomously	Yes = 1 No =2 Missing: unknown refused unascertained
Asthma Management Measure						
Asthma Management plan	AASWMP	asthman	samadult	Categorical	Categorized dichotomously	Yes =1 No=2 Missing don't know refused unascertained
Independent Variables						
Asthma Control	Awzmswk	Wrkmiss	Samadult	Categorical	Categorized dichotomously	1= no days missed 2 = 1- 365 days of work missed Missing: refused, cannot do this activity, don't know, not ascertained
Asthma emergency visits	aasmeryr	EDasthma	Samadult	Categorical	Categorized dichotomously	1= yes 2= now Missing: don't know refused not ascertained
Birthplace	GEOBRTH	brthplc	personsx	Categorical	3 categories	1= born in one of the 50 states or DC 2= born in a U.S. territory 3= not born in the U.S. or U.S.

Variable	Variable Name	New name	Where to find	Type	Description	Categories
						territory Missing= don't know; not ascertained
Birthplace	GEOBRTH	Brthplc1	personsx	Categorical	Categorized dichotomously	1= born in one of the 50 states or D.C. 2= born in a U.S. territory or foreign born
Length of Time in U.S. (foreign born and U.S. territories)	YRSINUS	lnghtme	personsx	Categorical	Categorized dichotomously	1= less than 5 years 2= 5 years or more Missing unknown
Language of Interview	LNG_INTV	lang	household	Categorical	Categorized dichotomously	1= English only 2 = Spanish only Missing = Spanish and English, refused, don't know, no ascertained
Age	R_AGE1	age	Personx	Categorical	Categorical	1 = 18-24 2= 25-44 3 = 45-64 Missing= 65and older
Sex	SEX	Not changed	samadult	Categorical	Categorized dichotomously	1= male 2= female
Education	EDUC	Edu1	samadult	Categorical	Categorized as less than high school diploma; high school diploma or GED; some college; ; bachelor's degree or higher	1= never attended-11 grade 2=high school graduated/GED 3=some college/AA degree 4= Bachelor's degree, masters degree, professional degree, PhD Missing = Refused, Not Ascertained, Don't know

Variable	Variable Name	New name	Where to find	Type	Description	Categories
Hispanic origin	HISPAN_1	Hispan	Person level	Categorical		1= Puerto Rican 2= Mexican 3=Cuban 4=Dominican 5= Central and South American 6= other Hispanic
Combined race/ethnicity	Racehis	Combined Hispanic origin and race	n/a	categorical	Combines race and ethnicity into one variable	1= non-Hispanic White 2= Non-Hispanic Black 3= Hispanic 4= other Non-Hispanic (includes Asian and American Indian/Alaska Native)
Health Insurance coverage	notcov	Notcov1	Household	Categorical	Categorized dichotomously	1= not covered 2= covered Missing= refused, not ascertained, don't know
Usual place for care	AUSUALPL	Usual1	Sample adult	Categorical	Categorized as having a place, having no place, and there is no one place	1 = yes have a usual place 2=no has no usual
Access to care	AHCPLKND	uplace	Sample adult	categorical		1= no preventative care 2= clinic or health center 3= Doctor's office or HMO 4= Emergency room
Income	Incgrp	Income	Personx	Categorical		1 = \$ 0-19999 2= \$20000-54999 3 =\$55000and over

Appendix C: Dummy Variable

Variable (variable name)	Reference (X)	#	Category	Dummy Variable Name
Education (edu)				
	X	1	Never attended- 11 <sup>th</sup> grade	Edu1
		2	High School graduate/GED	Edu2
		3	Some college/AA degree	Edu3
		4	Bachelor's Degree, Master's Degree; Professional degree; PhD	Edu4
Visited the ER (edasthma)				
		1	Yes, visited ER w/in last 12 months	Edasthma1
	X	2	No, did not visit ER	Edasthma2
Sex (sex)				
	X	1	Male	Sex1
		2	Female	Sex2
Age (age)				
	X	1	18-24	Age1
		2	25-44	Age2
		3	45-64	Age3
Asthma management (asthman)				
		1	Yes, have a plan	Asthman1
		2	No, does not have a plan	Asthman2
Birthplace (Brthplc)				
		1	U.S. 50 states and D.C.	Brthplc_1
	X	2	U.S. territories and foreign born	Brthplc_2
Birthplace (Brthplc1)				
		1	U.S. 50 states and D.C.	Brthplce1
		2	U.S. territories	Brthplce2
		3	Foreign born	Brthplce3
Income (income)				
	X	1	\$0-19,999	Income_1
		2	\$20,000- 54,999	Income_2
		3	\$55,000 or more	Income_3
Language (lang)				
		1	English	Lang1
	X	2	Spanish	Lang2
Length of time in the U.S. (lnghtme3)				
	X	1	Less than 5 years	Lnghtme_1
		2	More than or equal to 5 yrs	Lnghtme_2

Insurance Coverage (notcov1)				
	X	1	Not covered	Notcov_1
		2	Covered	Notcov_2
Usual Care (usual1)				
		1	Yes, have a usual place of care	Usual_1
	X	2	No, have no usual place of care	Usual_2
Race/ethnicity (raceth)				
	X	1	Non-Hispanic White	Raceth1
		2	Non-Hispanic Black	Raceth2
		3	American Indian/Alaska Native	Raceth3
		4	Asian	Raceth4
		5	Puerto Rican	Raceth5
		6	Mexican	Raceth6
		7	Dominican	Raceth7
		8	Central and south American	Raceth8
		9	Other Hispanic	Raceth9
		10	Other Non-Hispanic	Raceth10
Race/ethnicity (racehis)				
	X	1	Non-Hispanic White	Racehis1
		2	Non-Hispanic Black	racehis2
		3	Hispanic	racehis3
		4	Other Non-Hispanic/AIAN/Asian	Racehis4
Ethnicity (hispan)				
	X	1	Puerto Rican	Hispan1
		2	Mexican	Hispan2
		3	Cuban	Hispan3
		4	Dominican	Hispan4
		5	Central or South American	Hispan5
		6	Other Hispanic	Hispan6
Days Missed from work (wrkmiss)	X	1	No days missed	Wrkmiss1
		2	1 to 365 days missed	Wrkmiss2
Usual place of preventative care (uplace)	X	1	No place of preventative	Uplace1
		2	Clinic or health center	Uplace2
		3	Doctor's office or HMO	Uplace3
		4	Emergency Room	Uplace4

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