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Risk Factors that Predict Asthma Among Adult, foreign-born African Americans in California

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This is to certify that the doctoral study by

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Walden University
2018

Abstract

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MS, Hohai University, 2003

BS, Njala University, 1998

Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Public Health

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Abstract

The purpose of this quantitative study was to examine possible risk factors that predict asthma among adult, foreign-born African Americans in California. A total of 794 foreign-born African Americans (87 asthma cases) were included from the 2017-2018 California Health Interview Survey database. Data analysis included both descriptive and inferential statistical methods including chi-square analysis and multiple logistic regression techniques. The socioeclogical model was used to help understand and interpret the findings. The dependent variable was asthma status and the independent variables were the risk factors (tobacco smoking, alcohol use, health insurance, income level, and education level). Confounders included in the analysis were age, gender, and marital status. Findings yielded no statistically significant relationship between asthma status and tobacco smoking ($p = 0.19$, $x^2 = 1.74$, $OR = 0.59$, 95% CI = 0.27-1.30), alcohol use ($p = 0.92$, $x^2 = 0.01$, $OR = 0.98$, 95% CI = 0.61-1.58), health insurance ($p = 0.63$, $x^2 = 0.23$, $OR = 0.85$, 95% CI = 0.44-1.65), income level ($p = 0.99$, $x^2 = 0.00$, $OR = 0.99$, 95% CI = 0.44-2.24), or education level ($p = 0.47$, $x^2 = 0.52$, $OR = 1.51$, 95% CI = 0.49-4.59). Although this study did not find significant associations between asthma and study variables, study limitations, mainly the small sample size, may have prevented the detection of small associations. Future research should involve a larger sample size to investigate whether the findings reported remain true. This study is a step in the exploration of the problem and has the potential to promote positive social change by increasing asthma awareness among foreign-born African Americans in California and among public health policy makers.

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Dedication

This doctoral study is dedicated to my late father, Mohamed Sanusie Barrie, and my late sister, Umu Hawa Barrie. Also, this work is specially dedicated to my loving and caring wife, Susan Nancy Barrie; my children, Sanusie, Umu, and Cherinor; and my mother, Kadiatu Barrie. I could not have achieved this level without you all in my life.

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Section 1: Foundation of the Study and Literature Review

Introduction

This research study was centered on an examination of risk factors that predict asthma among adult, foreign-born African Americans in California. Health studies have often highlighted an association between asthma and several risk factors such as tobacco smoking, alcohol use, and access to health care (Lee, Forey, & Coombs, 2012). Some researchers claim that most people who have asthma and are exposed to these risk factors are in double jeopardy because the presence of asthma is bad for their health and the additional risk factors could worsen it (Dutra, Williams, Gupta, Kawachi, & Okechukwu, 2014). A worsened asthma condition could lead to excessive mucus production, chronic cough, and phlegm (Lee et al., 2012). Additionally, for many asthmatic patients, these risk factors may not only manifest in the aforementioned symptoms, but also make breathing difficult and lead to death (Gilreath, Chaix, King, Matthews, & Flisher, 2012).

The focus on foreign-born African Americans as a target population for this study was important because this population is a relatively understudied group. Furthermore, the population is mostly underinsured and experiences significant variations in terms of education and income outcomes, relative to other ethnic groups (Dutra et al., 2014). Because of the low socioeconomic status (SES) of foreign-born African Americans, they often experience inadequate medical care, which is often characterized by the lack of access to health care services (Dutra et al., 2014; Gilreath et al., 2012). Besides poor socioeconomic conditions, foreign-born African Americans also suffer from other risk factors such as environmental exposures (because of the difficult working conditions they

are often subject to) and respiratory tract infections that are often associated with low-income living (Dutra et al., 2014).

This study may have a positive impact on social change because it could help to increase asthma awareness within the target population. Such an outcome would come, in part, from understanding the association between risk factors and asthma. Understanding the association between these variables could also help to improve the health outcomes and well-being of immigrant populations in California. The research could also shed more light on the factors that affect the association between asthma and its risk factors. The insights drawn from this study could also be instrumental in understanding the social, economic, and political factors associated with foreign-born African Americans in California and provide a better understanding of their health outcomes and overall well-being. Additionally, the findings of the study could help to expand the body of research by explaining the association between risk factors and asthma among foreign-born African Americans in California. Thus, this study could promote positive social change by informing health policy decisions regarding the risk factors and asthma management in California.

The first section of this study starts with a review of the research topic, which focuses on the research gap. This was followed by the problem statement, purpose of the study, research questions, and research hypotheses. The next section presents the theoretical framework, which grounds this study. This was followed by the nature of the study. The literature review starts with an outline of the search strategy followed by an extensive review of materials related to the key variables and concepts of this study. Key

definitions, study assumptions, scope and delimitations, and limitations of the study were then presented. The final part of this section explains the significance of this study followed by a summary and conclusion.

Problem Statement

African and Hispanic immigrants suffer a high risk of asthma fatalities compared to major ethnic groups in California (Findley & Matos, 2015). For example, the prevalence of asthma among Puerto Ricans and foreign-born African Americans is significantly higher than other racial and ethnic groups in America. Relative to this assertion, the American Psychological Association (2017) says that more African Americans have emergency room visits and morbidity rates associated with asthma than European Americans do. Furthermore, African Americans are not only disproportionately affected by asthma compared to their European American counterparts; they are also encumbered with higher rates of asthma-related morbidity and death, relative to European Americans (American Psychological Association, 2017). The statistics are also unfavorable for Hispanics because they have an asthma incidence of 16%, while European Americans have an incidence of 7%; African Americans have an asthma incidence of 11% (American Psychological Association, 2017). These statistics show that racial and ethnic minorities have a disproportionately higher incidence of asthma compared to European Americans.

This high incidence of asthma was largely because of socioeconomic disadvantages and the lack of proper access to health care services (Findley & Matos, 2015). Tobacco smoking was also a contributor to this outcome because different studies

have shown that many immigrants often continue their smoking habits after arriving in the United States (Amer & Awad, 2015). Researchers who have further investigated this issue point out that, immigrants experience fewer inhibitions about tobacco smoking because of a group-based cultural identity theory, which presupposes that they are free to smoke in America because of fewer social inhibitions that often prevented them from doing so in their home countries (Gatrell & Elliott, 2014). Nonetheless, this habit contributes to their poor health outcome. This statement was supported by the fact that after migrating to the United States, few variations in smoking prevalence emerge among different types of racial and ethnic groups. For example, the American Psychological Association (2017) reported that Hispanics, European Americans, and African Americans have smoking prevalence rates of 23%, 25% and 26%, respectively. These percentages show that there is only a 3% difference in the incidence of smoking across the racial groups. There was a significant difference between these statistics and the smoking incidence of immigrant populations, because before coming to America, the smoking incidences of most immigrant populations were within the ranges of 16% and 18% (American Psychological Association, 2017). Thus, immigration accounts for about a 6% rise in smoking incidences within this demographic. Collectively, this net increase in smoking incidences contributes to poor respiratory health outcomes (American Psychological Association, 2017).

Another set of contributors to the poor health outcome among immigrants was the nature of jobs that they perform in America. As demonstrated by Braback, Vogt, and Hjern (2011), most immigrants often work in low-paying jobs that expose them to indoor

and outdoor air pollution, which affects their overall health. Most of these jobs are concentrated in the agricultural, construction, and service sectors (Gatrell & Elliott, 2014). Some of the materials used in these industries contain harmful chemicals that further jeopardize their general health. For example, glues, insulation, and wood products contain harmful chemicals that are known to harm people's health (Braback et al., 2011). Paints, cleaning products, and carpets also contain similar harmful chemicals, such as formaldehyde, which cause respiratory health complications.

Although there are foreign-born African Americans residing in the United States, many health studies have often categorized them as African Americans, thereby failing to draw the distinction between the health outcomes of African Americans and foreign-born African Americans (Schenker, Casta-eda, & Rodriguez-Lainz, 2014). Furthermore, this population group (foreign-born African Americans) is one of the understudied groups in the area of immigrant health because researchers have mostly focused on studying Hispanics and Asian immigrants (Gatrell & Elliott, 2014). The neglect of foreign-born African Americans, as a significant health cohort worth studying, betrays the spirit of public health, which promotes the provision of a holistic picture of health management (Moreland-Russell & Brownson, 2016). With this study, I sought to fill this research gap by examining the risk factors that may predict asthma among adult, foreign-born African Americans in California.

Purpose of the Study

The purpose of this study was to examine the risk factors that predict asthma among adult, foreign-born African Americans residing in California. Also, I used a

quantitative correlational approach. For my inferential statistical analysis, I used the multiple logistic regression using the Statistical Package for the Social Sciences (SPSS) software. The dependent variable was asthma status and the independent variables were the risk factors (tobacco smoking, alcohol use, education level, income level, and health insurance). The confounders were age, gender, and marital status.

This study was a secondary analysis of archived data obtained from the California Health Interview Survey (CHIS), an annual health database in the state. The data were developed from an annual telephone interview of about 20,000 Californians and is considered the largest in the United States at the state level (Elk & Landrine, 2012). The CHIS database is an annual, cross-sectional survey and was appropriate for this study because it was credible and reliable. I also chose to use this database as the source of data for my study because it was not only free, but also easy to use. The reliability of research data was supported by the fact that the internal consistency of the scales used to measure the variables in question (in the CHIS database) were found to be excellent (CHIS, 2014). The Cronbach's alpha value was 0.89 for most of the research scales used, based on a sample of 100 households (CHIS, 2014). The validity of the research data was evaluated through a pilot study, which centered on interviewing adults using telephones. The interviews were conducted a few months before the actual research was undertaken, as indicated by Guerrero, Ponce, and Chung (2015), who similarly used CHIS data to evaluate the dietary practices of Latinos and Hispanics living in California. By doing so, the researchers evaluated the feasibility of sampling and interviewing the respondents using telephones. The overall results of the pilot study showed that the first 100

interviews did not show any signs of poor validity or high rates of false negative or false positive responses, especially when compared to prior responses provided in other national quantitative studies (Guerrero et al., 2015). In fact, different professionals have used it to conduct health needs assessments, other health research, and develop grant proposals (Elk & Landrine, 2012). Others have used it in news reporting and policy-making with great success. This record of accomplishment using the CHIS database affirms its reliability and credibility.

Research Variables and Study Population

The research variables and study population for this quantitative correlational study were as described below.

Dependent variable (DV): Asthma status

Independent variables (IV): Tobacco smoking, alcohol use, health insurance, income level, and education level.

Confounders: Age, gender, and marital status.

Study population: Adult, foreign-born African Americans in California

Research Questions and Hypotheses

The quantitative research questions (RQ) and their corresponding null hypotheses (H_0) and alternative hypotheses (H_1) for this study are stated below.

RQ1: Does tobacco smoking predict asthma status among adult, foreign-born African Americans in California when adjusting for age, gender, and marital status?

$H_0$1: Tobacco smoking does not predict asthma status among adult, foreign-born African Americans in California when adjusting for age, gender, and marital status.

$H_1$1: Tobacco smoking predicts asthma status among adult, foreign-born African Americans in California when adjusting for age, gender, and marital status.

RQ2: Does alcohol use predict asthma status among adult, foreign-born African Americans in California when adjusting for age, gender, and marital status?

$H_0$2: Alcohol use does not predict asthma status among adult, foreign-born African Americans in California when adjusting for age, gender, and marital status.

$H_1$2: Alcohol use predicts asthma status among adult, foreign-born African Americans in California when adjusting for age, gender, and marital status.

RQ3: Is there an association between asthma status and health insurance among adult, foreign-born African Americans in California when adjusting for age, gender, and marital status?

$H_0$3: There is no association between asthma status and health insurance among adult, foreign-born African Americans in California when adjusting for age, gender, and marital status.

$H_1$3: There is an association between asthma status and health insurance among adult, foreign-born African Americans in California when adjusting for age, gender, and marital status.

RQ4: Is there an association between asthma status and income level among adult, foreign-born African Americans in California when adjusting for age, gender, and marital status?

$H_0$4: There is no association between asthma status and income level among adult, foreign-born African Americans in California when adjusting for age, gender, and marital status.

$H_1$4: There is an association between asthma status and income level among adult, foreign-born African Americans in California when adjusting for age, gender, and marital status.

RQ5: Is there an association between asthma status and education level among adult, foreign-born African Americans in California when adjusting for age, gender, and marital status?

$H_0$5: There is no association between asthma status and education level among adult, foreign-born African Americans in California when adjusting for age, gender, and marital status.

$H_1$5: There is an association between asthma status and education level among adult, foreign-born African Americans in California when adjusting for age, gender, and marital status.

Theoretical Framework

The socioecological model (SEM) was the theoretical framework for this study. Introduced in the 1970s by sociologists from the Chicago School of Sociology, and revised by Bronfenbrenner throughout the 1970s and 1980s, this theory has been used to merge behavioral and anthropology issues in health studies (Moore, de Silva-Sanigorski, & Moore, 2013). A key contribution of this theory to different fields of health and psychology is the understanding that the true comprehension of human growth should occur through a complete understanding of the ecological system, which supports or influences their behaviors (Yakob & Ncama, 2016).

The rationale for using this theoretical framework in this study stems from its ability to show how different levels of personal and environmental factors affect human behaviors and health outcomes. This dynamism justifies its application in this study because it has helped other researchers to address complicated social issues such as domestic violence and child abuse (Gilioli, Caroli, Tikubet, Herren, & Baumgärtner, 2014). The success of the SEM in community health promotion was the main motivator for applying it in this study.

The SEM has five nested levels of interlocking behavioral and anthropological factors: individual, interpersonal, organizational, community, and public policy. The interactions of these five SEM levels are shown in Figure 1 below.

Figure 1. Socioecological model. From "Understanding the social ecological model and communication for development," UNICEF, 2016. Retrieved from https://www.unicef.org/cbsc/files/Module_1_-_MNCHN_C4D_Guide.docx

The five levels of the SEM described above align with the five research questions listed in the previous subsection. These research questions are products of community, environmental, and individualistic factors affecting human health. The first and second research questions align with the individual level of the SEM because tobacco smoking and alcohol use are individual factors that could affect people's health and lifestyle. Indeed, people's ability to undertake a risk/benefit analysis of these lifestyle behaviors would affect whether they choose to engage in them, or not. Such decisions are

undertaken individually and could broadly affect the incidence of asthma in the population.

The third research question addresses health care access and it aligns with the public policy level of the SEM. The congruence emerges from the interrelation between health care services and public health policies/laws. The failure to access such services and the abundance of the services could affect human health. Health insurance issues appear at the public policy level of the SEM because people's access to health care services is partly informed by existing laws and regulations governing the industry. Unfavorable policies often lead to a large population of people being locked out of the health care system, while favorable policies could amount to increased access to health care services.

The fourth and fifth research questions draw attention to income and education as key variables affecting asthma. Education level is categorized in both the organizational and public policy levels of the SEM. Income level is integrated into the interpersonal and community levels of the SEM because income could affect how people relate to one another. By extension, income and education could influence the kind of diseases people are exposed to and the type of health services they could get.

The confounders highlighted in this study also align with the levels of the SEM because they appeal to individual, interpersonal, organizational, community, and public policy levels of the SEM. Table 1 shows the alignment of the independent variables and the confounders with the SEM levels.

Table 1

Levels of the SEM

Levels of the SEM	Research variables
Individual SEM	Tobacco smoking, alcohol use, age, and gender.
Interpersonal SEM	Income level and marital status.
Organizational SEM	Education level
Community SEM	Income level
Public Policy SEM	Health insurance and education level.

According to the Table 1, tobacco smoking, alcohol use, age and gender align with the individual level of the SEM because these variables appeal to people's attitudes and behaviors. Gender and age issues are also specific to personal demographic characteristics. Therefore, they cement the inclusion of these confounders in the individual level of the SEM. Marital status and income level are included in the interpersonal level of the SEM because they moderate people's interaction with one another. For example, marriages define how men and women should relate and interact. Education is integrated into the organizational SEM level because they are products of a society's institutional processes. For example, schools and higher institutions of learning contribute to people's education standards. Health insurance and education are integrated into the public policy SEM level because the policy environment partly dictates people's ability to access associated services.

Overall, the alignment of the research questions, the independent variables, the confounders, and the SEM helps to address the complexity of asthma as a dependent variable. In other words, the SEM helps to unravel the complexity of its origins and

unmask the interrelated nature of factors that contribute to its occurrence. Thus, this section of the research highlighted the association between asthma and the risk factors, and demonstrated how they fit within the wider SEM.

The SEM model emerged as an ideal one to use in this study because it provides a holistic understanding of the personal and community/environmental factors affecting asthma (Sharma, 2016). The multifaceted nature of the model was appropriate for the study because it helps in the exploration of the influence of several health risk factors such as tobacco smoking, alcohol use, education level, income level, and health insurance in predicting asthma among adult, foreign-born African Americans in California (Coutts, 2016).

Nature of the Study

I used the quantitative correlational approach in the study. This technique aligns with the research topic, which sought to examine the risk factors that could predict asthma among adult, foreign-born African Americans in California. The research variables are quantitative in nature. Therefore, the selection of the quantitative technique was a natural process, based on the type and characteristics of the variables measured (Creswell, 2014). I used the multiple logistic regression as the inferential statistical analysis.

The quantitative approach was applicable to this research because my source of data (the CHIS) was quantitative in nature. There are different types of research approaches in quantitative studies. The correlation method was the main approach to this study because it focuses on examining the existence and extent of an association between

two or more variables. It aligns with my research topic because I also sought to examine the association between asthma and risk factors among adult, foreign-born African Americans in California. Thus, the justification for using the correlational approach rests in the fact that it sought to examine the associations between different variables (Guest, 2014).

The CHIS is a state-based, annual cross-sectional survey that contains quantitative data about different health issues in California. Supported by the California Department of Public Health and the Department of Health Care Services, this database contains health data obtained from telephone surveys that includes the views of thousands of California residents (UCLA Center for Health Policy Research, 2017).

My research topic centered on examining the risk factors that predict asthma among adult, foreign-born African Americans in California. The research variables for this study include the dependent variable (asthma status), independent variables (tobacco smoking, alcohol use, education level, income level, and health insurance), and confounders (age, gender, and marital status).

Literature Search Strategy

I conducted the literature review using peer-reviewed articles identified via the following databases: Walden library database, Google Scholar, Google Books, PubMed, and MEDLINE. The key research terms used to identify the articles were *asthma*, *risk factors*, *health insurance*, *tobacco smoking*, *alcohol use*, *socioeconomic status*, *African Americans*, and *socioecological model*. Most of these terms were derived from the variables under study and the nature of the research topic. All the sources consulted in

this review were not more than 5 years old (they were published between 2012 and 2017). I also excluded articles that came from commercial websites, blogs, and other online sources that were not credible.

Literature Review Related to Key Variables/Concepts

Prevalence and Incidence of Asthma

The global prevalence and incidence of asthma varies across different regions and countries. According to the American Academy of Allergy, Asthma and Immunology (2017), about 300 million people suffer from the condition globally. Similarly, there are 250,000 annual deaths attributed to the same condition worldwide (American Academy of Allergy, Asthma and Immunology, 2017). The number of people suffering from the condition is expected to increase dramatically by more than 100 million (American Academy of Allergy, Asthma and Immunology, 2017). Thus, experts estimate that in 2025, the global population of people suffering from asthma would be 400 million (Naturopath, 2013). Researchers claim that poor workplace conditions, such as exposure to toxic fumes, are responsible for the increase in asthma incidences (Naturopath, 2013).

In the United States, it is estimated that one in 12 people suffer from the condition (Naturopath, 2013). This figure is equivalent to 25 million people and it represents 8% of the country's population. Reports show that 53% of the American population, which suffers from asthma, had suffered an attack as well (Naturopath, 2013). However, this number is skewed towards children because there are more asthma attacks among children than in adults. Nonetheless, statistics from 2008 to 2010 show that the incidence

of asthma was higher among minority racial and ethnic groups in America, compared to the European American population (Naturopath, 2013).

In California, it is estimated that more than 5 million adults suffer from asthma (CDC, 2014). Health agencies also point out that more than 1.7 million children suffer from the condition in the state (CDC, 2014). California reports more than 500 deaths associated with this condition. The CDC (2014) adds that 145,000 annual emergency room visits in California are associated with this condition as well. Based on these statistics, asthma is not only a significant health problem in California, but also a national problem for America and a global health issue for many countries.

Prevalence and Incidence of Tobacco Smoking

According to the World Health Organization (2016), more than 1 billion people smoke tobacco worldwide. Statistics show that more men than women make up this number of smokers (World Health Organization, 2016). Similarly, they show that, although the incidence of smoking is declining globally, the Mediterranean and African regions have the highest incidences of tobacco smoking (World Health Organization, 2016). This finding means that smoking is primarily a problem that is concentrated among developing countries and within lower socioeconomic groups. Indeed, out of 5 million deaths that occur because of smoking, more than two-thirds of them are concentrated in developing countries (World Health Organization, 2016). These deaths are projected to increase because the number of smokers is expected to grow to 1.5 – 1.9 billion in 2025 (World Health Organization, 2016).

In the United States, cigarette smoking is attributed to be the leading cause of preventable diseases (CDC, 2015). Statistics show that it accounts for more than 480,000 deaths annually (CDC, 2015). Additionally, the CDC (2015) says there are about 15 smokers out of a population of 100 Americans. This figure translates to 15% of the population being smokers. Nonetheless, there is a decline in the incidence of smoking in America because the above figure represents statistics reported in 2015. In 2005, the figure was 21% (CDC, 2015). Based on these statistics, the CDC (2015) says that 16 million American smokers live with a smoking-related disease.

The prevalence of tobacco smoking in California follows a decline in the number of smokers nationally. However, researchers estimate that the state has a tobacco smoking prevalence of 11% (Walters, 2015). This is below the Healthy 2020 goal of 12%; meaning that California is among the few states that have met its Healthy 2020 goal of reducing the smoking prevalence to less than 12%. Statistics show that African American Californians have the highest prevalence rate of smoking in the state (Walters, 2015). The incidence of smoking is also more prevalent among low-income populations than other socioeconomic groups. These findings show that smoking is a state, national and global health problem.

Effects of Healthcare Access on Asthma

Access to health care services is a critical component of asthma management. Indeed, medical reports have often shown that victims of asthma attacks should visit the nearest heath facility whenever an attack happens (Gulliford & Morgan, 2013). However, it is impossible to do so if there are barriers to accessing the vital health care service.

Barriers may emerge in different ways, including through inadequate or the lack of health insurance coverage, absence of health care facilities and discriminatory practices among selected health care facilities. The lack of proper health care access could lead to a worsening of the condition and possibly even death. Indeed, a report by Gulliford and Morgan (2013) say that most cases of asthma deaths are preventable if patients sought timely medical attention. For example, in one study conducted in Wales, England, Gulliford and Morgan (2013) established that asthma deaths were proportionately correlated to the nearest large health facility. The delay in seeking the right medical attention was outlined as the main reason for the higher incidence of deaths of people who were far from health facilities.

The lack of proper health care access could also deny asthma patients the opportunity to get medication, which would allow them to manage the condition better. These possibilities have informed the decision by many experts who have recommended that an increase in health care access could be instrumental in managing asthma (Mahmoudi, 2016). Their recommendations stem from the understanding that adequate access to medications would improve asthma management. Concisely, the ability of asthma patients to lead normal lives depends on their ability to gain access to health care services.

Since the association between health care access and asthma is well established, it was paramount to investigate some of the main issues of the problem to find out effective ways of improving asthma management. Doing so could also lead to the formulation of more specific recommendations for managing asthma and a greater specificity in the

strategies that could be used in managing it. All stakeholders involved in asthma management, such as the government, pharmaceutical companies, and health care service providers, would only achieve such outcomes if there is a comprehensive approach to do so. Doing so would also contribute towards reallocating the disproportional burden of asthma to relevant stakeholders (Gulliford & Morgan, 2013). This action would also be integral to the general management of the disease because low-income and uninsured groups bear the most burden of asthma.

Effects of Occupation on Asthma

Researchers have established an association between asthma and occupation because certain symptoms of the condition manifest because of people's exposure to specific work-related factors. The term *occupational asthma* has been associated with this concept because it refers to people who suffer aggravated symptoms because of work-related issues. It could also refer to people who develop the condition because of the exposure to the same elements. Statistics show that one out of ten cases of asthma is caused by work-related factors (Mahmoudi, 2016). Mahmoudi (2016) adds that the earliest studies depicting the effects of occupation on asthma were observed among metalworkers, tailors and equestrians. Farmers and anglers also formed other groups of workers who suffered aggravated symptoms of the condition because of the type of job they did (Gulliford & Morgan, 2013).

Although some studies paint a clear association between asthma and different occupations, Mahmoudi (2016) believes that it is difficult to ascertain the incidence of occupational asthma because different countries have reported varied figures of the same.

The statistics show that the numbers of occupational asthma are between 10 million and 144 million annually (Mahmoudi, 2016). The wide variation in numbers has largely been attributed to methodological variations in computation and in the definition of occupations. Regardless of these differences, Mahmoudi (2016) clarifies that 5–20% of asthma cases could be products of occupational factors. Estimates that are more detailed show that, more than 250 risk factors, spread across different occupations, cause asthma (Gulliford & Morgan, 2013). Although these statistics are general, it is pertinent to point out that, environmental conditions within the workplace and the associated exposure levels influence the effects of occupational factors on asthma.

Effects of Immigration on Health

Different researchers have explored the association between immigration and asthma. Such is the case of Cabieses, Uphoff, Pinart, Antó and Wright (2014) who conducted a systematic review to analyze the effect of immigration on the association between asthma and smoking. They conducted this review according to the guidelines stipulated in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) and found that there were significant differences in allergic reactions for populations that lived in their countries of origin and those that emigrated to other countries (Cabieses et al., 2014). They also found that the level of development in the host countries significantly affected the level of asthma developed by the immigrants.

Fox, Entringer, Buss, DeHaene, and Wadhwa (2015) have also demonstrated that immigrants who lived in developed countries had higher rates of asthma compared to those who lived in less developed countries. The researchers also established that there

was a strong influence of the environment on the development of asthmatic conditions among the sample populations (Fox et al., 2015). Additionally, they established a higher prevalence of asthma among second generation immigrants compared to first generation immigrants because the latter group was not exposed to the environmental conditions of the host countries as much as the former group. This assertion showed that the length of stay in the host country was directly related to the development or seriousness of asthmatic conditions. These findings were consistent with research studies conducted by Ro (2014), which upheld the same conclusion across sample groups of different nationalities, study populations and age groups. However, Ro established differences across these social groups when the linear model was used (Ro, 2014). The differences also emerged when the respondents compared the findings across early and later stages of immigration. Differences in time of residence also yielded the same outcomes.

In a different study to investigate asthma incidences among Asian immigrants living in America, Becerra, Scroggins and Becerra (2014) established that Chinese, Filipino, South Asian, and Japanese immigrants reported a positive association between asthma and immigration. The same was true for Korean immigrants because the study showed that there was a positive association between asthma prevalence and immigration status (Becerra et al., 2014). The researchers used a linear regression model to come up with the findings after relying on data prepared by the CHIS 2001-2011.

Garcia-Marcos et al. (2014) also conducted a study to investigate whether immigration affects asthma incidences among immigrants and came up with the same findings. In other words, they established that immigrants to western countries often

adopt the same allergic reactions that host populations suffer from. The researchers used a mixed method approach to conduct the review by first gathering data using questionnaires from 13-14 years old immigrants living in the United States. They also gathered the views of parents who had children aged 6-7 years old using secondary research data (Garcia-Marcos et al., 2014). Their findings showed a weak association between immigration and higher incidences of asthma. Thus, they believed that the reduced risk of asthma was often related to immigrants who had lived in America for the shortest time. This finding is consistent with the views of Lopez and Golden (2014) who say an increased stay in the host countries, often leads to the loss of protective pre-immigration environment that would have otherwise helped immigrants to lower their risk of asthma.

Corlin, Woodin, Thanikachalam, Lowe, and Brugge (2014) investigated how immigration affected the health outcomes of Chinese immigrants and after sampling the health outcomes of more than 147 immigrants, they established that the immigrant population had better health outcomes compared to the native populations. The researchers also used bivariate and multivariate models to compare the prevalence of diseases among the two population groups, as well as the clinical biomarkers associated with the study focus (Corlin et al., 2014). To explain their findings, the researchers said that healthier diets, minimal exposure to cigarette smoke and increased physical activity among the Chinese immigrants was mostly responsible for their positive health outcomes. Also, Corlin and Brugge (2014) conducted an independent research study to investigate the incidence of asthma among immigrant populations and found that there is a “silent

epidemic" of asthma among immigrant subpopulations in America. The authors said the epidemic was largely unreported because of poor access to health care services within this immigrant population.

Camacho-Rivera, Kawachi and Bennett (2015) also investigated the association between immigration and health outcomes by exploring the effect of race, ethnicity and country of origin on the risk of developing asthma. The researchers used 2,558 non-Hispanic European Americans and Hispanic children to investigate this research phenomenon and found that lifetime asthma incidence was prevalent in less than 9.1% of the population (Camacho-Rivera et al., 2015). They also found no significant differences in asthma rates between Hispanic and non-Hispanic respondents. This study highlighted the importance of moving beyond racial or ethnic classifications to develop policies surrounding asthma management because these classifications often mask different subgroups of people who are at high risks of asthma.

Barr et al. (2016) conducted a study to test whether ethnicity is a dependent variable in the prediction of asthma incidences among immigrant populations in the United States by analyzing whether the condition was prevalent among Hispanics and Puerto Ricans more than other immigrant groups. They found that asthma was more prevalent among second-generation Hispanic and Puerto Rican immigrants than first generation immigrants were (Barr et al., 2016). They partly explained this finding using differences in smoking patterns among the sampled population groups. Their study included a sample of 16,415 Hispanics and Latinos (Barr et al., 2016).

In a different study to evaluate asthma admissions using ethnic variations, Sheikh et al. (2016) found that South Asian immigrants reported the highest hospital admissions attributed to asthma. These findings were developed after evaluating two main ethnic groups – European Americans and South Asian immigrants. However, the researchers failed to take into account sex-related differences that would have affected health outcomes. Benchimol et al. (2015) also used South Asian immigrants as a sample group to estimate the incidence of asthma and immune-mediated diseases among immigrants in western countries. They used population-based cohorts of respondents who suffered from asthma and diabetes to undertake the review and found that adults from South Asia had a higher predisposition to asthma compared to other ethnic immigrant groups (Benchimol et al., 2015). This finding contradicted the view of many studies in this literature review because other studies have consistently shown that immigrants from other countries had a lower risk of developing asthma compared to host populations. However, the explanation for this inconsistency could stem from the fact that the findings of Benchimol et al. (2015) are mostly attributed to a genetic predisposition to the disease among South Asian immigrants.

Mahmoudi (2016) conducted a broader review involving more than 40 countries to understand the effect of immigration on asthma incidences and found that immigration was associated with a low incidence of asthma. He developed these findings after conducting a survey of more than 326,000 adolescents from more than 40 countries. The survey also included a population of 207,000 children from 30 countries (Mahmoudi, 2016). However, the association between immigration and asthma incidence was limited

to affluent countries. The findings of Hamilton, Cardoso, Hummer, and Padilla (2011) would be useful to my study because they would explain how immigration affects the health outcomes of immigrants in California. Their findings stem from a review of how assimilation has affected the health outcomes of immigrant children in America.

Reed and Barosa (2016) have also explored the role of nativity in explaining the advantage enjoyed by immigrants compared to their host populations, when it comes to asthma prevalence. To explain this advantage, they explored the health outcomes of two groups of immigrants – refugees and non-refugees. The findings revealed that refugees were disadvantaged when it came to access to health care services, thereby suffering poor health outcomes compared to their non-refugee counterparts. Comprehensively, these studies show there is an association between asthma and immigration, with immigrants suffering lower incidences of asthma compared to host populations.

Effect of Environmental Exposures on Health

In an effort to understand the effects of environmental exposures on health, Im et al. (2015) outlined the case of a researcher, Johnson, who used an innovative framework to separate a host of factors affecting asthma incidences into different constituents. His analysis concentrated on factors that affect the design, construction and conditions of the dwellings, which immigrants lived in. The researcher found that the risk of developing asthma was directly correlated to the nature and type of dwelling (Im et al., 2015). Im et al. (2015) said this association was a product of the interaction between culture and environment. In a separate study, Rumrich and Hänninen (2015) found that the complexity associated with asthma management was directly associated with the

immigrants' ability to communicate fluently in English and partly on whether they were born in the U.S, or not. They also established that asthma was more severe for immigrants who were relatively acculturated to their host countries, compared to those who were not (Rumrich & Hänninen, 2015). Their findings corresponded with a similar study by Chiu et al. (2016), which highlighted the lower incidence of asthma among new immigrants compared to those who had been in the host nations for a long time. This comparison implies that western risk factors increased the risk of developing asthma. This fact was supported by studies, which investigated the same issue among Arab-Americans (Im et al., 2015).

Rottem, Geller-Bernstein, and Shoenfeld (2015), established that environmental factors and the age of immigration affected people's predisposition to asthma. The researchers went further to explain that the level of immunoglobin E was relatively higher among immigrants compared to the local population, thereby decreasing their predisposition to asthma (Rottem et al., 2015). The researchers also explored the possibility of a reversal of allergies because of parasitic infections. In this regard, they proposed that secondary prevention guidelines should be introduced to immigrants before they settle in their host nations, as a strategy to prevent asthma attacks (Rottem et al., 2015). Gatrell and Elliott (2014) also conducted a similar study by exploring the association between geographical location and health status among immigrants. Although the study assessed different health variables, it found that geographical differences significantly affected the incidences of asthma among immigrants.

Studies that have tried to explore the impact of the environment on the health of immigrants have found it difficult to isolate the environment from other socioeconomic factors affecting immigrants that would ultimately affect their health as well (Okechukwu, Souza, & Davis, 2014). For example, a study by Guruge, Birpreet, and Samuels-Dennis (2015) to investigate the impact of environmental conditions on older women immigrants in Canada found that SES, cultural beliefs, gender norms, and influences of the physical and social environment weighed heavily on immigrant health. The studies also showed that older immigrant women were more likely to have health problems because of poor access to health care services and the underutilization of preventive health services (Guruge et al., 2015).

Martinez et al. (2015) contend that some of the problems faced by immigrants living in America are partly caused by unfavorable immigration policies. For example, they say unfavorable immigration policies often affect access to health care issues (Martinez et al., 2015). They arrived at these conclusions after reviewing eight health databases, which showed that anti-immigrant sentiments often affected the health outcomes of immigrants because it limited their ability to access health care services. Rhodes et al. (2015) also came up with similar findings after investigating the effect of immigration policies on immigrant health in America.

Flynn, Carreón, Eggerth, and Johnson (2014) say that understanding the impact of someone's work environment on their health goes beyond merely understanding how their work presents social hazards and risks to their well-being. Indeed, as explained by Arcury (2014), someone's work also affects other aspects of their social well-being, and

by extension, their health (work is the major incentive for many people who emigrate to the United States). According to Pichardo-Geisinger et al. (2014), many immigrant groups often experience deteriorating physical health after working in the United States for some time. They made this finding after reviewing the physical health of a group of Latino immigrants working in the United States. The link between work and immigration occurs through the understanding that work often alters the physical environment of immigrants, thereby putting their physical health and those of their family members at risk of deterioration.

Shani et al. (2013) explored the association between Asthma among Ethiopian born immigrants and of those living in western countries. They found that the intensity of asthma increased after their travel to western countries. The researchers used 1,217 matched controls for a population sample of the same number of immigrants and found that asthma incidences among second-generation immigrants did not significantly differ with those of the native population. The findings affirm the view that environmental exposures affected asthma incidences.

Socioeconomic Status and Asthma

The effect of SES and asthma has emerged in several research studies that have tried to investigate the association between immigration and asthma incidences. Most of these studies have developed findings that have overlapped with similar findings from researchers who have studied the influence of the environment on the incidence of asthma attacks. According to Acton (2012), most immigrant groups living in America have a lower SES. In fact, he says that most of them have household incomes that were

below $50,000 (Acton, 2012). Most of the houses or dwellings that these immigrants live in were overcrowded. Kelly, Glick, Kulbok, Clayton, and Rovnyak (2012) estimate that one-quarter of them were living this way. Owing to these conditions, most of these homes create adverse environmental conditions, such as dampness or molds (44%), pests (28%), and poor ventilation (26%) (Acton, 2012). These conditions are known to increase the incidence of asthma and atopic diseases. Similar studies have shown that at least one of the aforementioned adverse conditions was found in at least 67% of homes inhabited by immigrants (Kelly et al., 2012). Furthermore, they found that multiple hazards were present in more than 27% of similar homes inhabited by immigrants. Grzywacz et al. (2012) say that children of recent immigrants showed symptoms of asthma a year after immigration. In detail, these symptoms were suggestive of asthma (4%) and atopic disorders (10%).

Studies conducted by Landsbergis, Grzywacz, and LaMontagne (2014) have also shown that lower SES is often related to increased asthma incidences, especially among immigrant populations. Differences in race and ethnicity have also been associated with higher rates of asthma attacks, as explained by Abraído-Lanza, Echeverría, and Flórez (2016) who say that the two factors are predictors of health indicators, such as access to health care and health insurance. The disproportionate nature of asthma and SES has led many researchers to delineate this association and to show the underlying factors that moderate this association. For example, Borges, Orozco, Rafful, Miller, and Breslau (2012) conducted a study to investigate the extent that SES influences asthma incidences among African American immigrants and Latino youth. Studies that have undertaken the

same analysis have used parental SES, education standards and family income as predictors of SES (Kelly et al., 2012). Their findings have generally shown that decreasing SES scores was directly associated with increased adjusted odds of asthma. Nonetheless, as explained by Riosmena, Wong and Palloni (2013) these studies have also shown that acculturation was among the strongest moderating variables for understanding the incidence of asthma among immigrant populations.

Studies that have investigated the impact of SES on asthma incidences have also studied African American populations in America and found that the poorest children were most affected by asthma (Carroll, 2013). The same finding was revealed in studies that investigated the same research issue among non-Hispanic African Americans and non-Hispanic European American populations (Kelly et al., 2012). In ethnic-stratified models, researchers such as Thakur et al. (2013) and Beck, Simmons, Huang, and Kahn (2012) have not found statistically significant associations between maternal education levels and asthma incidences across different ethnic or racial groups. However, in small high-risk cohorts of children within the Hispanic communities, there was an association between ethnicity and asthma levels when the researchers adjusted different SES metrics. One advantage of these studies is the requirement that the respondents identify themselves as African American or Hispanic before being included in the study (Thakur et al., 2013). This provision helped the researchers to capture the cultural influences that would have affected their research outcomes. In addition, the respondents included in the study must have had a physician diagnose them as asthmatic within the past 2 years.

There was also a control population, which included respondents without any symptoms of asthma or any prior diagnosis of the same condition (Beck et al., 2012).

Considering the collective research one can conclude that SES could affect the incidence of asthma among different racial and ethnic populations in the United States. This fact outlines the presence of different confounding factors that could ultimately affect the association between SES and asthma incidence. Generally, these studies have shown that urban populations living in low-income settlements suffer a high risk of asthma because they are exposed to harmful indoor allergens that increase their predisposition to asthmatic attacks. Outdoor pollutants have also been established to exacerbate their asthmatic conditions for those who suffer from the condition. Relative to this fact, Carroll (2013) added that exposures such as child psychosocial, socio-emotional, and anthropometric factors are associated with both low SES and asthma.

Gong et al. (2014) emphasized the need to understand the effect of social and economic influences on asthma incidences after evaluating how parental SES affects the risk of asthma among their offspring. The researchers established that there was a direct association between household income levels and the health outcomes of children growing up in the same settings (Gong et al., 2014). The researchers also established an association between asthma incidences and educational levels within different household settings because there was an association between high education levels and lower risks of asthma, as well as an association between high incidences of asthma and lower education levels. They developed these findings after studying a cohort of 211,500 children born between 2006 and 2008 (Gong et al., 2014).

Keet et al. (2015) investigated whether neighborhood poverty and residence status (inner cities and non-inner cities) were associated with asthma incidences. Their study aimed to evaluate whether residency status within inner cities and non-inner cities could help to predict the incidence of asthma (Keet et al., 2015). After conducting a secondary analysis through a national database, the researchers found that inner city residency was associated with higher incidences of asthma (Keet et al., 2015). However, this association was not statistically significant after adjusting for specific social variables, such as race, ethnicity and religion. Based on these findings, the researchers claimed that although the incidence of asthma was highest among inner city neighborhoods and among specific immigrant populations, such as Hispanics and Puerto Ricans, demographic factors mostly explained this association, as opposed to inner city residency (Keet et al., 2015). This finding contradicted the views of some researchers highlighted in this study who said SES could be used to assess the risk of developing asthma. Instead, it draws our attention to demographic factors, as opposed to SES, as a predictor of asthma incidences.

Celedón (2016) investigated health inequality between immigrants and U.S.-born citizens and found out that there are significant health disparities between the two groups. Her findings would be instrumental to my study because they would help us understand the impact of socioeconomic factors on health outcomes among immigrant groups. In another book titled, *The Immigrant Health*, Loue (2013), shows the flip side of immigrant health by saying that socioeconomic factors have always made it difficult for immigrant populations to gain access to health care services, thereby increasing their incidence of asthma. Streja et al. (2014) also contributed to this discussion by saying that poor living

conditions have increased secondary smoke exposure to children born in immigrant families, thereby increasing their incidence of asthma. Passive smoking is an issue with regards to asthma attacks.

Effects of Smoking on Health

Many studies have investigated the association between smoking and asthma. Different immigrant groups in America report different levels of smoking. In one study conducted by Burgess (2014), Southeast Asian communities living in America are among the heaviest smokers. After collecting the views of 60 leaders within this ethnic group (using semi-structured interviews), the researchers also discovered that smoking tobacco was a cultural heritage issue for this immigrant group (Burgess, 2014). In other words, it was used to convey social status and was a symbol of respect. Furthermore, the study revealed that many older social males suffered from isolation and smoked to alleviate the stress associated with it (Burgess, 2014). Based on these assertions, the findings suggested that community leaders in South Asian immigrant communities needed to promote a cultural shift in smoking to prevent their members from promoting this habit.

Allem et al. (2012) conducted a study to investigate how the environment often affects smoking habits when immigrants move from their countries of origin to America. After investigating the smoking behaviors of Koreans in Seoul and Koreans in America and collecting data using telephone surveys, they found that smoking patterns differed for both groups of Koreans (Allem et al., 2012). Although they found that there was a peak in the association between smoking habits and immigrants' age, at 35 years, they found that South Koreans living in America smoked more than those living in their home

countries (Allem et al., 2012). They mostly attributed this finding to social role transitions between Koreans living in America and those living in their countries of origin.

In a study to investigate the smoking-related mortality rates among Latino and Hispanic immigrants, Fenelon (2013) found that these immigrant groups had lower levels of smoking-related deaths compared to European Americans living in America. This finding was established, irrespective of the low SES of the immigrants (Fenelon, 2013). However, culture was established as a moderating variable that could influence the smoking patterns between immigrants and populations living in the host nations.

Bosdriesz et al. (2013) explored the prevalence of smoking behaviors among immigrant groups by comparing such trends to smoking behaviors in their host countries and with the general U.S. population. They found that the prevalence of smoking behaviors among immigrant groups was lower than the prevalence of smoking among the U.S. population. These findings are instrumental in my study because they would help us to understand smoking behaviors among various immigrant groups. Cho and Paik (2016) conducted a different study to investigate the same research health issue (asthma), but assessed it by investigating the association between e-cigarettes among South Korean immigrants, as the chosen study population. After assessing a sample of 35,904 students, the researchers pointed out that there is a positive association between e-cigarette consumption and increased asthma incidences.

Generally, these findings have shown that smoking worsens people's health. The evidence supporting this assertion is abundant. For example, in one study conducted by

Polosa, Caponnetto, and Sands (2012) to care for smoking asthmatic patients, it was established that smoking asthmatic patients could present a distinct disease entity, which manifests as asthma complications and chronic pulmonary disease obstructions. In the assessment of asthma management, smoking could have clinical and prognostic implications. Nonetheless, the researchers pointed out that smoking severely increases the impact of asthma attacks (Polosa et al., 2012). Spears et al. (2013) also arrived at the same conclusion when he investigated the incidence of asthma among affected persons who started smoking. To meet his objectives, the researchers conducted an exploratory study on three groups of respondents. The first one comprised 22 current smokers. The second one was made up of 21 people who had never smoked. The last group comprised 10 ex-smokers. The researchers examined their blood and sputum cytokine concentrations to understand the effect of smoking on their risk of asthma. The results showed that smoking had increased sputum cytokine levels, thereby supporting the view that smoking increased the risk of asthma (Spears et al., 2013).

Role of Acculturation

Researchers, such as Reiss, Razum, and Lehnhardt (2015) have explored the impact of acculturation on the smoking habits of different immigration groups and found gender differences in immigration smoking patterns between men and women. Men reported the highest smoking incidence compared to women. Similarly, women who had undergone years of acculturation were more susceptible to smoking compared to those who had not (Reiss et al., 2015). The researchers came up with these findings after retrieving and analyzing 27 studies published between 1998 and 2013. Generally, they

pointed out that, different groups of immigrants from different countries had reached different stages of smoking where non-western countries were in early stages of smoking while western countries were in later stages of smoking.

Reiss, Sauzet, Razum, Breckenkamp, and Spallek (2014) did a similar study where they compared the prevalence of smoking among Turkish immigrants who had emigrated to Germany and the Netherlands. They used two sets of data to come up with their findings. The first set of data was the German 2009 micro-census, while the second set of data was the Dutch POLS database. They also developed logistic regression models for age-specific smoking habits and sex-specific smoking behaviors. Generally, the researchers found that the immigrants had changed their smoking behaviors to suit those of their host nations (Reiss et al., 2014). The strength of the adaptation was correlated with their length of stay. This association was stronger for Turkish immigrants who had left their country of origin before reaching 18 years. These findings support the views of similar researchers in this study who has shown that the length of stay in immigrant countries often affects health habits of immigrant groups.

Printz (2015) conducted another study to investigate the effect of immigration and acculturation on smoking among Latino and Asian immigrants in America. The researchers used a sample of 3,249 Latino and Asian immigrants and found that male immigrants smoked four times more than their female counterparts did (Printz, 2015). These findings were also consistent with other studies that showed that the length of stay in the host country was a strong moderating factor for smoking habits among immigrants because Printz (2015) found that increased length of stay often leads to the increased

frequency and prevalence of smoking among the sampled population. Their findings also showed that immigrants who acculturated themselves well, in terms of English proficiency and citizenship acquisition benefitted from reduced smoking behavior.

Li, Kwon, Weerasingh, Rey, and Trinh-Shevrin (2013) also arrived at the same finding when they explored the impact of smoking on Asian communities living in New York because they established that acculturation explained the consistent rise in smoking behavior among these immigrants, while the rate of smoking in the general population decreased. These findings were developed through an analysis of data from the REACH Risk Factor Survey (2009-2011). Gorman, Lariscy, and Kaushik (2014) also explored the role of acculturation in predicting the smoking behaviors of immigrants in the United States after finding that female immigrants smoke less than their male counterparts do. They found that gender had a moderating effect on acculturation because differences in smoking behaviors between the sexes could not be holistically explained by acculturation alone (Gorman et al., 2014). They came up with this finding after analyzing data from 3,249 Latino and Asian immigrants living in the United States.

Bostean, Ro, and Fleischer (2017) investigated smoking trends among U.S.-born and foreign-born Latino immigrants and found that the latter group smoke less compared to the former. The findings of this study would be helpful in understanding the disparities in smoking behaviors among foreign-born and U.S.-born immigrants. Poureslami, Shum, and FitzGerald (2015) explored the reasons why Chinese immigrants in Vancouver continued smoking and found that their cultural inclinations provided less internal incentive to stop smoking. Cultural orientation can influence health behaviors like

smoking. In an article titled, the "Immigrant Advantage," Kolker (2013) says that, Americans could learn how to reduce the incidence of diseases, such as asthma, by emulating the dietary practices and discipline that some immigrants exude from their culture. The authors drew attention to the high incidence of smoking and alcoholism in America as significant contributors to asthma cases in the country.

In a study to investigate the impact of nativity on the association between asthma and immigrants, Arsen (2013) investigated the influence of a person's immigration status on their risk of developing asthma. This study was prepared against a background of research studies that showed immigrants had better health outcomes than their host populations and the understanding (among many sociology researchers) that immigrants had poor SES and were more prone to asthmatic attacks, compared to host populations, which are ordinarily in higher SES (Alkerwi et al., 2012). The analysis of Arsen (2013) supported the findings of other studies, which showed that immigrants suffered a lower risk of asthmatic attacks compared to the native-born population. He conducted this study by comparing the risk of asthma among French immigrants and the native population.

Lee, O'Neill, Ihara, and Chae (2013) also explained the importance of understanding how long immigrants have stayed in their host countries, as a prerequisite for understanding their health outcomes, because they explained that although acculturation improves the SES of immigrants, their continued stay in the host countries is associated with worsening health outcomes. The researchers developed these findings after conducting a cross sectional study that used data from a survey analyzing the behaviors of immigrants who came to the host nations between 2003 and 2004. Their

findings implied that increased stay in the United States often leads to the adoption of unhealthy lifestyle behaviors, which are responsible for poor health outcomes (Lee et al., 2013).

Theoretical Framework (SEM)

The SEM was the theoretical framework for this study. However, other researchers have used other types of frameworks to explore the interaction between human and environmental factors while trying to assess or predict health outcomes. For example, Kapp, Simoes, DeBiasi, and Kravet (2016) used the systems theory to investigate how immigration patterns affect health outcomes in America. Jayasinghe (2015) also used the same conceptual framework to explain how social issues affect health outcomes. Both researchers said that the systems theory provided a reliable conceptual framework for understanding how natural and social systems interact. They also said that the same framework properly conceptualized population health outcomes as dynamic, open, and adaptive systems. Broadly, these researchers have managed to demonstrate that human health outcomes are products of interrelated parts or subsystems, thereby enhancing our understanding of interactions between micro-meso-macro levels of health (Jayasinghe, 2015).

Researchers have also used the social construction theory as another conceptual framework for understanding the interrelations between different health variables. As indicated in the works of Onono et al. (2015), this theoretical foundation explains how socio-cultural and historical factors often shape people's health outcomes. This theory would have been relevant to my research issue because it has been used by many

researchers to explain the lived experiences of oppressed or minority communities. However, its main flaw is its bias on cultural and historical factors as predictors of health outcomes. In this regard, it has no proper consideration of other factors that could affect health outcomes.

The main issue to point out in this analysis was that these conceptual frameworks do not institute change. Instead, they merely strive to describe a health phenomenon. The SEM adopts a broader view of health issues; hence, it was the most appropriate model for the quantitative research. As mentioned in this research, the broad view of the SEM is represented by the five levels of health analysis: individual, interpersonal, organizational, community, and public policy.

The individual level defines personal factors that would affect people's health. People's attitudes, behaviors, values, and beliefs about health and asthma fall in this category (Hinds & Giardino, 2017). They would often dictate how well they take care of themselves or the types of risks they would encounter. The interpersonal level of the SEM would highlight unique relationships people have that could ultimately affect their health. This research has already mentioned marriage as one such moderator of health, which falls within this category. Peer influence is another factor that would explain people's health behaviors (Hinds & Giardino, 2017).

Organizational factors affecting health were also mentioned in the SEM. They refer to the role played by different institutions and organizations in influencing health outcomes. For example, they could be instrumental in educating the public about asthma and even in providing the same people with adequate resources to manage the condition.

This way, they have a direct role to play in managing the condition. The community level also has a significant impact on asthma-related incidences because people's cultural values often influence their health behaviors as well (Hinds & Giardino, 2017). For example, communal issues would influence how, what and when people seek medical attention.

Public policy matters were also highlighted in the SEM model as influencing people's health because the legal and policy environments of many jurisdictions influence how health services are offered. Issues of access to healthcare, which are highlighted in this study fit within this category. For example, when governments adopt universal health coverage, it becomes easier for every citizen to access health care services. However, if authorities support employment-based health coverage, only those people with jobs gain access to health services. This example depicts how the public policies could have an effect on people's health.

Comprehensively, the SEM provides a broad analysis of asthma and works to meet the main aim of this research, which is to examine the risk factors that predict asthma among foreign-born African Americans living in California. Therefore, in this study, the SEM would help to provide a greater view of the risk factors affecting asthma incidences among the target population. The model would consider the complex interplay among the five levels of personal and ecological factors affecting human health described in this research.

Relevant Factors Identified in the Literature Review

As evidenced by this literature review, there is increased attention to understanding the effect of asthma and smoking among immigrant communities, not only in America, but around the world as well. This concern is partly because of the rising prevalence of asthma and associated complications, globally. Most of the researchers in this literature review have explored the causal pathway of asthma and allergies. However, there have been contradictory and conflicting findings regarding the interplay between allergy and the socioeconomic determinants of health. Immigration status is at the top of the list of factors that have been poorly understood, but as seen from this literature review, many researchers have tried to explain it.

The focus on SES was of an important theme of this literature review because I am focusing on foreign-born African Americans whose health has been proved to be affected by their socioeconomic conditions. I have also explored the role of acculturation on the tobacco smoking habits of immigrants and found that the longer the immigrants stayed in the host countries, the higher their intensity and frequency of smoking. I have established that there are significant gender differences in acculturation among different immigrant communities that would ultimately affect their general smoking behaviors. While these studies (generally) have good merit in the way they were designed, I did not come across any study that focused on foreign-born African Americans as a unique sample population. In fact, the only studies that were close to my target population were those that sampled the health outcomes of African Americans. However, these two populations are not the same. Additionally, the latter is not an immigrant group, per se.

Based on this fact, there is a significant gap in the literature because health studies have failed to recognize the unique socio-cultural and economic dynamics of foreign-born African Americans that affect their health. This study sought to fill this research gap by examining the association between risk factors and asthma among adult, foreign-born African Americans in California.

Definition of Terms

Asthma (dependent variable) – A respiratory condition characterized by the presence of spasms in the nasal cavity. It often causes difficulty in breathing and an inflammation of the lungs. Some common symptoms include wheezing, coughing, and shortness of breath (Arsen, 2013).

Tobacco smoking (independent variable) – The inhalation of tobacco smoke through the burning of cigarettes or other tobacco products; smoking is often a behavioral issue characterized as a recreational drug habit (Dutra et al., 2014).

California Health Interview Survey – CHIS is *o*ne of the largest health surveys in United States that provides population-based, standardized health-related data for California. The data is often obtained from 58 counties in California and is collected using telephone surveys (UCLA Center for Health Policy Research, 2017).

Socioeconomic status – SES is the classification or the positioning of the social and economic standing of a person or group, relative to other populations. The social and economic metrics for classification could be influenced by people's education standards, income, and work experience (Carroll, 2013).

Immigration status – This concept refers to the legal status of American immigrants. Immigrants may assume several legal statuses, including (but not limited to) permanent residency, refugees/asylees, and resident aliens, all of which allow people who are not born in the United States to live in the country legally. The process of gaining an immigrant status is often a lengthy and complex one. This fact explains why people often need thorough consultations with an immigrant attorney before seeking a legal status (Reingle et al., 2014).

Statistical Package for the Social Sciences – The SPSS is a computer program that analyzes data from surveys and experiments. It has different tools that allow researchers to manipulate and transform data into segments that would answer specific research questions and explore associations between variables. Therefore, simple and complex statistical data analytical procedures are included in the program. It also provides researchers with fully labeled data presentation tools, such as graphs and tables, which could be integrated in the final research process. Based on these key competencies of the SPSS technique, the program has been widely used by governments, market analysts, social researchers, and others (Frude, 2013).

Socioecological model – The SEM relies on individual and environmental factors to understand people's behaviors. These behaviors could explain different health and social issues. The theory-based framework has five nested and hierarchical levels: individual, interpersonal, community, organization, and policy. These levels of understanding people's behaviors are instrumental in comprehending human and organizational leverage points for health promotion within a society (UNICEF, 2016).

Health care access – This concept refers to the timely use of available health care services to improve people's health outcomes. Three things should denote the use of these health services: gaining entry into the health care system, accessing sites of care where health services are offered, and finding health care service providers who could address individual health needs and develop mutual relationships with the patients (Agency for Health Care Research and Quality, 2016). Different measures could be used to estimate health care access. One of them is the presence or absence of specific health resources that would be useful in improving people's health outcomes (Agency for Health Care Research and Quality, 2016). Another one is the ease at which people could access health care services, while the last one is the successful acknowledgement of receipt of health services. Some facilitators and barriers to health care access include health insurance, presence of a usual source of ongoing care, and the perception of patient's need to access health care services (Agency for Health Care Research and Quality, 2016).

Assumptions

According to Whaley (2014), assumptions are statements that are believed to be true, but cannot be verified by the researcher. One key assumption in this study—because the dataset forms the bedrock of my research findings—was that the findings from the CHIS were credible and reliable. I also believed (a) that this information was free from errors and (b) that the findings obtained in this study were representative of all foreign-born African Americans in California, regardless of their social or cultural affiliations. The CHIS, which was my source of secondary data, investigated various health

outcomes/issues. The likelihood that the respondents thought the survey was not investigating the association between risk factors and asthma was assumed. Hegde (2015) considers this feature as a strong predictor of internal validity and calls it the "double-blind technique," where the respondents and the researcher both do not understand what the investigative process represents.

Some of the assumptions mentioned above affected the choice of using the CHIS database as the main source of data. Research study conducted by Jans et al. (2015), showed that the CHIS database was a reliable source of data. Another study conducted by Elwood, Irvin, Sun, and Breen (2017) used the CHIS data to assess the effect of the legal status of marital union on same-sex relationships in California also arrived at the same conclusion. They compared two variables, including personal demographic characteristics and the rate of health insurance coverage, and found that most of the information presented in the analysis was consistent across many of these variables measured (Elwood et al., 2017). The study by Jans et al. (2015) used CHIS data to explore health disparities among Californians by comparing it to other health surveys, including the California Behavioral Risk Factor Surveillance Survey and the Maternal and Infant Health Assessment. Their findings supported those of Elwood et al. (2017), which used CHIS data and demonstrated that the CHIS was accurate in representing the health findings of California's non-institutionalized population.

Based on these findings, I have confidence that this database provided the most credible and reliable health survey in the state (UCLA Center for Health Policy Research, 2017). Additionally, it was based on a broad-based research strategy that included the

views of more than 20,000 respondents hailing from different counties in the state (UCLA Center for Health Policy Research, 2017). The credibility of using the database was also derived from the fact that the CHIS data has been successfully used to inform clinical health research and cancer research and to formulate policies at institutional levels (UCLA Center for Health Policy Research, 2017). These facts were important in affirming the credibility of this study: The more the database has been used to inform other research studies, the higher its credibility and reliability in the context of this research review.

Scope and Delimitations

In this research, I sought to examine the risk factors that predict asthma among adult, foreign-born African Americans in California. Specific aspects of the research that were addressed in the research problem include asthma status, tobacco smoking, alcohol use, health insurance, education level, income level, and foreign-born African Americans as the main target group. One factor that could have been important to the current study, but was excluded from it, was a primary data collection to examine the association between risk factors and asthma among the target population. I did not include data collection because the study scope was statewide. Conducting statewide research could have required many resources and a lot of time that I did not have. Consequently, relying on the public-use CHIS data was a better option. Another issue that could have been pertinent to this research was contextualizing the research problem to include African Americans as part of the target population. However, I could not do so because, although African Americans are not an immigrant group in California, they have unique social,

political and economic dynamics that are different from those of foreign-born African Americans, who were the target population.

Limitations of the Study

According to Mangal and Mangal (2013), limitations of a study often refer to issues that are outside a researcher's control. The limitations of this study largely stem from the use of the cross-sectional approach as the main technique for the formulation of the CHIS dataset. Causality was another weakness of the cross-sectional study, which informed the CHIS data because the findings cannot be used to ascertain the cause and effect of asthma and risk factors. Furthermore, it was difficult to establish the cause of asthma using the findings of the study.

A cross-sectional study is often used to obtain information at a specific point in time. From this standpoint, one limitation of the study was that the findings could not be assumed true for a long period. Additionally, the snapshot time within which the study was taken may not be holistically representative of the target population. For example, a study conducted during summer holidays using data from a student population may not be truly representative of a student population because most of them would be away. Therefore, the findings deduced from the CHIS database were limited to the period of collection and the dynamics that prevailed at the time. Also, the target population was limited to foreign-born African Americans.

Also, I realized that the questionnaire provided an insufficient assessment of alcohol use for the participants. However, it was the only question related to alcohol use in the CHIS questionnaire. Hence, I had no choice but to use the only available variable

relating to alcohol use. The asthma status variable was not further confirmed by medical records abstraction, thereby making it a self-reported asthma and a limitation on the accuracy of the dependent variable.

Significance of the Study

The findings of this study could help to fill the research gap identified above by examining risk factors that may predict asthma among foreign-born African Americans in California. Findings could help to formulate health interventions that address these attributes to achieve the highest levels of success in reducing the rates of asthma cases. Moreover, the findings of this study could help health experts to develop focused interventions as a strategy to increase asthma awareness among foreign-born African Americans.

The findings of this study could also contribute to asthma management by informing policy decisions about risk factors that may predict asthma. Mistakes made in the past highlight this fact: It took up to 60 years of research on tobacco smoking before governments started implementing policy decisions that reflected their findings (Pattanayak, Sunita, & Anshu, 2016). The research could provide a reliable basis for the formulation of public health decisions affecting asthma management through an understanding of its association with risk factors.

Lastly, the findings of this study could help promote positive social change by raising asthma awareness among minorities. Foreign-born African Americans are among the worst affected, and also one of the understudied groups. Examining the association between the risk factors and asthma within this demographic, would be the first step in

managing the disease and decreasing associated morbidity and mortality. Health care service providers might be able to have a holistic approach to asthma management that considers all immigrant groups and not just the frequently studied ones – Asian and Hispanic immigrants.

Summary and Conclusion

In this section, I showed that researchers have investigated the association between asthma and risk factors such as tobacco smoking, health care access, income, and education. Specialized studies have often focused on age differences and income groups to explain the same association. Those that have further broken down the demographic divide have investigated the association between risk factors and asthma among Hispanic and Asian immigrant groups. The association between risk factors and asthma among foreign-born African Americans is a relatively under-researched area because studies have always neglected this immigrant group.

I sought to fill this research gap by examining the risk factors that could predict asthma among adult, foreign-born African Americans using a quantitative correlational study design. The main variables for this study were the dependent variable (asthma status), independent variables (tobacco smoking, alcohol use, education level, income level, and health insurance), and confounders (age, gender, and marital status). The SEM was used to help understand and interpret the findings. My source of data was the CHIS 2011-2017 dataset. A limitation of this cross-sectional study was the difficulty to establish the cause of asthma using the findings. Another limitation was that the CHIS questionnaire provided an insufficient assessment of alcohol use. I anticipated that this

research would yield a better understanding of the association between risk factors and asthma among adult, foreign-born African Americans in California. The findings of this study could have a positive impact on social change because they could help to increase asthma awareness within the target population and could inform policy decisions that affect the research health issue: asthma.

Section 2: Research Design and Data Collection

Introduction

The purpose of this study was to examine the risk factors that predict asthma among adult, foreign-born African Americans in California. I used a quantitative correlation approach. The research variables included the dependent variable (asthma status), independent variables (smoking, alcohol use, education level, income level, and health insurance), and confounders (age, gender, and marital status). The findings of this research could help to fill a research gap; Previous researchers have not extensively explored the association between these variables among foreign-born African Americans in California.

This section contains five sub-sections. The first part outlines the research design and rationale, which explains the research variables and their connection to the research design. The second part contains details of the methodology used in the research. In this sub-section, the information about the target population, sampling procedures, power analysis, instrumentation, operationalization of constructs, data management, data analysis, procedures for recruitment, participation, and data collection were outlined. The third part of this section outlines the threats to validity, while the fourth part outlines the ethical procedures governing the research process. The last part of this section summarizes the main tenets of the section.

Research Design and Rationale

The first paragraph of the introduction highlighted the purpose of study and the research variables. This study used the quantitative correlation approach, which is often

used to explore the association between two or more research variables (Armijo-Olivo, Stiles, Hagen, Biondo, & Cummings, 2012). The research variables were measured quantitatively. The CHIS dataset used in this study measured the research variables in numbers (quantitative). Collectively, these factors provide the justification for using a quantitative approach. The use of the correlation design was appropriate for this study because it measures two or more variables (Chan et al., 2013).

Indeed, the research design had a clear connection to the research questions. The use of the quantitative correlation approach comes with limited time and resource constraints because the association under investigation (between risk factors and asthma) usually involves a deep analysis of data and a careful evaluation of demographic data to understand the associations (Hassan et al., 2015). However, the use of secondary research data to investigate the same association has alleviated this problem and the time taken to explore the association was small. Furthermore, since secondary data was used in this research, limited resources were needed to find out the association between the dependent and independent variables because the data was already published and did not require the researcher to use additional resources to get it.

The quantitative correlation design chosen for this study was consistent with other research designs capable of advancing knowledge in the health care practice because it opens up abundant opportunities for understanding the association between risk factors and asthma for future researchers interested in exploring the association further (Hoffmann, Bennett, & Del Mar, 2013). However, given that the current study used a cross-sectional design, it may not be straightforward to explain which variable influenced

the other. This is one reason why discussion and interpretation of results is important. For example, if you find an association between smoking status and higher odds of developing asthma after adjusting for important confounders, it is more logical to say that tobacco smoking may likely lead to asthma rather than that asthma led to someone becoming a tobacco smoker. In this regard, it provides a good starting point for investigating the association between risk factors and asthma by allowing researchers to understand the strength and direction of the association between the two variables without necessarily explaining the details surrounding the association. Thus, future researchers can narrow the findings down to understand the intricate details surrounding the association, experimentally or otherwise in more robust observational designs such as prospective cohort studies.

Methodology of Research

Target Population

There are inadequate research studies that have investigated the association between risk factors and asthma among foreign-born African Americans. Based on this gap, the target population for this research was adult, foreign-born African Americans in California. This target population comprises men and women at least 18 years of age. Additionally, they must have originally been born outside the United States and living and possibly working within California.

I used 7 years public use CHIS secondary dataset (2011-2017) yielding a total sample size of 794 respondents. A sample size requirement for the research questions was calculated using the G*Power v3.1 software. I used an alpha value of 0.5 and 80% power

in calculating the sample size. Result from the G*Power calculation revealed an overall sample size range requirement of 591-638 participants for both the exposed and unexposed groups (RQ1 = 610, RQ2 = 623, RQ3 = 605, RQ4 = 591, RQ5 = 638). Hence, the available sample size of 794 participants was adequate for a statistical analysis. Based on the parameters, a sample size of 610 participants in both exposed and unexposed groups would allow me to detect a significant odds ratio (*OR)* for asthma as low as 2.91 comparing smokers to nonsmokers. Also, a sample size of 623 participants in both exposed and unexposed groups would allow me to detect a significant *OR* for asthma as low as 2.43 comparing alcohol users to non-alcohol users. A sample size of 605 participants in both exposed and unexposed groups would allow me to detect a significant *OR* for asthma as low as 4.85 comparing participants with health insurance to those without health insurance. A sample size of 591 participants in both exposed and unexposed groups would allow me to detect a significant *OR* for asthma as low as 7.78 comparing participants with income range ($100,000-300,000) to those below this income range. Moreover, a sample size of 638 participants in both exposed and unexposed groups would allow me to detect a significant *OR* for asthma as low as 8.89 comparing participants with graduate degree to those without graduate degree.

I discern no issues with the internal validity as the CHIS design and annual data collection procedure was the same for these years (2011-2017). However, CHIS 2001-2010 data was collected every 2 years using a slightly different survey design and data collection procedure. Hence, I decided to use the recent CHIS data (2011-2017) with the same survey design and data collection procedure. I estimated that this sample size was

large enough to provide sufficient statistical power (see section on power analysis) to make inferences about the association between risk factors and asthma among adult, foreign-born African Americans in California because the CHIS 2011-2017 database includes 794 foreign-born African Americans.

Sampling and Sampling Procedures

The source of data and information for this study was the public use CHIS database. Since my source of information is attributed to the source of secondary data, the sampling strategy mirrors the same plan present in the original secondary data. The CHIS 2011-2017 dataset was developed through a random sampling technique where respondents had an equal chance of being selected for the study (UCLA, 2017). This sampling strategy is often lauded for reducing selection bias and improving the reliability of the associated findings. Additionally, the CHIS dataset was developed by randomly selecting one adult respondent in each household that chose to participate in the study. The sampling strategy employed in the study was designed to meet two main goals. The first one was to provide local estimates of population-based health data for comparison across different counties in California, while the second one was to provide statewide population-based health data for all the ethnic and racial groups in California (UCLA, 2017).

The sampling strategy adopted in the CHIS dataset was drawn from the dual-frame random-digit-dial method, which included a sample of the respondents' views using telephone surveys (UCLA, 2017). Besides the landline sample, the CHIS dataset also included a statewide cell phone sample of the overall population. The landline and

cell phone samples described two separate groups of respondents that characterized the data. Respondents using cell phones were asked to verify their home address so as to determine that the respondents actually resided in California State. The researchers administered these samples through a computer-assisted telephone interview that included both the statewide landline random digital dial and the statewide cell phone sample. The landline sample was stratified according to county demarcations, groups of small counties and sub-county areas (UCLA, 2017). Based on the nature of the data collection method, only those households that had a telephone were included in this sample.

The sampling frame used to develop the CHIS dataset involved the use of traditional random digit dial and cell phone random digit dial sampling frames. The inclusion criterion was households, which had a landline or cell phone. The inclusion criterion also included the views of respondents who were adults (18 years and above) (UCLA, 2017). Comparatively, the exclusion criterion included respondents who were under 18 years and households that lacked either a cell phone or a landline.

Recruitment, Participation and Data Collection

The participants who took part in the CHIS were recruited through random digit dial telephone survey. They were also selected from random households throughout California. In summary, more than 50,000 households were sampled (CHIS, 2016). One adult per household was interviewed in the survey and if there was no response, an adolescent of between 12 and 17 years was recruited (CHIS, 2016). The sample size of the CHIS 2016 database was 59,938 people; adults comprised 47,614 of the total sample,

while children and adolescents were 8,945 and 3,379, respectively (CHIS, 2016). The response rate for the CHIS 2016 was 6.8% and the success of introducing the survey to the household and selecting an adult to respond to the questions (screener rate) was 15.5%, and the response rate for the extended interview was 43% (CHIS, 2016). Collectively, this data collection process helped to provide a body of data that is hereby presented in this study as CHIS data. The benefits of using this information for this type of analysis are clear, but the limitations are also many, as argued by Faber and Fonseca (2014) who say the success of this type of data collection depends on the efficiency of health agencies and researchers to conduct reliable public health studies.

Data Management

Explaining the procedures for data management was important in this research study because it affects the credibility of research information (Jain et al., 2015). Data management also involves explaining the procedures for accessing data and the necessary permissions required to obtain such information. Generally, the data editing process underpinning the CHIS data followed three main steps that included problem resolving and management, coding the information obtained, and verifying that the data editing procedures were updated (CHIS, 2016). The process of problem resolving involved the possible identification of issues with the information collected. Problems were escalated to the project team and a research operations center officer reviewed them electronically (CHIS, 2016). Different types of problems were resolved at this stage. For example, enumeration errors were resolved this way. After editing the files, a final transformation process was undertaken to produce the data in SPSS data delivery files. The second stage

of data management involved a review of responses provided by the interviewees. Most of the pieces of information collected were closed-ended and coded into existing categories (CHIS, 2016). The last stage of data management involved updating the interview data. This stage was aided by the computer-assisted telephone interview system. In this process, the data collection and interview process were reviewed for quality using selected computer programs.

Although it is common practice that researchers get special permission to use secondary research data, this requirement is mostly applied to research information that are not freely available online (Jirojwong, Johnson, & Welch, 2014). However, this requirement was not applicable in my research because the information used was publicly available. However, I requested permission from Walden University Institutional Review Board (IRB) before accessing and analyzing this CHIS secondary data. My IRB approval number was 08-01-18-0423543.

Although using freely accessible data was acceptable in this study, it was important to use reputable data sources when undertaking this type of research. In the context of this study, the reputation of the findings depends on the reputation of the secondary data used. The CHIS dataset was appropriate because it was statewide and undertaken by a reputable organization. Furthermore, UCLA (2017), which undertook the study, has been collecting similar data since 2001 with relative success. Based on its good reputation, different professionals, including journalists, policy makers and health experts, use its information. Thus, this source of data was appropriate for this study.

Instrumentation and Operationalization of Constructs

Instrumentation

As mentioned in this study, the data was obtained from the CHIS database. It is among the largest statewide health interview surveys in the United States and is conducted on an annual basis to provide information about different health topics (UCLA, 2017). Although the CHIS publish health data relating to different years, the information used in this study was CHIS 2011-2017. Looking at the appropriateness of the CHIS data to the current study, I found that it was relevant and specific to the topic under investigation because the dataset provides health data relating to different ethnic and racial groups in California. A focus on foreign-born African Americans as one cohort in the study was ideal for my analysis because this study focuses on this ethnic group as the target population. The dataset was also appropriate to my study because asthma was a health topic investigated in the research data. Other health issues surveyed in the dataset include diabetes and obesity (UCLA, 2017). The inclusion of asthma as a relevant health issue in the dataset and the provision of health data relating to immigrants bring my attention to the appropriateness of the data to this study. The findings contained in the CHIS document are freely available to the public. Therefore, there was no special permission from the researcher needed to use the instruments. Based on the availability of the health data outlined by CHIS, different people including policymakers, state agencies, and community organizations, find the resource useful in improving the health outcomes of their subjects.

The instrumentation of the constructs was done by carrying out a telephone survey. The constructs were measured by assigning unique codes and values to them. These indices helped the researcher to identify differences in the participant's responses. For example, when analyzing the respondents' gender, males were assigned a value of "1," while females were represented with a value of "2." At the same time, the study's constructs were assessed using frequencies and expressed as a percentage of the total population (UCLA Center for Health Policy Research, 2017). The constructs were measures using frequencies, percentages, and codes.

The CHIS database was used to collect health data across different ethnic and racial groups in California. In the past, it has been used to collect health data from all 58 counties in the state of California (UCLA, 2017). However, there were cases where researchers have oversampled specific areas within the state that are heavily populated (such as Los Angeles and San Diego). The reliability and validity of the findings developed from the past use of CHIS data have been confirmed through the involvement of large and diverse samples (UCLA, 2017). In other words, past users of the data established that the samples used in the dataset were representative of the ethnic and racial diversity of the state, particularly because the findings could be used to answer specific and important health questions pertaining to different ethnic and racial groups in the state.

The CHIS data have sufficient instrumentation to answer the research questions. For example, I have established that the dataset contains health data about different ethnic and racial groups in California. This one instrumentation was useful in answering my

research questions, which focuses on foreign-born African Americans. Other aspects of the instrumentation used to develop the CHIS are its consistency, flexibility, and adaptability. These attributes mean that the findings included in the study can be used to investigate new health issues and emerging trends among specific racial or ethnic groups.

The questionnaire used to gather data in the survey was divided into different sections. The first one contained demographic information relating to the participants (age, sex, ethnicity, marital status, and race) (CHIS, 2016). The second part gathered information relating to their health conditions, such as asthma, diabetes, and hypertension. The third section explored the health behaviors of the respondents, such as dietary intake, alcohol use, and tobacco smoking. The fourth part of the questionnaire explored the general health, disability, and sexual health of the respondents. The fifth and sixth sections of the same data collection instrument investigated issues relating to women and mental health. Information relating to SES of the respondents was explored in the second part of the questionnaire. Issues relating to health insurance, health care access, discrimination, employment, public program participation, and suicide were investigated in this part as well (CHIS, 2016).

Questions in the survey that were useful to my investigation were centered on the respondent's asthma status, tobacco smoking status, alcohol use, health care access, SES, and demographic information (age, gender, marital status, and race). Some of the questions asked in the demographic section stated, "Are you male or female?" and "What is your age?" Questions that sought to find out the tobacco smoking status, alcohol use, education level, income level, and health insurance were pertinent to my investigation.

Collectively, they helped me to answer issues pertaining to the dependent variable, independent variables, and confounders in this research analysis.

Reliability and Validity of CHIS Data

Validity and reliability are important considerations when testing or formulating research instruments. The Cronbach alpha technique was used to assess the validity of the CHIS data. This technique is among the most common methods used to test for reliability because it measures the internal consistency of a set of items in a group. According to Statistics Solutions (2017), the Cronbach's alpha should typically give values from "0" to "1." These scores highlight the degree of internal consistency. Values, which are more than or equal to 0.9, are perceived to have an excellent internal consistency, while those that are between 0.8 and 0.9 are deemed to have a good internal consistency. Cronbach alpha values that are between 0.7-0.8 could be viewed to have an acceptable internal consistency, while those that are between 0.6 and 0.7 have questionable internal consistency. Lastly, values that are between 0.0 and 0.6 are perceived to have a poor internal consistency, while those that have a negative value are viewed to have no internal consistency.

The internal consistency of the scales used to measure the variables in the CHIS database was found to be generally excellent because the Cronbach's alpha was 0.89 for most of the research scales used, based on a sample of 100 households (CHIS, 2014). This score of internal consistency is regarded as higher than most national data. For example, the Medical Expenditure Panel Survey has been used for medical research and has a validity of 0.7, which is deemed acceptable (Lindly, Zuckerman, & Mistry, 2016).

Comparatively, a score of 0.89 for the CHIS data is deemed excellent (based on the evaluation metrics highlighted above).

According to a study by Wang, Ponce, Wang, Opsomer, and Yu (2015), which used CHIS data to generate health estimates by zip code found that the test-retest Pearson Correlation for CHIS data was satisfactory because the total score was 0.86. Although these statistics support the credibility and validity of the information obtained in the CHIS data, it is important to recognize that the responses obtained from the database were self-reported and could be vulnerable to selection bias. However, as supported by the findings of Gonzalez, Sanders-Jackson, and Emory (2016), which also used CHIS data, this limitation has been accepted for many large-scale studies. It may also be true that symptomatic signs of asthma may be misclassified as the condition, but it is not projected that such errors could skew estimates (Gonzalez et al., 2016; Silverberg, Simpson, Durkin, & Joks, 2013; Rosser, Forno, Cooper, & Celedón, 2014).

A pilot study of interviewing adults with telephones was also conducted when developing the CHIS data. By doing so, the researchers evaluated the feasibility of sampling and interviewing the respondents using telephones. Using this technique, important information relating to the feasibility of conducting a lengthy health interview survey (via a telephone) was reviewed because many past surveys had a limited time to engage the respondents (CHIS, 2014). The second piece of information that was obtained from the pilot study was the feasibility of using random sampling methods in a household. To get the above information, a survey plan was formulated where 100 interviews involving households that had a telephone and an adult present were

completed (CHIS, 2014). The overall results of the pilot study showed that the first 100 interviews did not show any signs of poor validity or high rates of false negative or false positive responses, especially compared to prior responses provided in other national quantitative studies. In fact, the findings of the study correlated with the Medical Expenditure Panel Survey, which had a Cronbach alpha of 0.70, as demonstrated by a study prepared by Elwood et al., 2017, which used CHIS data to measure the influence of legally recognized partnerships on the health and well-being of same-sex couples. Relative to this assertion, the CHIS (2016) and Gonzalez et al. (2016) say that the CHIS database is a reliable measure for conducting population-based studies and adapting CHIS questions in health research**.** Therefore, the findings of the validity test showed that the questions correctly measured the constructs.

Although the findings of the pilot testing supported the internal validity of the research instruments, another measure of validity for the findings that were generated from the CHIS data is the inclusion of confounders (age, gender, and marital status). In other words, confounders were not integrated into the study to create a new purpose of the investigation, but rather to add to the internal validity of the association that was deduced from assessing the dependent and independent variables.

All data relating to variances, such as the actual number of foreign-born African Americans in California, were also weighted as a measure of validity. Replicate weights were used in this regard to address the complex sampling design used to collect the CHIS data and adjusted for non-response bias as well (UCLA Center for Health Policy and Research, 2018). The resultant data were products of sequential series of logistic

regression models, which focused on understanding asthma incidences, subject to adjustments of the independent and confounding variables. Adjusting for a confounder does not create a new purpose for the study but simply adds to the internal validity (statistical validity) of the results. Weights were also used to adjust point estimates, variance estimates, and standard errors (UCLA Center for Health Policy and Research, 2018). All the weights used in the study had the same name – *RAKEDW0* (UCLA Center for Health Policy and Research, 2018).

The weighting technique accounted for sample selection probabilities and minimized the possibility of selection bias. They were also used in the study to account for sampling biases because some of the respondents included in the CHIS data could have had unequal chances of being included in the study if they were not used (UCLA Center for Health Policy and Research, 2018). Therefore, the weighting method was important in the collection of data because it provided a formula for analyzing the findings in a manner that was generalizable to the entire state of California. It also allowed the researchers to generate accurate data relating to standard errors and confidence intervals (Lee, Reed, & Berg, 2014). Tests of significance for population estimates were also generated using the same technique.

Operationalization of Constructs

The research variables identified in the CHIS database were numerous though I used only a few variables that are related to my research questions. As highlighted in this study, the dependent variable was asthma status and the independent variables were the potential risk factors (tobacco smoking, alcohol use, education level, income level, and

health insurance). The potential confounding variables were age, gender, and marital status. In the CHIS database, race and born in the United States emerged as two variables that helped to define the target population – foreign-born African Americans. Race was denoted by the term "Self-reported African American (SRAA)." Birth place was denoted by the term "Born in the United States (AH33NEW)." The target population was denoted by the term "foreign-born African Americans (AFIMMIG)" and this variable was created to represent African Americans born outside the United States. Asthma was denoted by code AB17 which was asthma status diagnosed by doctor. The process of measuring the variables was done quantitatively.

Dependent variable. Asthma status was assessed by asking participants questions about whether they had ever been diagnosed with the health condition. This variable was denoted by the code AB17 in the CHIS dataset and the exact question asked was, "Has a doctor ever told you that you have asthma?" (UCLA Center for Health Policy Research, 2017). There are two responses (1 = Yes, 2 = No) for this categorical variable. The reference category was *no* for this research variable (asthma status). Hence, this dependent variable (asthma) is a dichotomous categorical variable. The few variables related to asthma were self-reported and not confirmed by medical records.

Independent variables. The independent variables include smoking, alcohol use, education level, income level, and health insurance.

Tobacco smoking: Tobacco smoking was assessed in the CHIS study by evaluating the tobacco smoking status of the participants. This variable was denoted by the code SMOKING in the CHIS dataset and the exact question asked was, "What is your

current tobacco smoking habit?" (UCLA Center for Health Policy Research, 2017). There are three responses (1 = Current smoker, 2 = Previous smoker, 3 = Never smoked) for this categorical variable. The reference category was *never smoked* for this research variable (tobacco smoking).

Alcohol use: Alcohol use was assessed by evaluating participants' alcohol consumption in the past year. This variable was denoted by the code AC32 in the CHIS dataset and the exact question asked was, "In the past 12 months, did you have any kind of alcoholic drink?" (UCLA Center for Health Policy Research, 2017). There are two responses (1 = Yes, 2 = No) for this categorical variable. The reference category was *no* for this research variable (alcohol use). I realized that the research questionnaire was an insufficient assessment of alcohol use since it was lacking questions on the alcohol use frequency, length of time for alcohol use, previous alcohol use, or current alcohol use. However, it was the only question related to alcohol use in the CHIS questionnaire. Hence, I had no choice but to use the only available variable relating to alcohol use.

Education level: Education level was assessed by asking participants questions about their highest level of educational attainment. This variable was denoted by the code AHEDC_P1 in the CHIS dataset and the exact question asked was, "What is your highest education level attained?" Six education levels were outlined to choose from: Grades 1-8, Grades 9-12, vocational school/college, associate degree, bachelor's degree, and graduate degree (UCLA Center for Health Policy Research, 2017). The reference category was *graduate degree* for this research variable (education level). This variable was useful in examining how asthma varies across tiers of education.

Income level: Income level was assessed by asking participants to state their annual household income. This original variable was denoted by the code AK22_P in the CHIS dataset and the exact question asked was, "What is your household's total annual income?" (UCLA Center for Health Policy Research, 2017). However, this continuous variable was grouped and converted to a categorical variable. This categorical variable was denoted by the code INCOME in the CHIS dataset with six income groups: $0-9,999, $10,000-19,999, $20,000-39,999, $40,000-69,999, $70,000-99,999, and $100,000-300,000. The maximum earning for the participants was $300,000 and nothing more. The reference category was *$100,000-300,000* for this research variable (income level). This variable was useful in examining the association between asthma and income level.

Health insurance: Health care access was assessed by asking participants if they had a health care insurance plan. This variable was denoted by the code INS in the CHIS dataset and the exact question asked was, "Are you currently insured?" (UCLA Center for Health Policy Research, 2017). There are only two responses (1 = Yes, 2 = No) for this categorical variable. The reference category was *no* for this research variable (health insurance). This study explored whether there is an association between health insurance and asthma.

Confounders. The confounders included age, gender, and marital status.

Age: Age was assessed by asking participants to state their age. This variable was denoted by the code SRAGE_P1 in the CHIS dataset and the exact question asked was, "What is your self-reported age?" (CHIS, 2016). This Confounder has the following age group responses: 18-29, 30-39, 40-49, 50-59, 60-69, 70-79, 80+ years. The reference

category was *80+ years* for this confounding variable (age). Again, the only available data was categorical (age group); there was no data for age as a continuous variable.

Gender: Gender was assessed by asking respondents about their sex. This variable was denoted by the code SRSEX in the CHIS dataset and the exact question asked was, "What is your self-reported sex? (UCLA Center for Health Policy Research, 2017). The participants could only answer in two ways: male or female. Thus, this variable was a dichotomous one (1 = Male, 2 = Female). The reference category was *female* for this confounding variable (gender).

Marital status: This variable was assessed by asking participants about their marital status. Marital status was denoted by the code MARIT in the CHIS dataset and the exact question asked was, "What is your marital status?" (CHIS, 2016). Marital status was operationalized for this study by finding out whether the respondents were married, not married, or other (widowed/separated/ divorced). There are only three responses (1 = Married, 2 = Other/widowed/separated/ divorced, 3 = Never married) for this categorical variable. The reference category was *never married* for this confounding variable (marital status).

Data Management Plan

The data analysis plan was an important part of this research process because it helped me get useful information/findings from the research inputs. For purposes of undertaking this process, I used the SPSS software v.24.

Data Cleaning and Preparation

Before analyzing data with the SPSS software tool, I conducted data cleaning and screening procedures to make sure that the inputs of the data analysis process are reliable and credible. To make sure that the information entered in the SPSS software was credible, I checked for out of range data. This process also involved checking for the minimum and maximum values associated with the variables of interest (income level and age) by analyzing scores associated with the descriptive data (Murari, 2013). This process helped me understand whether the responses included in the analysis were legitimate, or not.

Statistical Analyses Plan

Descriptive Statistical Analysis

The dependent variable, independent variables and confounders were described using descriptive statistical methods that include frequency tables with ranges and percentages. I specifically used mean values as a measure of central tendency for continuous variables like age and income. The frequency statistics would simply help to point out the number of times each variable occurs. Also, cross-tabulations yielded the frequencies and percentages for the variables. Cross-tabulations of asthma versus the independent variables and confounders were useful. I constructed a table that described the characteristics of the study population by asthma status (yes/no). All variables were included in this table lined up in one column and asthma status (yes/no) in the next two columns and *p*-values in the last column, testing for significant differences in the frequency of asthma in categories of the variable. The result was one table of participant

characteristics. For example, it was instrumental in explaining the frequency of asthma among people who smoke tobacco. Also, I used bar graphs, histograms, pie charts, and tables in presenting the descriptive statistics. This statistical tool (SPSS software) was useful in describing the personal information of the sample. For example, researchers have used it to provide details about gender, educational qualifications, income and such like demographic data. This type of information was applicable in understanding both the independent variables and confounders.

Inferential Statistical Analysis (Multiple Logistic Regression)

For this study, I used multiple logistic regression as the inferential statistical analysis using the SPSS software v.24. As part of the data analysis plan, the use of multiple logistic regression was central to the whole process because it helped to test the hypotheses. Multiple logistic regression can predict the association between more than two variables and can use it to identify which independent variables or confounders can predict the outcome (dependent) variable. The multiple logistic regression method was applicable in this study because the dependent variable (asthma status) is categorical and there are two levels (yes and no) of the dependent variable (Polit & Hungler, 2013). This type of analysis also helped in mimicking the real-life scenario of confounding factors that affect the association between the dependent variable (asthma) and independent variables. This analysis was crucial in investigating the association of the confounders on the dependent and independent variables. Its significance would be hinged on investigating whether there was a significant difference between two or more research variables.

Multiple logistic regression. According to Warner (2012), the multiple logistic regression method is used for testing the association of one categorical dependent variable and two or more independent variables. According to Denham (2016), this regression method is mostly used in understanding the association between different independent variables and a dependent variable. In the context of this study, the multiple logistic regression method was used in estimating the association between the variables. The capability of the method to investigate multiple associations was exploited in this regard by understanding the effect of the independent variables and confounders. Through this analysis, I was able to examine how the risk factors can predict asthma among the target population (Warner, 2012). Comprehensively, the use of the multiple logistic regression as the inferential statistical analysis helped to provide an understanding of the association between the dependent and independent variables.

As highlighted in earlier sections of this study, my study was guided by five research questions. The first and second questions sought to establish if tobacco smoking and alcohol use predict asthma among adult, foreign-born African Americans in California and it was analyzed using the inferential statistical analysis. The third question strives to investigate if there is an association between asthma and health insurance among adult, foreign-born African Americans in California. It was analyzed using the multiple logistic regression analysis. The fourth and fifth questions sought to establish if education and income levels predict asthma among adult, foreign-born African Americans in California.

To recap, it was important to point out that the determinants of asthma as a dependent variable was first understood through an examination of descriptive data to test the hypotheses about the possible associations that could exist among the variables (exposures and outcomes). The second phase of analysis employed analytical data techniques to investigate the hypotheses more intricately. Here, samples of respondents were drawn from the overall data and compared to different groups to find out if there were variations in health outcomes based on different exposures. For example, if it was estimated that one independent variable, such as the lack of health insurance, could increase the exposure to asthma, an association was established. If the hypothesis were controlled for an exposure (such as age) and it is established that the exposure did not affect the association between health insurance and asthma, it meant that the risk of asthma developing, based on health insurance access, is independent of age as a confounder. In other words, there was a similar probability of developing asthma for the controlled and uncontrolled groups.

Two logistic regression analysis models were used to address the research questions and hypothesis. The first model was a univariate logistic regression analysis involving only one predictor (independent) variable at a time without controlling for the other predictor and confounding variables. For this first model, addressing each research question was based on separate logistic regression analysis results. I calculated odds ratio and associated 95% CI to estimate the odds of asthma comparing tobacco smokers to nonsmokers without adjusting for any predictor or confounding variables. The same approach was taken when examining each of the other variables.

The second model was a multivariate logistic regression analysis wherein all predictor and confounding variables (tobacco smoking, alcohol use, education level, income level, health insurance, age, gender, and marital status) were entered simultaneously into the model. Hence, to answer the research questions while controlling for the predictor and confounding variables, a multivariate logistic regression analysis was conducted. In this multivariable-adjusted model, I calculated odds ratio and associated 95% CI to estimate the odds of asthma comparing tobacco smokers to nonsmokers and adjusting for alcohol use, health insurance, education level, income level, age, gender, and marital status. The same approach was taken when examining each of the other predictor variables (alcohol use, health insurance, income level, and education level) adjusting for all other variables.

Power Analysis

Power analysis was an important aspect of this methodology because it outlines the procedures used to select a right sample size that could be reliably used to find out if there is an association between risk factors and asthma among adult, foreign-born African Americans in California. I used 7 years public use CHIS secondary dataset (2011-2017) yielding a total sample size of 794 respondents. A power analysis was conducted for the research questions using the G*Power v3.1 software (see Table 2 below). I used an alpha value of 0.5 and a sample size of 794 participants in calculating the power analysis. Result from the G*Power calculation in Table 2 revealed an overall power range requirement of 0.88-0.92 (88-92%) for both the exposed and unexposed groups (RQ1 = 88%, RQ2 = 89%, RQ3 = 91%, RQ4 = 92%, RQ5 = 90%).

Table 2

*Power Analysis Using G*Power Software v.3.1*

	Research Question 1	Research Question 2	Research Question 3	Research Question 4	Research Question 5
Sample size	794	794	794	794	794
Pr(H_0)	0.03	0.04	0.02	0.01	0.01
Pr(H_1)	0.08	0.07	0.09	0.09	0.10
Odds Ratio	2.91	2.43	4.85	7.78	8.89
R Squared	0.00	0.00	0.00	0.00	0.00
Alpha	0.05	0.05	0.05	0.05	0.05
Power	0.88	0.89	0.91	0.92	0.90
X parm π	0.23	0.60	0.82	0.81	0.85

Hence, the available sample size of 794 participants yielded adequate power (greater than 80%) for a statistical analysis. Based on the parameters, a power of 88% for both exposed and unexposed groups would allow me to detect a significant odds ratio (*OR*) for asthma as low as 2.91 comparing smokers to nonsmokers. Also, a power of 89% for both exposed and unexposed groups would allow me to detect a significant OR for asthma as low as 2.43 comparing alcohol users to non-alcohol users. A power of 91% for both exposed and unexposed groups would allow me to detect a significant *OR* for asthma as low as 4.85 comparing participants with health insurance to those without health insurance. A power of 92% for both exposed and unexposed groups would allow me to detect a significant *OR* for asthma as low as 7.78 comparing participants with income range ($100,000-300,000) to those below this income range. Moreover, a power of 90% for in both exposed and unexposed groups would allow me to detect a significant

OR for asthma as low as 8.89 comparing participants with graduate degree to those without graduate degree. Hence, the sample size (794 participants) used in this research was large enough to provide sufficient statistical power to make inferences about the association between risk factors and asthma among adult, foreign-born African Americans in California.

Threats to Validity

Threats to validity are issues that could affect the credibility of the research findings. Two types of threats to validity exist - internal and external validity threats (Guerrero et al., 2015). Internal validity threats are those, which undermine the cause and effect relationship between variables in a research, while external validity threats are those that affect the ability to generalize a study's findings in other research settings (Nieswiadomy, 2012). The effects of these two types of threats to validity on the current research are explained in the subsections below.

Internal Validity

One of the threats to internal validity was the self-reporting nature of CHIS data. The accuracy of these self-reports is questionable because variations in language, race, or immigration status may cause differences in the accuracy of the responses given by the informants (Lee et al., 2014). The self-reporting nature of the CHIS also data made it difficult to verify asthma diagnoses independently. This threat to validity was partially addressed by undertaking the research using multiple languages (English, Chinese, Spanish, Korean, and Vietnamese) because it increased the probability that the

respondents understood the questions asked, based on the convenience of choosing a language they were most comfortable with.

The specificity of variables was also another threat to the internal validity of the study because different criteria for analyzing the variables may have caused distortions in the findings. For example, a person's tobacco smoking status may quickly change within the time a study is undertaken. This change may significantly affect the applicability of the study's findings. To solve the problem of instrumentation, it was essential to include confounding variables in the study when analyzing the data to understand the effects of the use of different instrumentation techniques when developing the findings (Lang & Altman, 2014). Similarly, standardizing the research process could help to avoid this issue because it would make sure researchers replicate the same context when conducting future studies (Lang & Altman, 2014).

External Validity

The threats to validity in this study stem from the nature of the CHIS data. For example, the confined nature of the data to California alone is a threat because the health environment in the state is different from others in America because of the large presence of the health maintenance organization (HMO) (Wilson, 2016). The HMO is a type of health insurance that focuses on prevention and the alignment of financial goals with wellness (Wilson, 2016). The state of California was among its early adopters and its health landscape has been predominantly defined by it (Wilson, 2016). Therefore, it may be difficult to extrapolate health data from the state to others which are not largely defined by the HMO or other aspects of California's healthcare system. At the same time,

California is a relatively heterogeneous state, in terms of racial hegemony. Therefore, the experience of being a foreign-born African American in the state may be different from others in America. This was a limitation of the study.

Another threat to external validity was the failure to include institutionalized populations in the CHIS data (Becerra, Mshigeni, & Becerra, 2018). This makes it difficult to extrapolate the data to institutionalized populations such as those living in rehabilitation centers, prisons, correctional facilities, nursing homes, and assisted living facilities. The last threat to external validity stems from the fact that the sample population was predominantly Californians. This sampling procedure means that there may be a need to undertake future researcher to compare the findings of the study with a nationwide sample.

Ethical Procedures

Any study that involves human participants is often subject to several ethical issues (Ndebele et al., 2014; Nicholls et al., 2015). The CHIS dataset used in this research is subject to these ethical issues. In this section of the study, I explained how these ethical issues affect the treatment of data and the recruitment of participants and materials.

The ethical procedures used by the CHIS researchers to collect data were approved by UCLA. The ethical procedures that were followed in the current study were also based on the guidelines outlined by the Walden University Institutional Review Board (IRB). I applied to the Walden University IRB and waited for approval before accessing the CHIS data and conducting the statistical analysis. My IRB approval number was 08-01-18-0423543.

The current study also involved an analysis of de-identified data to avoid instances of privacy infringement or confidentiality breaches. Data was stored safely in a computer and protected by a password, which only the researcher and research committee members could gain access to. Although the CHIS dataset used was a public-use database, I was required to create an account with the CHIS website with my credentials before accessing and downloading the data files. This safeguard ensured that no other person had access to the information besides the researcher and research committee members (Nursing and Midwifery Board of Australia, 2012).

Summary

This section shows the research methodology in answering the five research questions. Multiple logistic regressions analysis was used to test the association between risk factors and asthma among adult, foreign-born African Americans in California. The research variables include the dependent variable (asthma status), independent variables (tobacco smoking, alcohol use, education level, income level, and health insurance), and confounders (age, gender, and marital status). Secondary analysis of the archived data was conducted after receiving IRB approval. I conducted both descriptive and inferential statistical analyses for this study. I completed a descriptive analysis using frequency tables, percentages, graphs and cross-tabulations. I also conducted the inferential analysis using multiple logistic regressions.

Quantitative correlation research was the main design used to answer the research questions. It was based on the understanding that the research topic was a correlation study because the current research examines the association between risk factors and

asthma among foreign-born African Americans in California. The source of information was secondary research data, which comes from an independent survey by the CHIS. The SPSS software tool was also the data analysis technique used in this study because of its ability to analyze large amounts of data. The correlation technique was the main SPSS tool applied in this study because of its ability to examine the association between two or more variables. The results of the data analysis process are presented in Section 3, which outlines the results and findings of the study.

Section 3: Presentation of the Results and Findings

Introduction

The purpose of this study was to examine the risk factors that predict asthma among adult, foreign-born African Americans in California. Five research questions guided the investigation. The quantitative research questions (RQ) and their corresponding null hypotheses (H_0) and alternative hypotheses (H_1) for my study are stated below.

RQ1: Does tobacco smoking predict asthma status among adult, foreign-born African Americans in California when adjusting for age, gender, and marital status?

$H_0$1: Tobacco smoking does not predict asthma status among adult, foreign-born African Americans in California when adjusting for age, gender, and marital status.

$H_1$1: Tobacco smoking predicts asthma status among adult, foreign-born African Americans in California when adjusting for age, gender, and marital status.

RQ2: Does alcohol use predict asthma status among adult, foreign-born African Americans in California when adjusting for age, gender, and marital status?

$H_0$2: Alcohol use does not predict asthma status among adult, foreign-born African Americans in California when adjusting for age, gender, and marital status.

$H_1$2: Alcohol use predicts asthma status among adult, foreign-born African Americans in California when adjusting for age, gender, and marital status.

RQ3: Is there an association between asthma status and health insurance among adult, foreign-born African Americans in California when adjusting for age, gender, and marital status?

$H_0$3: There is no association between asthma status and health insurance among adult, foreign-born African Americans in California when adjusting for age, gender, and marital status.

$H_1$3: There is an association between asthma status and health insurance among adult, foreign-born African Americans in California when adjusting for age, gender, and marital status.

RQ4: Is there an association between asthma status and income level among adult, foreign-born African Americans in California when adjusting for age, gender, and marital status?

$H_0$4: There is no association between asthma status and income level among adult, foreign-born African Americans in California when adjusting for age, gender, and marital status.

$H_1$4: There is an association between asthma status and income level among adult, foreign-born African Americans in California when adjusting for age, gender, and marital status.

RQ5: Is there an association between asthma status and education level among adult, foreign-born African Americans in California when adjusting for age, gender, and marital status?

$H_0$5: There is no association between asthma status and education level among adult, foreign-born African Americans in California when adjusting for age, gender, and marital status.

$H_1$5: There is an association between asthma status and education level among adult, foreign-born African Americans in California when adjusting for age, gender, and marital status.

This section contains a review of the data analysis and results. The findings were obtained by performing both descriptive and inferential statistical analyses using SPSS software v.24 on the data obtained from the CHIS 2011-2017 dataset. This section comprises three additional parts. The first part outlines how the data collection process was carried out. In the second part, the results of the analysis were explained in the subsequent section, which is the results segment. The third part, summary, outlines the main points in the study.

Summary of Methodology

The time taken to sample data from the CHIS database was a day. This short time frame was accomplished because the CHIS 2011-2017 data used was already available in the public-use CHIS database. Therefore, I only had to retrieve and analyze it. Based on the nature of the data retrieved, the response rate was 100%. The CHIS database was deemed reliable and credible because reputable researchers who have undertaken similar

credible studies have used it (Kent, Jensen, & Kongsted, 2014). Also, the reliability and credibility tests highlighted before showed that they match the measures of quality as other reputable national studies (Merlo, Wagner, Ghith, & Leckie, 2016).

The original study population was made up of foreign-born African Americans living in California. The inclusion criterion for the original study population were defined by men and women who were at least 18 years old, and that they must have been born outside the United States.

The CHIS data for my study were collected from 2011 to 2017. The CHIS dataset was developed through a random sampling technique where respondents had an equal chance of being selected for the study. I used 7 years of public-use CHIS secondary dataset (2011-2017) yielding a sample size of 794 respondents. Using the G*Power v3.1 statistical software, my sample size of 794 participants was deemed sufficient power for a statistical analysis.

Confounders, which are variables that influence the association of the dependent and independent variables, were included in the study because a univariate analysis of the research findings would not have provided a true picture of the association between asthma and the independent/predictor variables. The confounders that were included in the study were age, gender, and marital status. The findings of both the descriptive and inferential statistical analyses appear below.

Results

Descriptive Statistical Analysis

Descriptive statistics are used to describe the basic features of the data in a study, and they provide simple summaries about the sample and the measures. Table 3 below shows the summary descriptive statistics of the research variables (age, gender, marital status, education level, income level, health insurance, tobacco smoking, alcohol use, and asthma status) among the study participants.

Age. Age was assessed by asking participants to state their age in years. Their ages were then categorized into seven age groups. There were 794 valid cases for age as summarized in Table 3 below. From the data analysis, the age distribution of the study participants were as follows: 18-29 years (12.1%), 30-39 years (17.4%), 40-49 years (20.9%), 50-59 years (25.1%), 60-69 years (14.7%), 70-79 years (6.3%), and 80+ years (3.5%). Study participants within age group 50-59 years formed the majority (25.1%) of the study participants. In addition, the study participants within age group 40-49 years formed the second largest group (20.9%) of the study participants.

Marital status. This confounding variable was assessed by asking participants to state their marital status (married, never married, other). There were 794 valid cases for gender as summarized in Table 3 above. From the data analysis, 42.8% of the cases analyzed were married, 25.6% were never married, and 31.6% of the study participants indicated other marital status (widowed, separated, divorced). The majority (42.8%) of the study participants were married and 25.6% of them were never married.

Table 3

Distribution of Research Variables Among the Study Population (N = 794)

Variable		*n*	%
Asthma status	Yes	87	11.0
	No	707	89.0
Gender	Male	372	46.9
	Female	422	53.1
Marital status	Married	340	42.8
	Widow/sep/div	251	31.6
	Never married	203	25.6
Health insurance	Yes	655	82.5
	No	139	17.5
Alcohol use	Yes	474	59.7
	No	320	40.3
Tobacco smoking	Current smoker	54	6.8
	Previous smoker	129	16.2
	Never smoked	611	77.0
Education level	Grades 1-8	113	14.2
	Grades 9-12	208	26.2
	Vocational college	118	14.9
	Associate degree	59	7.4
	Bachelor degree	190	23.9
	Graduate degree	106	13.4
Income level	$0-9,999	189	23.8
	$10,000-19,999	109	13.7
	$20,000-39,999	155	19.5
	$40,000-69,999	122	15.4
	$70,000-99,999	68	8.6
	$100,000-300,000	151	19.0
Age group	18-29 years	96	12.1
	30-39 years	138	17.4
	40-49 years	166	20.9
	50-59 years	199	25.1
	60-69 years	117	14.7
	70-79 years	50	6.3
	80+ years	28	3.5

Note. *n* = sample size

Gender. Gender was assessed by asking participants to state their sex (male or female). There were 794 valid cases for gender as summarized in Table 3 below. From the data analysis, 46.9% of the cases analyzed were males, and 53.1% of the study participants were females. The majority (53.1%) of study participants were females and 46.9% of them were males.

Educational level. Education level was assessed by asking participants about their highest level of educational attainment. Six education levels were outlined to choose from. There were 794 valid cases of educational levels as summarized in Table 3 above. From the data analysis, 14.2 % of the cases reviewed were participants with Grades 1-8 educational level, and 26.2% of the cases reviewed were participants with Grades 9-12 educational level. Also, the percentages of participants whose educational levels were vocational degree, associate degree, bachelor's degree, and graduate degree were 14.9%, 7.4%, 23.9%, and 13.4%, respectively.

The majority of the study population either had an educational level of Grades 9-12, or had a bachelor's degree. In fact, both groups of participants were in the 25-percentile range. The third biggest group of respondents had a vocational degree accounting for 14.9% of the study population. The fourth biggest group of respondents who took part in the study had a graduate degree (13.4% of the study population). The smallest group of respondents in the study comprised of people who had an associate degree (7.4% of the study population).

Income level. Income level was assessed by asking participants to state their annual household income. Six income groups were outlined to choose from. There were

794 valid cases of income levels as summarized in Table 3 above. From the data analysis, majority (23.8%) of the cases reviewed were of participants who were in the $0-9999 income bracket. The analysis shows that 13.7%, 19.5%, 15.4%, 8.6%, and 19.0% of the respondents were in the $10,000-19,999, $20,000-39,999, $40,000-69,999, $70,000-99,999, and $100,000-300,000 income brackets respectively. The majority (23.8%) of the respondents were in the lowest income group ($0-9,999). The second biggest group (19.5%) of respondents was in the highest income group ($20,000-39,999). The smallest group (8.6%) of respondents was in the $70,000-99,000 income category.

Health insurance. Health insurance was defined in the original study as having a current health insurance plan. There were 794 valid cases of alcohol use as summarized in Table 3 above. From the data analysis, majority 82.5% of the cases reviewed were participants who had a health care insurance plan, and 17.5% of the population did not have health insurance plan. Study participants with a health insurance plan formed the majority of the sample (82.5%), while the rest (17.5%) were participants who did not have a health insurance plan.

Tobacco smoking. Tobacco smoking was defined in the original study by asking participants to state their tobacco stating status. There were 794 valid cases of tobacco smoking (cigarette smoking) as summarized in Table 3 above. From the data analysis, 6.8% of the cases analyzed here involved current tobacco smokers, 16.2% of the cases analyzed here involved current tobacco smokers, and 77.0% of the participants never smoked tobacco. Hence, study participants who did not smoke formed the majority of the sample (77.0%).

Alcohol use. Alcohol use was defined in the original study as having any alcoholic drink in the past year. It was the only question related to alcohol use in the CHIS questionnaire. There were 794 valid cases of alcohol use as summarized in Table 3 above. From the data analysis, 59.7 % of the cases reviewed were participants who consumed alcohol in the past year, and 40.3% of the population did not consume alcohol within the same period. Study participants who consumed alcohol in the past year formed the majority of the sample (59.7%), while the rest were participants did not consume alcohol (40.3%) in the same period.

Asthma status. Asthma status was the dependent variable in the study. There were 794 valid cases of physician-diagnosed asthma as summarized in Table 3 above. Exactly 11.0% of the sample included people who were diagnosed with asthma, and 89.0% of the study population were not diagnosed with asthma. Study participants who were not diagnosed with asthma formed the majority of the sample at 89.0%, while the rest, 11.0% of the sample, were participants who were diagnosed with asthma.

Bivariate Analysis: Chi-square Test Summaries

Chi-square (x^2) test for independence was conducted to determine whether there is a significant association between asthma status and the independent variables. The x^2 test measured the significance of the contribution of the other variables on asthma status. The x^2 is used for testing associations between categorical variables. The chi-square cross-tabulations for asthma status versus the independent variables and confounders are shown in Table 4 below.

Table 4

Results of Chi-square and Crosstab Analysis for Independent Variables and Asthma Status (N = 794)

		Asthma Status			x^2 value *p*-value	Critical x^2 value
		Yes (%)	No (%)	Total		
Gender	Male	31 (3.9%)	341 (42.9%)	372	$x^2 = 4.94$	3.84
	Female	56 (7.1%)	366 (46.1%)	422	$p = 0.03$*	(*df* = 1)
Tobacco smoking	Current smoker	9 (1.1%)	45 (5.7%)	54	$x^2 = 2.13$	5.99
	Previous smoker	15 (1.9%)	114 (14.4%)	129	$p = 0.35$	(*df* =2)
	Never smoked	63 (7.9%)	548 (69.0%)	611		
Health insurance	Yes	74 (9.3%)	581 (73.2%)	655	$x^2 = 0.45$	3.84
	No	13 (1.6%)	126 (15.9%)	139	$p = 0.51$	(*df* = 1)
Alcohol use	Yes	53 (6.7%)	421 (53.0%)	474	$x^2 = 0.06$	3.84
	No	34 (4.3%)	286 (36.0%)	320	$p = 0.81$	(*df* = 1)
Marital status	Married	27 (3.4%)	313 (39.4%)	340	$x^2 = 5.55$	5.99
	Widow/sep/div	33 (4.2%)	218 (27.5%)	251	$p = 0.06$	(*df* = 2)
	Never married	27 (3.4%)	176 (22.2%)	203		
Education level	Grades 1-8	7 (0.9%)	106 (13.4%)	113		
	Grades 9-12	25 (3.1%)	183 (23.0%)	208		
	Vocational college	17 (2.1%)	101 (12.7%)	118	$x^2 = 13.64$	11.07
	Associate degree	13 (1.6%)	46 (5.8%)	59	$p = 0.02$*	(*df* = 5)
	Bachelor degree	16 (2.0%)	174 (21.9%)	190		
	Graduate degree	9 (1.1%)	97 (12.2%)	106		
Income level	$0-9,999	22 (2.8%)	167 (21.0%)	189		
	$10,000-19,999	14 (1.8%)	95 (12.0%)	109		
	$20,000-39,999	16 (2.0%)	139 (17.5%)	155	$x^2 = 2.54$	11.07
	$40,000-69,999	12 (1.5%)	110 (13.9%)	122	$p = 0.77$	(*df* = 5)
	$70,000-99,999	10 (1.3%)	58 (7.3%)	68		
	$100,000-300,000	13 (1.6%)	138 (17.4%)	151		
Age group	18-29 years	15 (1.9%)	81 (10.2%)	96		
	30-39 years	17 (2.1%)	121 (15.2%)	138		
	40-49 years	9 (1.1%)	157 (19.8%)	166	$x^2 = 13.57$	12.59
	50-59 years	20 (2.5%)	179 (22.5%)	199	$p = 0.04$*	(*df* = 6)
	60-69 years	20 (2.5%)	97 (12.2%)	117		
	70-79 years	3 (0.4%)	47 (5.9%)	50		
	80+ years	3 (0.4%)	25 (3.1%)	28		

*Statistically significant *p*-value. (The significance level is α=0.05).
Note. *p* = significance; x^2 = chi-square; *df* = degree of freedom

The critical chi-square values were obtained based on the degree of freedom (*df*). For the chi-square analysis, a significance level (α) of 0.05 was chosen which is the alpha level associated with a 95% confidence level.

For the tobacco smoking variable, the x^2 value of 2.13 is less than the critical x^2 value of 5.99. I would suggest that the tobacco smoking and asthma status are independent of each other. Also, the *p*-value of $p = 0.35$ is greater than $\alpha = 0.05$ suggests that the association is not statistically significant for tobacco smoking and asthma status. Hence, I fail to reject the null hypothesis that tobacco smoking does not predict asthma status among adult, foreign-born African Americans in California.

For the health insurance variable, the x^2 value of 0.45 is less than the critical x^2 value of 3.84. I would suggest that the health insurance and asthma status are independent of each other. Also, the *p*-value of $p = 0.51$ is greater than $\alpha = 0.05$ suggests that the association is not statistically significant for health insurance and asthma status. Hence, I fail to reject the null hypothesis that there is no association between asthma status and health insurance among adult, foreign-born African Americans in California.

For the education level variable, the x^2 value of 13.64 is more than the critical x^2 value of 11.07. I would suggest that the education level and asthma status are not independent of each other. Also, the *p*-value of $p = 0.02$ is less than $\alpha = 0.05$ suggests that the association is statistically significant for education level and asthma status. Hence, I reject the null hypothesis that there is no association between asthma status and education level among adult, foreign-born African Americans in California.

For the income level variable, the x^2 value of 2.54 is less than the critical x^2 value of 11.07. I would suggest that the income level and asthma status are independent of each other. Also, the p-value of $p = 0.77$ is greater than $\alpha = 0.05$ suggests that the association is not statistically significant for income level and asthma status. Hence, I fail to reject the null hypothesis that there is no association between asthma status and income level among adult, foreign-born African Americans in California.

For the alcohol use variable, the x^2 value of 0.06 is less than the critical x^2 value of 3.84. I would suggest that the alcohol use and asthma status are independent of each other. Also, the p-value of $p = 0.81$ is greater than $\alpha = 0.05$ suggests that the association is not statistically significant for alcohol use and asthma status. Hence, I fail to reject the null hypothesis that alcohol use does not predict asthma status among adult, foreign-born African Americans in California.

For the gender variable, the x^2 value of 4.94 is more than the critical x^2 value of 3.84. I would suggest that the gender and asthma status are not independent of each other. Also, the p-value of $p = 0.03$ is less than $\alpha = 0.05$ suggests that the association is statistically significant for gender and asthma status.

For the marital status variable, the x^2 value of 5.55 is less than the critical x^2 value of 5.99. I would suggest that the marital status and asthma status are independent of each other. Also, the p-value of $p = 0.06$ is greater than $\alpha = 0.05$ suggests that the association is not statistically significant for marital status and asthma status.

For the age group variable, the x^2 value of 13.57 is greater than the critical x^2 value of 12.59. I would suggest that the age group and asthma status are not independent

of each other. Also, the p-value of $p = 0.04$ is less than $\alpha = 0.05$ suggests that the association is statistically significant for age group and asthma status.

Inferential Statistical Analysis

The multiple logistic regression statistical analysis using SPSS software v.24 was undertaken to investigate the association between the dependent and independent variables. The reference categories for the research variables were: asthma status (no diagnosis), alcohol use (no), tobacco smoking (never smoked), health insurance (no), education level (graduate degree), income level ($100,000-300,000), age group (Grades 9-12), gender (female), and marital status (never married).

Predictive Ability of the Logistic Regression Model

The ability of the logistic regression model to predict the outcome variable correctly was achieved by comparing a classification table of the null model without predictors with that of the model with all the predictors. The results in Table 5 showed that the logistic regression model correctly classified the outcome variable (asthma status) for 89.0% of the cases.

A chi-square test was used to check the significance of the improvement of the logistic regression model with the predictor variables over the baseline model. Results in Table 5 provide information on the significance of the difference between the model with and without the predictor variables. The chi-square is large (36.81); the significance level (0.03) is less than 0.05, meaning that the addition of the predictor variables to the model was significant. This was supported by the Nagelkerke pseudo R^2 value which suggests that the model predicts 9.1% of the variation in the outcome variable. This Nagelkerke

pseudo R^2 value (0.09) shows that the model with all the research variables entered simultaneously is much stronger than the model with only one predictor variable at a time. The Nagelkerke pseudo R^2 value (0.09) for the multivariate model was greater compared to the univariate model values (0.01, 0.00, 0.00, 0.01, and 0.03).

Table 5

Predictive Coefficients for the Multiple Logistic Regression Model

Tests	Coefficients
Chi-square	$x^2 = 36.81, \quad df = 23, \quad p = 0.03$
Nagelkerke R^2	0.09
Overall classification	89.0
Hosmer & Lemeshow (H-L)	$x^2 = 3.29, \quad df = 8, \quad p = 0.92$

Note. p = significance; x^2 = chi-square; df = degree of freedom

The findings for the goodness of fit appear in the Hosmer and Lemeshow test is shown in Table 5 above. The Hosmer and Lemeshow (H-L) test for goodness of fit compares the observed cases to the predicted cases by the logistic regression, and a H-L goodness of fit greater than 0.05 shows that the model prediction is not statistically different from observed cases (Field, 2014). The result in Table 5 below shows a *p*-value of 0.92 and a chi-square value of 3.29. Considering *p*-values greater than 0.05 to be of good fit, then the chi-square stated above (0.92) shows that the values investigated have a good logistic regression model fit. The results of the above evaluation show that the data fits the regression model and the model can classify the outcome variable (asthma status) correctly for the majority of the cases. Consequently, this analysis means that there was a strong support for the logistic regression model.

Addressing the Research Questions and Hypothesis from the Results

Two logistic regression models were used to address the research questions and hypotheses. The first model was a univariate logistic regression analysis involving only one predictor (independent) variable at a time without controlling for the other predictor and confounding variables. For this first model, addressing each research question was based on separate logistic regression analysis results.

The second model was a multivariate logistic regression analysis wherein all predictor and confounding variables were entered simultaneously into the model. Hence, to answer the research questions while controlling for the predictor and confounding variables, a multivariate logistic regression analysis was conducted. The results of the multiple logistic regression are shown in Table 6 and discussed in the following sections.

Moreover, the reference categories for the research variables were: asthma status (no diagnosis), alcohol use (no), tobacco smoking (never smoked), health insurance (no), education level (graduate degree), income level ($100,000-300,000), age group (Grades 9-12), gender (female), and Marital status (never married).

Overall, there was no significant difference in the logistic regression results between the first and second models. The decision rule for testing the research hypotheses below was premised on the following equations:

Accept H_0 if $p > 0.05$, and reject H_0 if $p < 0.05$

Accept H_1 if $p < 0.05$, and reject H_1 if $p > 0.05$

The research questions and hypotheses were answered from the multiple logistic regression using the SPSS statistical analysis. Specifically, I used the second logistic

regression model above with all the research variables considered (dependent, independent, and confounding variables). I set significance level (α) at 0.05 as per the most generally accepted level in statistical analysis. The confidence interval (CI) was set at the 95% level. Using the critical value approach, this significance level was computed as α = 0.05, and the findings for the research questions and hypotheses are explained below.

Research Question 1

RQ1: Does tobacco smoking predict asthma status among adult, foreign-born African Americans in California when adjusting for age, gender, and marital status?

$H_0$1: Tobacco smoking does not predict asthma status among adult, foreign-born African Americans in California when adjusting for age, gender, and marital status.

$H_1$1: Tobacco smoking predicts asthma status among adult, foreign-born African Americans in California when adjusting for age, gender, and marital status.

Univariate logistic regression model. The first model was a univariate logistic regression analysis involving only one predictor variable (tobacco smoking) without controlling for the other predictor and confounding variables. The results from the univariate analysis for tobacco smoking were as follow: current smoker (p = 0.15, OR = 0.58, 95% CI = 0.27-1.23) and previous smoker (p = 0.66, OR = 0.87, 95% CI = 0.44-1.59).

Table 6

Univariate Logistic Regression Results for Tobacco Smoking for the First Model with OR, 95% CI, Wald and P-values (N = 794)

Variables [a]	B	S.E.	Wald (x^2)	*df*	Sig. (*p*)	Exp(B) (*OR*)	95% CI for Exp(B)	
							Lower	Upper
Tobacco smoking			2.08	2	0.35			
Tobacco smoking(1)	-0.55	0.39	2.03	1	0.15	0.58	0.27	1.23
Tobacco smoking(2)	-0.14	0.31	0.20	1	0.66	0.87	0.48	1.59
Constant	2.16	0.13	264.39	1	0.00	8.70		

[a] Variables entered on step 1: Tobacco smoking.
Note. *p* = significance; x^2 = chi-square; CI = confidence interval; *OR* = odds ratio; *df* = degree of freedom

Table 6 results show that there was no significant association between tobacco smoking and asthma status because the p-values are greater than α = 0.05. The *p*-values for the tobacco smoking categories were: current smoker (0.15) and previous smoker (0.66). The overall *p*-value was 0.35 for tobacco smoking variable. The reference category for tobacco smoking was *never smoked*. The reference category for asthma status was *no* and the odds are the odds of being diagnosed with asthma. In this model, the odds of being diagnosed with asthma for current tobacco smokers and previous tobacco smokers are 0.58 and 0.87 times than for participants who never smoked tobacco, respectively. The CI values do include 1.0 for the tobacco smoking categories: current smoker (0.268–1.231), and previous smoker (0.48–1.59). These CI values suggest that there was no significant association between tobacco smoking and asthma status in this first model. Moreover, the chi-square values of 2.03 and 0.20 are less than the critical

chi-square value of 3.84. This chi-square value suggests that there was no significant association between health insurance and asthma status in this first model.

Multivariate logistic regression model. The second model was a multivariate logistic regression analysis wherein all predictor and confounding variables were entered simultaneously into the model. A multiple regression analysis was therefore conducted to investigate the association between tobacco smoking and asthma status while controlling for other predictor and confounding variables (alcohol use, health insurance, income level, education level, age, gender, and marital status). The results from the multivariate analysis for tobacco smoking were as follow: current smoker (p = 0.19, OR = 0.59, 95% CI = 0.27-1.30) and previous smoker (p = 0.62, OR = 0.85, 95% CI = 0.46-1.60).

Table 7 results show that there was no significant association between tobacco smoking and asthma status because the p-values are greater than $\alpha = 0.05$. The p-values for the tobacco smoking categories were: current smoker (0.19) and previous smoker (0.62). The overall p-value was 0.40 for tobacco smoking variable. The reference category for tobacco smoking was *never smoked*. The reference category for asthma status was *no* and the odds are the odds of being diagnosed with asthma. In this model, the odds of being diagnosed with asthma for current tobacco smokers and previous tobacco smokers are 0.59 and 0.85 times than for participants who never smoked tobacco, respectively. The CI values do include 1.0 for the tobacco smoking categories: current smoker (0.27–1.30), and previous smoker (0.46–1.60). Moreover, the x^2 values of 1.74 and 0.24 were less than the critical chi-square value of 3.84. These CI and x^2 values suggest that there was no significant association between tobacco smoking and asthma.

Table 7

Multiple Logistic Regression Analysis for all Predictor and Confounding Variables for the Second Model with OR, 95% CI, Wald and P-values (N = 794)

Variables [a]	B	S.E.	Wald (x^2)	*df*	Sig. (*p*)	Exp(B) (*OR*)	95% CI for Exp(B) Lower	Upper
Tobacco smoking			1.82	2	0.40			
Tobacco smoking(1)	-0.53	0.40	1.74	1	0.19	0.59	0.27	1.30
Tobacco smoking(2)	-0.16	0.32	0.24	1	0.62	0.85	0.46	1.60
Alcohol use (1)	-0.02	0.24	0.01	1	0.92	0.98	0.61	1.58
Health insurance(1)	-0.17	0.34	0.23	1	0.63	0.85	0.44	1.65
Income level			1.60	5	0.90			
Income level(1)	-0.01	0.41	0.00	1	0.99	0.99	0.44	2.24
Income level(2)	-0.07	0.47	0.02	1	0.89	0.93	0.37	2.36
Income level(3)	0.09	0.43	0.04	1	0.84	1.09	0.47	2.55
Income level(4)	0.16	0.45	0.12	1	0.73	1.17	0.48	2.83
Income level(5)	-0.41	0.47	0.77	1	0.38	0.66	0.26	1.66
Educational level			11.61	5	0.04			
Educational level(1)	0.41	0.57	0.52	1	0.47	1.51	0.49	4.59
Educational level(2)	-0.29	0.45	0.40	1	0.53	0.75	0.31	1.83
Educational level(3)	-0.49	0.47	1.08	1	0.30	0.61	0.24	1.54
Educational level(4)	-1.12	0.50	5.00	1	0.03	0.33	0.12	0.87
Educational level(5)	0.03	0.45	0.00	1	0.95	1.03	0.43	2.47
Age group			10.31	6	0.11			
Age group(1)	-0.46	0.72	0.41	1	0.52	0.63	0.15	2.60
Age group(2)	-0.37	0.70	0.28	1	0.60	0.69	0.18	2.72
Age group(3)	0.60	0.73	0.69	1	0.41	1.83	0.44	7.62
Age group(4)	-0.12	0.68	0.03	1	0.86	0.89	0.23	3.39
Age group(5)	-0.64	0.68	0.88	1	0.35	0.53	0.14	2.00
Age group(6)	0.37	0.87	0.18	1	0.67	1.45	0.26	8.04
Gender(1)	0.45	0.25	3.18	1	0.07	1.56	0.96	2.55
Marital status			2.43	2	0.30			
Marital status(1)	0.31	0.34	0.88	1	0.35	1.37	0.71	2.64
Marital status(2)	-0.14	0.34	0.17	1	0.68	0.87	0.45	1.68
Constant	2.46	0.90	7.48	1	0.01	11.76		

[a] Variable(s) entered on step 1: Alcohol use, Educational level, Income level, Health insurance, Marital status, Age group, Gender, Tobacco Smoking.

Note. *p* = significance; x^2 = chi-square; CI = confidence interval; *OR* = odds ratio; *df* = degree of freedom

Results of the multiple logistic regression analysis in Table 7 indicated that tobacco smoking was not significantly associated with asthma status after controlling for the other independent variables and confounders (alcohol use, health insurance, income level, education level, age, gender, and marital status). Based on this finding, the null hypothesis was not rejected. Hence, tobacco smoking does not predict asthma status among adult, foreign-born African Americans in California when adjusting for alcohol use, health insurance, income level, education level, age, gender, and marital status.

Research Question 2

RQ2: Does alcohol use predict asthma status among adult, foreign-born African Americans in California when adjusting for age, gender, and marital status?

$H_0$2: Alcohol use does not predict asthma status among adult, foreign-born African Americans in California when adjusting for age, gender, and marital status.

$H_1$2: Alcohol use predicts asthma status among adult, foreign-born African Americans in California when adjusting for age, gender, and marital status.

Univariate logistic regression model. The first model was a univariate logistic regression analysis involving only one predictor variable (alcohol use) without controlling for the other predictor and confounding variables. The results from the univariate analysis for alcohol use were as follow: alcohol user (p = 0.81, OR = 0.94, 95% CI = 0.60-1.49).

Table 8

Univariate Logistic Regression Analysis for Alcohol Use for the First Model with OR, 95% CI, Wald and P-values (N = 794)

Variables [a]	B	S.E.	Wald (x^2)	*df*	Sig. (*p*)	Exp(B) (*OR*)	95% CI for Exp(B)	
							Lower	Upper
Alcohol use (1)	-0.06	0.23	0.06	1	0.81	0.94	0.60	1.49
Constant	2.13	0.18	137.82	1	0.00	8.41		

[a] Variables entered on step 1: Alcohol use.
Note. *p* = significance; x^2 = chi-square; CI = confidence interval; *OR* = odds ratio; *df* = degree of freedom

Table 8 results show that there was no significant association between alcohol use and asthma status because the p-value was greater than α = 0.05. The *p*-value for the alcohol use was 0.81. The reference category for alcohol use was *no*. The reference category for asthma status was *no* and the odds are the odds of being diagnosed with asthma. In this model, the odds of being diagnosed with asthma for alcohol users are 0.94 times than for non-alcohol users. The CI values do include 1.0 for alcohol use (0.60-1.49). These CI values suggest that there was no significant association between alcohol use and asthma status in this first model. Moreover, the chi-square value of 0.06 was less than the critical chi-square value of 3.84. This chi-square value suggests that there was no significant association between alcohol use and asthma status in this first model.

Multivariate logistic regression model. The second model was a multivariate logistic regression analysis wherein all predictor and confounding variables were entered simultaneously into the model. A multiple regression analysis was therefore conducted to investigate the association between alcohol use and asthma status while controlling for

other predictor and confounding variables (tobacco smoking, health insurance, income level, education level, age, gender, and marital status). The results from the multivariate analysis for alcohol use were as follow: alcohol user (p = 0.92, OR = 0.98, 95% CI = 0.61-1.58).

Table 7 results show that there was no significant association between alcohol use and asthma status because the p-value was greater than $\alpha = 0.05$. The p-value for alcohol use was 0.92. The reference category for alcohol use was *no*. The reference category for asthma status was *no* and the odds are the odds of being diagnosed with asthma. In this model, the odds of being diagnosed with asthma for alcohol users are 0.98 times than for non-alcohol users. The CI values do include 1.0 for alcohol use (0.61–1.58). Moreover, the chi-square value of 0.01 was less than the critical chi-square value of 3.84. These CI and chi-square values suggest that there was no significant association between alcohol use and asthma status in this second model.

Results of the multiple logistic regression analysis in Table 7 indicated that alcohol use was not significantly associated with asthma status after controlling for the other independent variables and confounders (tobacco smoking, health insurance, income level, education level, age, gender, and marital status). Based on this finding, the null hypothesis was not rejected. Hence, alcohol use does not predict asthma status among adult, foreign-born African Americans in California when adjusting for tobacco smoking, health insurance, income level, education level, age, gender, and marital status.

Research Question 3

RQ3: Is there an association between asthma status and health insurance among adult, foreign-born African Americans in California when adjusting for age, gender, and marital status?

$H_0$3: There is no association between asthma status and health insurance among adult, foreign-born African Americans in California when adjusting for age, gender, and marital status.

$H_1$3: There is an association between asthma status and health insurance among adult, foreign-born African Americans in California when adjusting for age, gender, and marital status.

Univariate logistic regression model. The first model was a univariate logistic regression analysis involving only one predictor variable (health insurance) without controlling for the other predictor and confounding variables. The results from the univariate analysis for health insurance were as follow: participants with health insurance (p = 0.51, OR = 0.81, 95% CI = 0.44-1.51).

Table 9

Univariate Logistic Regression Analysis for Health Insurance for the First Model with OR, 95% CI, Wald and P-values (N = 794)

Variables [a]	B	S.E.	Wald (x^2)	*df*	Sig. (p)	Exp(B) (OR)	95% CI for Exp(B)	
							Lower	Upper
Health insurance(1)	-0.21	0.32	0.44	1	0.51	0.81	0.44	1.51
Constant	2.27	0.29	60.79	1	0.00	9.69		

[a] Variables entered on step 1: Health insurance.
Note. p = significance; x^2 = chi-square; CI = confidence interval; OR = odds ratio; df = degree of freedom

Table 9 results show that there was no significant association between health insurance and asthma status because the p-value was greater than $\alpha = 0.05$. The *p*-value for the health insurance was 0.51. The reference category for health insurance was *no*. The reference category for asthma status was *no* and the odds are the odds of being diagnosed with asthma. In this model, the odds of being diagnosed with asthma for participants with health insurance are 0.81 times than for those without health insurance. The CI values do include 1.0 for health insurance (0.44-1.51). These CI values suggest that there was no significant association between health insurance and asthma status in this first model. Moreover, the chi-square value of 0.44 was less than the critical chi-square value of 3.84. This chi-square value suggests that there was no significant association between health insurance and asthma status.

Multivariate logistic regression model. The second model was a multivariate logistic regression analysis wherein all predictor and confounding variables were entered simultaneously into the model. A multiple regression analysis was therefore conducted to investigate the association between alcohol use and asthma status while controlling for other predictor and confounding variables (tobacco smoking, alcohol use, income level, education level, age, gender, and marital status). The results from the multivariate analysis for health insurance were as follow: alcohol user ($p = 0.63$, $OR = 0.85$, 95% CI = 0.44-1.65).

Table 7 results show that there was no significant association between health insurance and asthma status because the p-value was greater than $\alpha = 0.05$. The *p*-value for alcohol use was 0.63. The reference category for health insurance was *no*. The

reference category for asthma status was *no* and the odds are the odds of being diagnosed with asthma. In this model, the odds of being diagnosed with asthma for participants with health insurance are 0.85 times than for non-alcohol users. The CI values do include 1.0 for health insurance (0.44–1.65). Moreover, the chi-square value of 0.23 was less than the critical chi-square value of 3.84. These CI and chi-square values suggest that there was no significant association between health insurance and asthma status in this second model.

Results of the multiple logistic regression analysis in Table 7 indicated that health insurance was not significantly associated with asthma status after controlling for the other independent variables and confounders (tobacco smoking, alcohol use, income level, education level, age, gender, and marital status). Based on this finding, the null hypothesis was not rejected. Hence, there was no association between asthma status and health insurance among adult, foreign-born African Americans in California when adjusting for tobacco smoking, alcohol use, income level, education level, age, gender, and marital status.

Research Question 4

RQ4: Is there an association between asthma status and income level among adult, foreign-born African Americans in California when adjusting for age, gender, and marital status?

$H_0$4: There is no association between asthma status and income level among adult, foreign-born African Americans in California when adjusting for age, gender, and marital status.

$H_1$4: There is an association between asthma status and income level among adult, foreign-born African Americans in California when adjusting for age, gender, and marital status.

Univariate logistic regression model. The first model was a univariate logistic regression analysis involving only one predictor variable (income level) without controlling for the other predictor and confounding variables. The results from the univariate analysis for income level categories were as follow: \$0-9,999 (p = 0.36, OR = 0.72, 95% CI = 0.35-1.47), \$10,000-19,999 (p = 0.27, OR = 0.64, 95% CI = 0.29-1.42), \$20,000-39,999 (p = 0.61, OR = 0.82, 95% CI = 0.38-1.77), \$40,000-69,000 (p = 0.73, OR = 0.86, 95% CI = 0.38-1.97), and \$70,000-99,999 (p = 0.18, OR = 0.55, 95% CI = 0.23-1.32).

Table 10

Univariate Logistic Regression Analysis for Income Level for the First Model with OR, 95% CI, Wald and P-values (N = 794)

Variables [a]	B	S.E.	Wald (x^2)	*df*	Sig. (p)	Exp(B) (OR)	95% CI for Exp(B)	
							Lower	Upper
Income level			2.51	5	0.77			
Income level(1)	-0.34	0.37	0.83	1	0.36	0.72	0.35	1.47
Income level(2)	-0.45	0.41	1.21	1	0.27	0.64	0.29	1.42
Income level(3)	-0.20	0.39	0.26	1	0.61	0.82	0.38	1.77
Income level(4)	-0.15	0.42	0.12	1	0.73	0.86	0.38	1.97
Income level(5)	-0.60	0.45	1.81	1	0.18	0.55	0.23	1.32
Constant	2.36	0.29	66.30	1	0.00	10.62		

[a] Variables entered on step 1: Income level.
Note. p = significance; x^2 = chi-square; CI = confidence interval; OR = odds ratio; df = degree of freedom

Table 10 results show that there was no significant association between income level and asthma status because the p-values are greater than α = 0.05. The *p*-values for the income level categories were: $0-9,999 (*p* = 0.36), $10,000-19,999 (*p* = 0.27), $20,000-39,999 (*p* = 0.61), $40,000-69,000 (*p* = 0.73), and $70,000-99,999 (*p* = 0.18). The overall *p*-value was 0.77 for income level variable. The reference category for income level was $100,000-300,000. The reference category for asthma status was *no* and the odds are the odds of being diagnosed with asthma. In this model, the odds of being diagnosed with asthma for respondents with income levels of $0-9,999, $10,000-19,999, $20,000-39,999, $40,000-69,999, and $70,000-99,999 are 0.72, 0.64, 0.82, 0.86, and 0.55 times than for respondents with the reference income level category, respectively. The CI values do include 1.0 for the income level categories: $0-9,999 (0.35–1.47), $10,000-19,999 (0.29–1.42), $20,000-39,999 (0.38–1.77), $40,000-69,999 (0.38–1.97), and $70,000-99,999 (0.23–1.32). These CI values suggest that there was no significant association between income level and asthma status in this first model. Moreover, the chi-square values of 0.83, 1.21, 0.26, 0.12, and 1.81 were less than the critical chi-square value of 3.84. These chi-square values suggest that there was no significant association between income level and asthma status in this first model.

Multivariate logistic regression model. The second model was a multivariate logistic regression analysis wherein all predictor and confounding variables were entered simultaneously into the model. A multiple regression analysis was therefore conducted to investigate the association between income level and asthma status while controlling for other predictor and confounding variables (tobacco smoking, alcohol use, health

insurance, education level, age, gender, and marital status). The results from the multivariate analysis for tobacco smoking categories were as follow: $0-9,999 ($p$ = 0.99, OR = 0.99, 95% CI = 0.44-2.24), $10,000-19,999 ($p$ = 0.89, OR = 0.93, 95% CI = 0.37-2.36), $20,000-39,999 ($p$ = 0.84, OR = 0.1.09, 95% CI = 0.47-2.55), $40,000-69,000 ($p$ = 0.73, OR = 0.1.17, 95% CI = 0.48-2.83), and $70,000-99,999 ($p$ = 0.38, OR = 0.66, 95% CI = 0.26-1.66).

Table 7 results show that there was no significant association between income level and asthma status because the p-values were greater than $\alpha = 0.05$. The p-values for the tobacco smoking categories were: $0-9,999 (0.99), $10,000-19,999 (0.89), $20,000-39,999 (0.84), $40,000-69,999 (0.73), and $70,000-99,999 (0.38). The reference category for income level was $100,000-300,000. The reference category for asthma status was *no* and the odds are the odds of being diagnosed with asthma. In this model, the odds of being diagnosed with asthma for respondents with income levels of $0-9,999, $10,000-19,999, $20,000-39,999, $40,000-69,999, $70,000-99,999 are 0.99, 0.93, 1.09, 1.17, 0.66 times than for respondents with the reference income level category, respectively. The CI values do include 1.0 for the income level categories: 0-9,999 (0.44–2.24), $10,000-19,999 (0.37–2.36), $20,000-39,999 (0.47–2.55), $40,000-69,999 (0.48–2.83), and $70,000-99,999 (0.26–1.66). These CI values suggest that there was no significant association between income level and asthma status in this second model. Moreover, the chi-square values of 0.00, 0.02, 0.04, 0.12, and 0.77 were less than the critical chi-square value of 3.84. These chi-square values suggest that there was no significant association between education level and asthma status in this second model.

Results of the multiple logistic regression analysis indicated that income level was not significantly associated with asthma status after controlling for the other independent variables and confounders (tobacco smoking, alcohol use, health insurance, education level, age, gender, and marital status). Based on this finding, the null hypothesis was not rejected. Hence, there was no association between asthma status and income level among adult, foreign-born African Americans in California when adjusting for tobacco smoking, alcohol use, health insurance, education level, age, gender, and marital status.

Research Question 5

RQ5: Is there an association between asthma status and education level among adult, foreign-born African Americans in California when adjusting for age, gender, and marital status?

$H_0$5: There is no association between asthma status and education level among adult, foreign-born African Americans in California when adjusting for age, gender, and marital status.

$H_1$5: There is an association between asthma status and education level among adult, foreign-born African Americans in California when adjusting for age, gender, and marital status.

Univariate logistic regression model. The first model was a univariate logistic regression analysis involving only one predictor variable (education level) without controlling for the other predictor and confounding variables. The results from the univariate analysis for education level categories were as follow: Grades 1-8 ($p = 0.52$, $OR = 1.41$, 95% CI = 0.50-3.92), Grades 9-12 ($p = 0.34$, $OR = 0.68$, 95% CI = 0.31-1.51),

vocational college (p = 0.17, *OR* = 0.55, 95% CI = 0.24-1.30), associate degree (p = 0.02, *OR* = 0.33, 95% CI = 0.13-0.82), and bachelor degree (p = 0.98, *OR* = 1.01, 95% CI = 0.43-2.37). Therefore, Grades 1-8, Grades 9-12, vocational college, and bachelor degree categories were specifically not significant predictors of asthma status. However, the p-value for associate degree (p = 0.02) was specifically significant predictor of asthma status.

Table 11

Univariate Logistic Regression Analysis for Education Level for the First Model with OR, 95% CI, Wald and P-values (N = 794)

Variables [a]	B	S.E.	Wald (x^2)	*df*	Sig. (p)	Exp(B) (*OR*)	95% CI for Exp(B)	
							Lower	Upper
Educational level			12.84	5	0.03			
Educational level(1)	0.34	0.52	0.42	1	0.52	1.41	0.50	3.92
Educational level(2)	-0.39	0.41	0.90	1	0.34	0.68	0.31	1.51
Educational level(3)	-0.60	0.44	1.87	1	0.17	0.55	0.24	1.30
Educational level(4)	-1.11	0.47	5.64	1	0.02	0.33	0.13	0.82
Educational level(5)	0.01	0.44	0.00	1	0.98	1.01	0.43	2.37
Constant	2.38	0.35	46.55	1	0.00	10.78		

[a] Variables entered on step 1: Education level.
Note. p = significance; x^2 = chi-square; CI = confidence interval; *OR* = odds ratio; *df* = degree of freedom

Table 10 results show that there was no significant association between education level and asthma status because the p-values were greater than α = 0.05 except for associate degree category. The p-values for the income level categories were: Grades 1-8 (p = 0.52), Grades 9-12 (p = 0.34), vocational college (p = 0.17), associate degree (p = 0.02), and bachelor degree (p = 0.98). The reference category for education level was *graduate degree*. The reference category for asthma status was *no* and the odds are the

odds of being diagnosed with asthma. In this model, the odds of being diagnosed with asthma for respondents with education levels of Grades 1-8, Grades 9-12, vocational college, associate degree, and bachelor degree are 1.41, 0.68, 0.55, 0.328, and 1.01 times than for respondents with the reference education level category, respectively.

The CI values do include 1.0 for the education level categories: Grades 1-8 (0.50-3.92), Grades 9-12 (0.31-1.51), vocational college (0.24-1.30), and bachelor degree (0.43-2.37), except for associate degree (0.13-0.82). The CI value for associate degree suggests that there was a significant association between education level and asthma status in this first model. The CI values for the other five education level categories suggest that there was no significant association in this first model. Moreover, the chi-square value of 0.42, 0.90, 1.87, and 0.00 were less than the critical chi-square value of 3.84. These chi-square values suggest that there was no significant association between education level and asthma status in this first model.

Multivariate logistic regression model. The second model was a multivariate logistic regression analysis wherein all predictor and confounding variables were entered simultaneously into the model. A multiple regression analysis was therefore conducted to investigate the association between education level and asthma status while controlling for other predictor and confounding variables (tobacco smoking, alcohol use, health insurance, income level, age, gender, and marital status). The results from the multivariate analysis for education level categories were as follow: Grades 1-8 ($p = 0.47$, $OR = 1.51$, 95% CI = 0.49-4.59), Grades 9-12 ($p = 0.53$, $OR = 0.75$, 95% CI = 0.31-1.83), vocational college ($p = 0.30$, $OR = 0.61$, 95% CI = 0.24-1.30), associate degree ($p = 0.03$,

OR = 0.33, 95% CI = 0.12-0.87), and bachelor degree (*p* = 0.95, *OR* = 1.03, 95% CI = 0.43-2.47).

Table 7 results show that there was no significant association between income level and asthma status because the p-values were greater than α = 0.05. The *p*-values for the education level categories are: Grades 1-8 (*p* = 0.47), Grades 9-12 (*p* = 0.53), vocational college (*p* = 0.30), associate degree (*p* = 0.03), and bachelor degree (*p* = 0.95). However, all the education level categories (except for associate degree) are specifically not significant predictors of asthma status. The reference category for education level was *graduate degree*. The reference category for asthma status was *no* and the odds are the odds of being diagnosed with asthma. In this model, the odds of being diagnosed with asthma for respondents with education levels of Grades 1-8, Grades 9-12, vocational college, associate degree, and bachelor degree, are 1.51, 0.75, 0.61, 0.33, and 1.03 times than for respondents with the reference education level category, respectively. The CI values do include 1.0 for the education level categories: Grades 1-8 (0.49-4.59), Grades 9-12 (0.31-1.83), vocational college (0.24-1.54), and bachelor degree (0.43-2.47), except for associate degree (0.12-0.87). The CI value for associate degree suggests that there was a significant association between education level and asthma status in this second model. The CI values for the other five education level categories suggest that there was no significant association in this second model. Moreover, the chi-square value of 0.52, 0.40, 1.08, and 0.00 were less than the critical chi-square value of 3.84. These chi-square values suggest that there was no significant association between education level and asthma status in this second model.

Results of the multiple logistic regression analysis in Table 7 indicated that education level was not significantly associated with asthma status after controlling for the other independent variables and confounders (tobacco smoking, alcohol use, health insurance, income level, age, gender, and marital status). Based on this finding, the null hypothesis was not rejected. Hence, there was no association between asthma status and education level among adult, foreign-born African Americans in California when adjusting for tobacco smoking, alcohol use, health insurance, income level, age, gender, and marital status.

Summary

The purpose of this study was to examine the risk factors that predict asthma among adult, foreign-born African Americans residing in California. For my inferential statistical analysis, I used the multiple logistic regression using the SPSS software v.24.

For the first research question, tobacco smoking did not significantly predict asthma ($p = 0.19$, $x^2 = 1.74$, $OR = 0.59$, 95% CI = 0.27-1.30). This finding means that the null hypothesis was not rejected; hence, tobacco smoking does not predict asthma status among adult, foreign-born African Americans in California.

For the second research question, alcohol use did not significantly predict asthma ($p = 0.92$, $x^2 = 0.01$, $OR = 0.98$, 95% CI = 0.61-1.58). This finding means that the null hypothesis was not rejected; hence, alcohol use does not predict asthma status among adult, foreign-born African Americans in California.

For the third research question, health insurance did not significantly predict asthma status ($p = 0.63$, $x^2 = 0.23$, $OR = 0.85$, 95% CI = 0.44-1.65). This finding means

that the null hypothesis was not rejected; hence, there was no association between asthma status and health insurance among adult, foreign-born African Americans in California.

For the fourth research question, income level was not a significant predictor of asthma ($p = 0.99$, $x^2 = 0.00$, $OR = 0.99$, 95% CI = 0.44-2.24). This finding means that the null hypothesis was not rejected; hence, there was no association between asthma status and income level among adult, foreign-born African Americans in California.

For the fifth research question, education level was not a significant predictor of asthma ($p = 0.47$, $x^2 = 0.52$, $OR = 1.51$, 95% CI = 0.49-4.59). This finding means that the null hypothesis was not rejected; hence, there was no association between asthma status and education level among adult, foreign-born African Americans in California.

In Section 4, I interpret the findings presented in this section. I interpret the results as it relates to the literature and public health practice. I also outline recommendations and implications for professional practice and social change.

Section 4: Application to Professional Practice and Implications for Social Change

Introduction

The purpose of this study was to fill a gap in the research by examining risk factors that predict asthma among adult, foreign-born African Americans in California. Study participants identifying themselves as African Americans in California who were born outside the United States made up the study sample.

Through my analysis of the sampled data, I found that there were no statistically significant associations between asthma status and tobacco smoking, alcohol use, health insurance, income level, and education level. These findings were reached after accounting for the effects of confounders (age, gender, and marital status).

Interpretation of the Findings

Interpretation of the Findings in Relation to the Literature

These findings differ from those of other researchers because past researchers have pointed out that asthma shares an association with the independent variables (tobacco smoking, alcohol use, health insurance, income level, and education level). For example, a study by Coogan et al. (2015), which investigated the association between asthma and smoking among African American women over a 16-year period, found that asthma incidences increased with an increase in active smoking behaviors.

Perret, Bonevski, McDonald, and Abramson (2016), who investigated smoking cessation strategies for patients with asthma, also found that the presence of smoking behaviors among young adolescents caused an increase in asthma incidences. They also pointed out that both smoking behaviors and asthma incidences interacted to diminish

lung functioning (Perret et al., 2016). In a different study, authored by Kim et al. (2015), it was established that the prevalence of asthma increased with a similar increase in smoking behaviors because of airflow obstruction. These findings were developed after the researchers examined risk factors contributing to asthma incidences among 12,631 participants (Kim et al., 2015).

Researchers such as Ejebe, Jacobs, and Wisk (2014) also established a positive association between asthma incidences and income levels after demonstrating that low incomes are associated with increased asthma incidences. Their views were informed by the fact that low-income levels are associated with poor housing conditions, poor diets, and low education levels, all of which contribute to an increase in asthma incidences (Li et al., 2017).

Past studies have also shown a positive association between asthma incidences and low access to health insurance (Shin et al., 2018). Most of these studies have pointed out that minorities living in the United States are more prone to asthma because of poor access to health insurance – a phenomenon which loosely translates to a poor access to quality healthcare services (Shin et al., 2018). Lastly, studies have also shown a positive association between increased asthma incidences and alcohol use (Guidot & Mehta, 2013; Linneberg & Gonzalez-Quintela, 2016).

It was interesting to find out that education level and income level had no significant impact on asthma status. Several studies such as those authored by Miller et al. (2017), Chung, Lim, Lee, Kim, and Kim (2017) have affirmed a significant correlation between income levels and education. Somanna (2016) explains that such findings have

been reported before because the aforementioned association between family income and education levels was weak. This view was developed after the researcher examined the association between income and educational levels using a General Social Survey, which analyzed cumulative data from surveys conducted between 1972 and 2012 (Somanna, 2016). His findings showed that the weak association between education and income levels largely stems from the fact that family income could be a construct of other social, political, or economic variables affecting a community. Therefore, education levels may not directly correlate with this variable. If this analogy is extrapolated to the findings of the current study, it is imperative to conclude a positive association between asthma status and that of education level and income level.

Comprehensively, the above-mentioned studies show that asthma incidences have been associated with low levels of health insurance, active smoking behaviors, alcohol use, low-education levels, and low-income levels. However, the current study affirms no such association. The disparity in findings could stem from low sample size and racial differences between the samples used. In the current study, African Americans were the only sample, while the above-mentioned studies were not keen on age or race. Comprehensively, these views imply that racial differences could explain disparities in the findings.

Interpretation of the Findings in the Context of the Theoretical Framework

As highlighted in this paper, the SEM was the main theoretical framework for the current study. This model describes the complex interplay between people's health, the environment, and their health outcomes, through an assessment of societal, community

and association factors. The SEM has five nested levels of interlocking behavioral and anthropological factors: individual, interpersonal, organizational, community, and public policy. The rationale for using this theoretical framework in this study stems from its ability to show how different levels of personal and environmental factors affect human behaviors and health outcomes.

The multifaceted nature of the model was appropriate for the study because it helped in the exploration of the influence of several health risk factors such as tobacco smoking, alcohol use, education level, income level, and health insurance in predicting asthma among adult, foreign-born African Americans in California. This framework also helped to explain why there were significant differences between the findings of this study and those of other researchers, who also investigated the effects of various risk factors on asthma incidence among immigrant populations.

As highlighted above, the findings of this paper showed no significant association between asthma status and tobacco smoking, alcohol use, health insurance, and income levels, and education levels. If this finding is contextualized within the wider prism of the SEM, which regards, social, community, association, and individual forces as being the greatest determinants of health, evidently environmental factors emerge as having an insignificant effect on the incidence of asthma among the sample population. Comparatively, individual factors have no significant effect on asthma because the findings showed that education levels were not correlated with asthma incidences Therefore, lack of association between asthma and education levels imply that individual

factors have a greater role to play in influencing the occurrence of asthma among the sample population.

The effect of race in influencing the above-mentioned outcomes is supported by studies, which have shown that cultural factors influence people's health outcomes. For example, researchers who have investigated the health status of immigrant populations from parts of Asia and Africa show that the health status of immigrant populations tends to be better in their countries of origin compared to when the same population resides in the United States (Iqbal, Oraka, Chew, & Flanders, 2014). They say that cultural factors associated with their countries of origin, such as the stigma associated with women who smoke, enabled them to have better health outcomes compared to their counterparts in the United States (Iqbal et al., 2014).

The influence of confounding factors (age, gender, and marital status) on the association between asthma status and the independent variables could be largely confined to the first level of the SEM, which postulates that individual factors influence people's health outcomes. Relative to the findings of this investigation, it has been established that these individual attributes did not have significant effects on the association between asthma status and the independent variables. Therefore, it was possible to generalize the findings across different demographic variables underpinning the investigation.

The interpersonal level of the SEM postulates that people who are close to a patient have an effect on their health. This tenet of the social-ecological model could influence the likelihood of the target population taking health insurance, consuming more

alcohol, and using more tobacco (among other health risk factors). Therefore, they have a strong likelihood of influencing the association between asthma status and the independent variables.

The fourth level of the SEM relating to societal factors influencing health outcomes could also have influenced the findings of this study by affecting some of the confounding and independent variables, such as access to health insurance, and alcohol use. Economics, education, and societal policies influencing the health status of foreign-born African Americans could also have had an effect on the risk factors that predict asthma status among the target population.

Limitations of the Study

Limitations of a study generally refer to aspects of a research investigation that are out of the control of the researcher and that may affect the overall integrity of the findings. One of the main limitations of the current study is the small number of confirmed cases of asthma among adult, foreign-born African American who were sampled in the study. As highlighted in this paper, the sample size was comprised of 794 participants. Out of this number, there were only 87 confirmed cases of asthma. If this number of contextualized within the greater population of respondents (794 participants) who took part in the study, the number of confirmed asthma cases emerges as being only 11% of the total sample. This small percentage of participants could have contributed to the null findings observed between the dependent variable (asthma) and all the independent variables because a sample of 11% of the target population, which had

asthma could have been too small to draw statistically significant correlations between the dependent variable (asthma) and the independent variables.

The self-reported nature of the CHIS data, which was used to develop current findings, was also a limitation of the study because the number of confirmed asthma cases highlighted in the report was not confirmed by medical records abstraction. In this regard, the number of confirmed asthma cases could be a limitation on the accuracy of the dependent variable (asthma). This limitation is confirmed by research studies, which have used a larger sample of respondents to come up with statistically significant findings between dependent and independent variables. For example, the study by Kim et al. (2015) sampled 12,631 respondents to examine risk factors that contributed to asthma incidences. A similar study conducted by Becerra, Scroggins, and Becerra (2014) also derived a large number of respondents (19,841) from CHIS data to find associations between asthma and obesity among Asian American immigrants. Therefore, the small number of African American immigrants (794 respondents), which characterized the current study was a limitation.

The CHIS data used in this research provided useful information relating to risk factors that predict asthma among adult, foreign-born African Americans in California. However, the findings obtained in this investigation are only indicative of the association between asthma (dependent variable) and its risk factors (tobacco smoking, alcohol use, education level, income level, and health insurance). Although some of these limitations largely reflect those of the CHIS data, it was important to consider the recommendations of Linneberg and Gonzalez-Quintela (2016), which suggest that no data is perfect.

Therefore, it was up to the discretion of researchers to balance the pros and cons of each research data for the advancement of a study's objective. The findings I presented in this study were developed with this consideration in mind.

Causality was another weakness of the cross-sectional study, which informed the CHIS data because the findings cannot be used to ascertain the cause and effect of asthma and risk factors. Furthermore, it was difficult to establish the cause of asthma using the findings of the study. Also, I realized that the questionnaire provided an insufficient assessment of alcohol use for the participants. However, it was the only question related to alcohol use in the CHIS questionnaire. Hence, I had no choice but to use the only available variable relating to alcohol use. The asthma status variable was not further confirmed by medical records abstraction, thereby making it a self-reported asthma and a limitation on the accuracy of the dependent variable. This limitation can be mitigated by conducting a survey specifically for asthma or a group of disease in which asthma was included.

Recommendations

A key finding in this study was the lack of a significant association between the independent variables (tobacco smoking, alcohol use, income level, education level, and health insurance) and asthma status. However, the associate degree education category emerged as a significant predictor of asthma status though this may be a chance finding given that this was the only significant finding from the other five education categories. This may have been due to the small sample size of 59 participants for this associate degree education category. Future research should be undertaken to find out why these

associations are as described. For example, future research should be undertaken to establish causality. An experimental research design would establish causality. The future research analysis would help to provide a broader picture of the association between asthma and the independent variables within the wider framework of social and ecological issues affecting the health of foreign-born African Americans in California.

Future research should also extend the scope of the analysis outside California to investigate whether the findings reported in this research remain true when a larger, sample of foreign-born African Americans are studied. The CHIS data I used in this research was not specifically focused on foreign-born African Americans as a target population or asthma as a health issue. Therefore, my recommendation is to design a study to include only this target population and collect primary data.

Future research investigating the association between asthma status and the independent variables should be a prospective cohort study. In this study, the analysis was only confined to the asthma status of the sample population between 2011 and 2016. Since CHIS data are readily available, a larger sample cohort of foreign-born African Americans may be investigated. This way, it could be possible to have a broader understanding of the effects of different risk factors in predicting asthma incidences among adult, foreign-born African Americans.

Implications for Professional Practice and Social Change

Professional Practice

The findings highlighted in this research have a positive effect on community health promotion because they expand the body of knowledge regarding the health of

minority populations in America. Particularly, the focus on foreign-born African Americans as a minority population in the United States provides an important contribution to the overall analysis of the health of minority populations in the country because this demographic is rarely studied.

The use of the SEM as the main theoretical framework in this study also had a significant implication for the use of the study's findings because it has been used to improve community health outcomes. This competency emerges from the fact that the model examines person–environment interactions, which are critical components of public health studies. For example, by understanding the risk factors that predict asthma incidences among adult, foreign-born African Americans, it could be easier for public health workers to improve the environments of the same population in support of expressions of individuals' systems dispositions. Such initiatives could be implemented in different ways, such as community health promotion where public health workers identify high impact leverage points to manage asthma.

Using the SEM, health workers can also facilitate the successful implementation of health promotion programs. The social-ecological model would also help in combining person-focused and environmentally based health promotion programs to develop sound health initiatives for managing asthma. The knowledge gained, relative to the risk factors that predict asthma, could also provide a reliable body of knowledge to understand environmental factors affecting asthma management. Such information could be used to develop comprehensive asthma management programs. The same information could be critical in understanding whether such programs are sustainable, or not.

Positive Social Change

The findings of this research could also be useful in creating a positive social change by improving health awareness among foreign-born African Americans. As highlighted in this section, they were critical in understanding immigrant health outcomes and providing a platform for undertaking further research on foreign-born African Americans as a minority health group in the United States.

At a policy level, the findings of this study could help policymakers to improve decision-making processes affecting asthma risk factors such as access to health insurance. At an individual level, the findings of this study could help to sensitize people to embrace health-promoting behaviors that allow them to manage asthma as a common respiratory health condition. Such recommendations could cover the willingness of a person to remove themselves from an environment that would be detrimental to their overall health or encourage them to refrain from engaging in risky health behaviors that exacerbate the condition. In this way, they could better understand how to exclude themselves from environments that are not conducive to their health.

Conclusion

In this study, I sought to examine the risk factors that predict asthma among foreign-born African Americans in California. Findings yielded no statistically significant associations between asthma status and tobacco smoking ($p = 0.19$, $x^2 = 1.74$, $OR = 0.59$, 95% CI = 0.27-1.30), alcohol use ($p = 0.92$, $x^2 = 0.01$, $OR = 0.98$, 95% CI = 0.61-1.58), health insurance ($p = 0.63$, $x^2 = 0.23$, $OR = 0.85$, 95% CI = 0.44-1.65), income level ($p =$

0.99, x^2 = 0.00, *OR* = 0.99, 95% CI = 0.44-2.24), or education level (p = 0.47, x^2 = 0.52, *OR* = 1.51, 95% CI = 0.49-4.59).

The findings of this study did not corroborate previous research on the deleterious association between asthma status and tobacco smoking, alcohol use, or the beneficial association with health insurance, and income level. The overall insignificant association between asthma and education level found in this study did confirm previous research studies. The individual education variable categories were not statistically significant predictors of asthma (except for associate degree).

The findings of this study seem to be fundamentally different from those of previous researchers who have highlighted a strong association between the risk factors examined in this study and asthma. This departure in conventional findings accentuates the importance of understanding the community health outcomes of different immigrant groups. Based on this understanding, environmental and social issues concerning immigrant populations seem to affect their health outcomes and they need to be explored separately as well (this was the basis for the recommendations).

The need to explore the specifics of community health behavior is an approach that should be further entrenched in healthcare practice because different populations have unique health characteristics that should be exclusively explored. Increased support for genetic and genomic services in the healthcare practice is one approach that appreciates individual and societal differences in health care outcomes. The same should be encouraged in the management of asthma as a health issue.

References

Abraído-Lanza, A. F., Echeverría, S. E., & Flórez, K. R. (2016). Latino immigrants, acculturation, and health: promising new directions in research. *Annual Review of Public Health*, *37*, 219–236. https://doi.org/10.1146/annurev-publhealth-032315-021545

Acton, A. (2012). *Bronchial diseases: Advances in research and treatment*. New York, NY: Scholarly Editions.

Agency for Health Care Research and Quality. (2016). *Access to health care*. Retrieved from https://archive.ahrq.gov/research/findings/nhqrdr/nhdr11/chap9.html

Alkerwi, A., Sauvageot, N., Pagny, S., Beissel, J., Delagardelle, C., & Lair, M. L. (2012). Acculturation, immigration status and cardiovascular risk factors among Portuguese immigrants to Luxembourg: Findings from ORISCAV-LUX study. *BMC Public Health*, *12*, 864. doi:10.1186/1471-2458-12-864

Allem, J. P., Ayers, J. W., Unger, J. B., Irvin, V. L., Hofstetter, C. R., & Hovell, M. F. (2012). Smoking trajectories among Koreans in Seoul and California: Exemplifying a common error in age parameterization. *Asian Pacific Journal of Cancer Prevention (APJCP)*, *13*(5), 1851–1856. doi:10.7314/APJCP.2012.13.5.1851

Amer, M., & Awad, G. (2015). *Handbook of Arab-American psychology*. London, UK: Routledge.

American Academy of Allergy, Asthma & Immunology. (2017). *Asthma statistics*. Retrieved from http://www.aaaai.org/about-aaaai/newsroom/asthma-statistics

American Psychological Association. (2017). *Ethnic and racial minorities & socioeconomic status*. Retrieved from http://www.apa.org/pi/ses/resources/publications/minorities.aspx

Arcury, T.A., Summers, P., Carrillo, L., Grzywacz, J.G., Quandt, S. A., & Mills, T. H. (2014). 3rd Occupational safety beliefs among Latino residential roofing workers. *American Journal of Industrial Medicine, 57*(6), 718–725. http://dx.doi.org/10.1002/ajim.22248

Armijo-Olivo, S., Stiles, C., Hagen, N., Biondo, P., & Cummings, G. (2012). Assessment of study quality for systematic reviews: A comparison of the cochrane collaboration risk of bias tool and the effective public health practice project quality assessment tool: Methodological research. *Journal of Evaluation in Clinical Practice, 18*(1), 12–18. doi:10.1111/j.1365-2753.2010.01516.x

Arsen, E. (2013). *La vie avec l'asthme: Analysis of asthma susceptibility differences between immigrant and native populations in France*. New York, NY: Columbia University Academic Commons.

Barr, R. G., Avilés-Santa, L., Davis, S. M., Aldrich, T. K., Gonzalez, F., Henderson, A. G., … Smith, L. J. (2016). Pulmonary disease and age at immigration among Hispanics. Results from the Hispanic community health study/study of Latinos. *American Journal of Respiratory and Critical Care Medicine*, *193*(4), 386–395. https://doi.org/10.1164/rccm.201506-1211OC

Becerra, B. J., Scroggins, C. M., & Becerra, M. B. (2014). Association between asthma and obesity among immigrant Asian Americans, California health interview

survey, 2001-2011. *Preventing Chronic Disease*, *11*(1), 105-111. http://doi.org/10.5888/pcd11.140333

Becerra, M. B., Mshigeni, S. K., & Becerra, B. J. (2018). The overlooked burden of food insecurity among Asian Americans: Results from the California health interview survey. *International Journal of Environmental Research, 15*(8), 1684-87.

Beck, A. F., Simmons, J. M., Huang, B., & Kahn, R. S. (2012). Geomedicine: Area-based socioeconomic measures for assessing risk of hospital reutilization among children admitted for asthma. *American Journal of Public Health, 102*(12), 2308–2314. http://doi.org/10.2105/AJPH.2012.300806

Benchimol, E. I., Manuel, D. G., To, T., Mack, D. R., Nguyen, G. C., Gommerman, J. L., … Guttmann, A. (2015). Asthma, type 1 and type 2 diabetes mellitus, and inflammatory bowel disease amongst South Asian immigrants to Canada and their children: A population-based cohort study. *PLoS ONE*, *10*(4), 6–5. http://doi.org/10.1371/journal.pone.0123599

Borges, G., Orozco, R., Rafful, C., Miller, E., & Breslau, J. (2012). Suicidality, ethnicity and immigration in the United States. *Psychological Medicine*, *42*(6), 1175–1184. doi:10.1017/S0033291711002340

Bosdriesz, J. R., Lichthart, N., Witvliet, M. I., Busschers, W. B., Stronks, K., & Kunst, A. E. (2013). Smoking prevalence among migrants in the US compared to the US-born and the population in countries of origin. *PLoS ONE, 8*(3), 1–13. http://doi.org/10.1371/journal.pone.0058654

Bostean, G., Ro, A., & Fleischer, N. L. (2017). Smoking trends among U.S. Latinos,

1998–2013: The impact of immigrant arrival cohort. *International Journal of Environmental Research and Public Health, 14*(3), 1–12. doi:10.3390/ijerph14030255

Braback, L., Vogt, H., & Hjern, A. (2011). Migration and asthma medication in international adoptees and immigrant families in Sweden. *Clinical and Experimental Allergy, 41*(8), 1108-1115. doi:10.1111/j.1365-2222.2011.03744.x

Burgess, D. J., Mock, J., Schillo, B. A., Saul, J. E., Phan, T., Chhith, Y., … Foldes, S. S. (2014). Culture, acculturation and smoking use in Hmong, Khmer, Latinos, and Vietnamese communities in Minnesota. *BMC Public Health*, *14*, 791. doi:10.1186/1471-2458-14-791

Cabieses, B., Uphoff, E., Pinart, M., Antó, J. M., & Wright, J. (2014). A systematic review on the development of asthma and allergic diseases in relation to international immigration: The leading role of the environment confirmed. *PLoS ONE 9*(8), 1–10. https://doi.org/10.1371/journal.pone.0105347

California Health Interview Survey (CHIS). (2016). *CHIS 2015 adult questionnaire*. Retrieved from http://healthpolicy.ucla.edu/chis/design/Documents/_CHIS2015AdultQuestionnaire.pdf

California Health Interview Survey. (2014). *Data collection methods*. Retrieved from http://healthpolicy.ucla.edu/chis/design/Documents/chis2011-2012-method-2_2014-02-21.pdf

Camacho-Rivera, M., Kawachi, I., & Bennett, G. G. (2015). Revisiting the Hispanic health paradox: The relative contributions of nativity, country of origin, and

race/ethnicity to childhood asthma. *J Immigrant Minority Health, 17*(3), 826–833. doi:10.1007/s10903-013-9974-6

Carroll, K. (2013). Socioeconomic status, race/ethnicity, and asthma in youth. *American Journal of Respiratory and Critical Care Medicine, 188*, 1180–1181. https://doi.org/10.1164/rccm.201310-1768ED

CDC. (2014). *NCEH state fact sheets: California*. Retrieved from https://www.cdc.gov/nceh/information/state_factsheets/california.htm

CDC. (2015). *Current smoking among adults in 2015 (Nation).* Retrieved from https://www.cdc.gov/tobacco/data_statistics/fact_sheets/adult_data/cig_smoking/index.htm

CDC. (2017). *International classification of diseases (ICD) codes*. Retrieved from https://wwwn.cdc.gov/eworld/Appendix/ICDCodes

Celedón, J. (2016). *Achieving respiratory health equality: A United States perspective*. New York, NY: Humana Press.

Chan, A., Tetzlaff, J., Altman, D., Laupacis, A., Gøtzsche, P., & Krleža-Jerić, K. (2013). SPIRIT 2013 statement: Defining standard protocol items for clinical trials. *Annals of Internal Medicine, 158*(3), 200–207. doi:10.7326/0003-4819-158-3-201302050-00583

Chiu, M., Lebenbaum, M., Lam, K., Chong, N., Azimaee, M., Iron, K., … Guttmann, A. (2016). Describing the linkages of the immigration, refugees and citizenship Canada permanent resident data and vital statistics death registry to Ontario's administrative health database. *BMC Medical Informatics and Decision Making*,

16, 135. http://doi.org/10.1186/s12911-016-0375-3

Cho, J. H., & Paik, S. Y. (2016). Association between electronic cigarette use and asthma among high school students in South Korea. *PLoS ONE, 11*(3), 1–13. https://doi.org/10.1371/journal.pone.0151022

Chung, W., Lim, S. J., Lee, S., Kim, R., & Kim, J. (2017). Gender-specific interactions between education and income in relation to obesity: A cross-sectional analysis of the fifth Korea national health and nutrition examination survey. *BMJ Open*, *7*(12), 142-56. doi:10.1136/bmjopen-2016-014276

Coogan, P. F., Castro-Webb, N., Yu, J., O'Connor, G. T., Palmer, J. R., & Rosenberg, L. (2015). Active and passive smoking and the incidence of asthma in the black women's health study. *American Journal of Respiratory and Critical Care Medicine*, *191*(2), 168-176.

Corlin, L., & Brugge, D. (2014). *The hidden asthma epidemic in immigrant subpopulations.* Retrieved from http://www.environmentmagazine.org/Archives/Back%20Issues/2014/November-December%202014/asthma-full.html

Corlin, L., Woodin, M., Thanikachalam, M., Lowe, L., & Brugge, D. (2014). Evidence for the healthy immigrant effect in older Chinese immigrants: A cross-sectional study. *BMC Public Health, 14*, 603–607. http://doi.org/10.1186/1471-2458-14-603

Coutts, C. (2016). *Green infrastructure and public health*. London, UK: Routledge.

Creswell, J. (2014). *Research design: Qualitative, quantitative, and mixed methods and approaches* (3rd ed.). Thousand Oaks, CA: SAGE Publications, Inc.

Denham, B. (2016). *Categorical statistics for communication research*. London, UK: John Wiley & Sons.

Dutra, L. M., Williams, D. R., Gupta, J., Kawachi, I., & Okechukwu, C. A. (2014). Human rights violations and smoking status among South African adults enrolled in the South Africa Stress and Health (SASH) study. *Social Science & Medicine, 105,* 103–111. https://doi.org/10.1016/j.socscimed.2014.01.018

Ejebe, I. H., Jacobs, E. A., & Wisk, L. E. (2014). Persistent differences in asthma self-efficacy by race, ethnicity, and income in adults with asthma. *The Journal of Asthma: Official Journal of the Association for the Care of Asthma*, *52*(1), 105-113. doi:10.3109/02770903.2014.947429

Elk, R., & Landrine, H. (2012). *Cancer disparities: Causes and evidence-based solutions*. New York, NY: Springer Publishing Company.

Elwood, W. N., Irvin, V. L., Sun, Q., & Breen, N. (2017). Measuring the influence of legally recognized partnerships on the health and well-being of same-sex couples: Utility of the California health interview survey. *LGBT Health*, *4*(2), 153–160. doi:10.1089/lgbt.2015.0085

Faber, J., & Fonseca, L. M. (2014). How sample size influences research outcomes. *Dental Press Journal of Orthodontics*, *19*(4), 27–29. doi:10.1590/2176-9451.19.4.027-029.ebo

Fenelon, A. (2013). Revisiting the Hispanic paradox in the United States: The role of smoking. *Social Science & Medicine, 19*(82), 1–9. http://doi.org/10.1016/j.socscimed.2012.12.028

Field, A. (2014). Discovering statistics using IBM SPSS statistics. SAGE Publications. IBM India Private Limited.

Findley, S., & Matos, S. (2015). *Bridging the gap: How community health workers promote the health of immigrants.* Oxford, UK: Oxford University Press, Incorporated.

Flynn, M. A., Carreón, T., Eggerth, D. E., & Johnson, A. I. (2014). Immigration, work, and health: A literature review of immigration between Mexico and the United States. *Revista de Trabajo Social*, *6*, 129–149.

Fox, M., Entringer, S., Buss, C., DeHaene, J., & Wadhwa, P. D. (2015). Intergenerational transmission of the effects of acculturation on health in Hispanic Americans: A fetal programming perspective. *American Journal of Public Health*, *105*(3), 409–423. doi:10.2105/AJPH.2015.302571

Frude, N. (2013). *A guide to SPSS/PC+ 1ED*. New York, NY: Springer.

Garcia-Marcos, L., Robertson, C., Anderson, R., Ellwood, P., Williams, H., Wong, G., …ISAAC Phase Three Study Group. (2014). Does migration affect asthma, rhinoconjunctivitis and eczema prevalence? Global findings from the international study of asthma and allergies in childhood. *International Journal of Epidemiology, 43*(6), 1846–1854. https://doi.org/10.1093/ije/dyu145

Gatrell, A., & Elliott, S. (2014). *Geographies of health: An introduction*. London, UK: John Wiley & Sons.

Gilioli, G., Caroli, A. M., Tikubet, G., Herren, H. R., & Baumgärtner, J. (2014). Implementation of a socio-ecological system navigation approach to human

development in Sub-Saharan African communities. *Journal of Public Health Research*, *3*(1), 218. https://doi.org/10.4081/jphr.2014.218

Gilreath, T. D., Chaix, B., King, G., Matthews, S., & Flisher, A. J. (2012). Multi-level influence of school norms on tobacco use in South Africa: An ecometric consideration of group differences. *Cancer Causes & Control: CCC*, *23*(1), 27–36. http://doi.org/10.1007/s10552-012-9908-y

Gong, T., Lundholm, C., Rejnö, G., Mood, C., Långström, N., & Almqvist. C. (2014). Parental socioeconomic status, childhood asthma and medication use – a population-based study. *PLoS ONE 9*(9), 21-2810. https://doi.org/10.1371/journal.pone.0106579

Gonzalez, M., Sanders-Jackson, A., & Emory, J. (2016). Online health information-seeking behavior and confidence in filling out online forms among Latinos: A cross-sectional analysis of the California health interview survey, 2011–2012. *Journal of Medical Internet Research*, *18*(7), 184.

Gorman, B., Lariscy, J., & Kaushik, C. (2014). Gender, acculturation, and smoking behavior among U.S. Asian and Latino immigrants. *Social Science & Medicine, 106,* 110–118. https://doi.org/10.1016/j.socscimed.2014.02.002

Grzywacz, J. G., Arcury, T. A., Mora, D., Anderson, A. M., Chen, H., & Rosenbaum, D. A. (2012). Work organization and musculoskeletal health: Clinical findings from immigrant Latino poultry processing and other manual workers. *Journal of Occupational and Environmental Medicine, 54*(8), 995–1001. http://dx.doi.org/10.1097/JOM.0b013e318254640d

Guerrero, A. D., Ponce, N. A., & Chung, P. J. (2015). Obesogenic dietary practices of Latino and Asian subgroups of children in California: An analysis of the California health interview survey, 2007–2012. *American Journal of Public Health*, *105*(8), 105–112.

Guest, G. (2014). *Public health research methods*. London, UK: SAGE Publications.

Guidot, D. M., & Mehta, A. J. (2013). *Alcohol use disorders and the lung: A clinical and pathophysiological approach*. New York, NY: Springer Science & Business Media.

Gulliford, M., & Morgan, M. (2013). *Access to health care*. London, UK: Routledge.

Guruge, S., Birpreet, B., & Samuels-Dennis, J. (2015). Health status and health determinants of older immigrant women in Canada: A scoping review. *Journal of Aging Research, 2*(5), 1–12. http://dx.doi.org/10.1155/2015/393761

Hamilton, E., Cardoso, J., Hummer, R., & Padilla, Y. (2011). Assimilation and emerging health disparities among new generations of U.S. children. *Demographic Research, 25*(25), 781–818. doi:10.4054/DemRes.2011.25.25

Hassan, S., Yellur, R., Subramani, P., Adiga, P., Gokhale, M., & Iyer M. (2015). Research design and statistical methods in Indian medical journals: A retrospective survey. *PLoS ONE, 10*(4), 12-18. doi:10.1371/journal.pone.0121268

Hegde, D. (2015). *Essays on research methodology*. New York, NY: Springer.

Hinds, T., & Giardino, A. (2017). *Child physical abuse: Current evidence, clinical practice, and policy directions.* New York, NY: Springer.

Hoffmann, T., Bennett, S., & Del Mar, C. (2013). *Evidence-based practice across the*

health professions. Chatswood, AU: Churchill Livingstone.

Im, E. O., Rendell Endowed, M. O., Chang, S. J., Chee, W., Chee, E., & Mao, J. (2015). Immigration transition and depressive symptoms: Four major ethnic groups of midlife women in the U.S. *Health Care for Women International*, *36*(4), 439–456. http://doi.org/10.1080/07399332.2014.924518

Iqbal, S., Oraka, E., Chew, G. L., & Flanders, W. D. (2014). Association between birthplace and current asthma: The role of environment and acculturation. *American Journal of Public Health*, *104*(1), 175-182.

Jain, S., Basavaraj, P., Singla, A., Singh, K., Kundu, H., Vashishtha, V., … Malhi, R. (2015). Bibliometric analysis of journal of clinical and diagnostic research (dentistry section; 2007-2014). *Journal of Clinical and Diagnostic Research*, *9*(4), 47–51. doi:10.7860/JCDR/2015/11994.5834

Jans, M., Viana, J., Grant, D., Cochran, S. D., Lee, A. C., & Ponce, N. A. (2015). Trends in sexual orientation missing data over a decade of the California health interview survey. *American Journal of Public Health*, *105*(5), 43–50.

Jayasinghe, S. (2015). Social determinants of health inequalities: Towards a theoretical perspective using systems science. *International Journal for Equity in Health, 14*, 71–73. http://doi.org/10.1186/s12939-015-0205-8

Jirojwong, S., Johnson, M., & Welch, A. (2014). *Research methods in nursing and midwifery*. Sydney, AU: Oxford University Press.

Kapp, J., Simoes, E., DeBiasi, A., & Kravet, S. (2016). A conceptual framework for a systems thinking approach to us population health. *Systems Research and*

Behavioral Science, 3(4), 98–105. doi:10.1002/sres.2420

Keet, C. A., McCormack, M. C., Pollack, C. E., Peng, R. D., McGowan, E., & Matsui, E. C. (2015). Neighborhood poverty, urban residence, race/ethnicity and asthma: rethinking the inner-city asthma epidemic. *The Journal of Allergy and Clinical Immunology*, *135*(3), 655–662. http://dx.doi.org/10.1016/j.jaci.2014.11.022

Kelly, N., Glick, D., Kulbok, P., Clayton, L., & Rovnyak, V. (2012). Health status of migrant farmworkers in the Shenandoah valley. *Journal of Community Health Nursing, 29*(4), 214–224. http://dx.doi.org/10.1080/07370016.2012.724288

Kent, P., Jensen, R.K., & Kongsted, A. (2014). A comparison of three clustering methods for finding subgroups in MRI, SMS or clinical data: SPSS twostep cluster analysis, latent gold and snob. *BMC Medical Research Methodology, 14*(1), 113.

Kim, H. J., Baek, S., Kim, H. J., Lee, J. S., Oh, Y. M., Lee, S. D., & Lee, S. W. (2015). The impact of smoking on airflow limitation in subjects with a history of asthma and inactive tuberculosis. *PloS One*, *10*(4), 538-543. doi:10.1371/journal.pone.0125020

Kolker, C. (2013). *The immigrant advantage: What we can learn from newcomers to America about health, happiness and hope*. New York, NY: Simon and Schuster.

Landsbergis, P.A., Grzywacz, J.G., & LaMontagne, A.D. (2014). Work organization, job insecurity, and occupational health disparities. *American Journal of Industrial Medicine, 57*(5):495–515. doi:10.1002/ajim.22126

Lang, T. A., & Altman, D. G. (2014). *Guidelines for reporting health research: A user's manual.* Oxford, UK: John Wiley & Sons, Ltd.

Lee, J., Reed, P. L., & Berg, J. P. (2014). Asthma characteristics among older adults: Using the California health interview survey to examine asthma incidence, morbidity, and ethnic differences. *Journal of Asthma, Early Online, 51*(4), 1-6.

Lee, P. N., Forey, B. A., & Coombs, K. J. (2012). Systematic review with meta-analysis of the epidemiological evidence in the 1900s relating smoking to lung cancer. *BMC Cancer*, *12*, 385. doi:10.1186/1471-2407-12-385

Lee, S., O'Neill, A. H., Ihara, E. S., & Chae, D. H. (2013). Change in self-reported health status among immigrants in the United States: Associations with measures of acculturation. *PLoS ONE, 8*(10), 56-61. https://doi.org/10.1371/journal.pone.0076494

Li, S., Kwon, S. C., Weerasingh, I., Rey, M. J., & Trinh-Shevrin, C. (2013). Smoking among Asian Americans: Acculturation and gender in the context of tobacco control policies in New York City. *Health Promotion Practice*, *14*(5), 18–28. http://doi.org/10.1177/1524839913485757

Li, Z., Leite, W., Thompson, L., Gross, H. E., Shenkman, E., Reeve, B. B., … Huang, I. C. (2017). Determinants of longitudinal health-related quality of life change in children with asthma from low-income families: A report from the PROMIS® pediatric asthma study. *Clinical and Experimental Allergy: Journal of the British Society for Allergy and Clinical Immunology*, *47*(3), 383-394.

Lindly, O. J., Zuckerman, K. E., & Mistry, K. B. (2016). Clarifying the predictive value of family-centered care and shared decision making for pediatric healthcare

outcomes using the medical expenditure panel survey. *Health Services Research*, *52*(1), 313-345.

Linneberg, A., & Gonzalez-Quintela, A. (2016). The unsolved relationship of alcohol and asthma. *International Archives of Allergy Immunology, 171*(1), 155-157.

Lopez, L., & Golden, S. H. (2014). A new era in understanding diabetes disparities among U.S. Latinos--all are not equal. *Diabetes Care, 37*(8), 2081–2083. López, L., & Golden, S. H. (2014). A New Era in Understanding Diabetes Disparities Among U.S. Latinos—All Are Not Equal. Diabetes Care, 37(8), 2081–2083. http://doi.org/10.2337/dc14-0923

Loue, S. (2013). *Handbook of immigrant health*. New York, NY: Springer Science & Business Media.

Mahmoudi, M. (2016). *Allergy and asthma: Practical diagnosis and management*. New York, NY: Springer.

Mangal, S., & Mangal, S. (2013). *Research methodology in behavioral sciences*. New York, NY: PHI Learning Pvt. Ltd.

Martinez, O., Wu, E., Sandfort, T., Dodge, B., Carballo-Dieguez, A., Pinto, R., … Chavez-Baray, S. (2015). Evaluating the impact of immigration policies on health status among undocumented immigrants: A systematic review. *Journal of Immigrant and Minority Health / Center for Minority Public Health*, *17*(3), 947–970. doi:10.1007/s10903-013-9968-4

Merlo, J., Wagner, P., Ghith, N., & Leckie, G. (2016). An original stepwise multilevel logistic regression analysis of discriminatory accuracy: The case of neighborhoods and health. *PLoS ONE, 11*(4), 1-10.

Miller, L. C., Joshi, N., Lohani, M., Rogers, B., Mahato, S., Ghosh, S., & Webb, P. (2017). Women's education level amplifies the effects of a livelihoods-based intervention on household wealth, child diet, and child growth in rural Nepal. *International Journal for Equity in Health*, *16*(1), 183.

Moore, L., de Silva-Sanigorski, A., & Moore, S. N. (2013). A socio-ecological perspective on behavioural interventions to influence food choice in schools: Alternative, complementary or synergistic? *Public Health Nutrition*, *16*(6), 1000–1005. http://doi.org/10.1017/S1368980012005605

Moreland-Russell, S., & Brownson, R. (2016). *Prevention, policy, and public health*. Oxford, UK: Oxford University Press.

Murari, G. (2013). Clinical research and its condition in India. *Journals of Clinical Research in Bioethics, 4*, 146-148. doi:10.4172/2155-9627.1000146

Naturopath, C. (2013). *Asthma solved naturally: The surprising underlying causes and hundreds of natural strategies to beat Asthma*. New York, NY: Logical Books.

Ndebele, P., Wassenaar, D., Benatar, S., Fleischer, T., Kruger, M., Adebamowo, C., … Meslin, M. (2014). Research ethics capacity building in Sub-Saharan Africa: A review of nih fogarty-funded programs 2000–2012. *Journal of Empirical Research on Human Research Ethics*, *9*(2), 24–40. doi:10.1525/jer.2014.9.2.24

Nicholls, S., Hayes, T., Brehaut, J., McDonald, M., Weijer, C., Saginur, R., & Fergusson,

D. (2015). A scoping review of empirical research relating to quality and effectiveness of research ethics review. *PLoS ONE*, *10*(7), 15-20. doi:10.1371/journal.pone.0133639

Nieswiadomy, R. M. (2012). *Foundations of nursing research*. Boston, MA: Pearson.

Nursing and Midwifery Board of Australia. (2012). *Code of professional conduct for nurses in Australia.* Retrieved from http://www. nursingmidwiferyboard.gov.au

Okechukwu, C. A., Souza, K., & Davis, K. D. (2014). Discrimination, harassment, abuse, and bullying in the workplace: contribution of workplace injustice to occupational health disparities. *American Journal of Industrial Medicine, 57*(5), 573–586. http://doi.org/10.1002/ajim.22221

Onono, M., Kwena, Z., Turan, J., Bukusi, E. A., Cohen, C. R., & Gray, G. E. (2015). "You know you are sick, why do you carry a pregnancy again?" Applying the socioecological model to understand barriers to PMTCT service utilization in western Kenya. *Journal of AIDS & Clinical Research*, *6*(6), 467. doi:10.4172/2155-6113.1000467

Pattanayak, S., Sunita, P., & Anshu, S. (2016). *Role of Cd4+T cell sub-populations in allergic asthma: A new strategy of natural flavonoids to ameliorate asthma*. New York, NY: GRIN Verlag.

Perret, J. L., Bonevski, B., McDonald, C. F., & Abramson, M. J. (2016). Smoking cessation strategies for patients with asthma: Improving patient outcomes. *Journal of Asthma and Allergy*, *9*(1), 117-28. doi:10.2147/JAA.S85615

Pichardo-Geisinger, R., Mora, D. C., Newman, J. C., Arcury, T. A., Feldman, S. R., &

Quandt, S. A. (2014). Comorbidity of tinea pedis and onychomycosis and evaluation of risk factors in Latino immigrant poultry processing and other manual laborers. *Southern Medical Journal, 107*(6), 374–379. http://dx.doi.org/10.14423/01.SMJ.0000450705.67259.26

Polit, D. F., & Hungler, B. P. (2013). *Essentials of nursing research: Methods, appraisal, and utilization*. Philadelphia, PA: Wolters Kluwer.

Polosa, R., Caponnetto, P., & Sands, M. (2012). Caring for the smoking asthmatic patient. *The Journal of Allergy and Clinical Immunology, 130*(5), 1221–1224. http://dx.doi.org/10.1016/j.jaci.2012.04.015

Poureslami, I., Shum, J., & FitzGerald, M. (2015). Why do Chinese people with COPD continue smoking: The attitudes and beliefs of Chinese residents of Vancouver, Canada? *Diversity and Equality in Health and Care, 12*(1), 18–27. Retrieved from http://diversityhealthcare.imedpub.com/why-do-chinese-people-with-copd-continue-smoking-the-attitudes-and-beliefs-of-chinese-residents-of-vancouver-canada.php?aid=3732

Printz, C. (2015). Immigration associated with an increase in smoking among Latinos, Asians. *American Cancer Society, 121*(1), 3–5. doi:10.1002/cncr.29186

Reed, H., & Barosa, G. (2016). Investigating the refugee health disadvantage among the U.S. immigrant population. *Journal of Immigration and Refugee Studies, 15*(1), 1–10. http://dx.doi.org/10.1080/15562948.2016.1165329

Reingle, J. M., Caetano, R., Mills, B. A., & Vaeth, P. A. C. (2014). The role of immigration age on alcohol and drug use among border and non-border Mexican

Americans. *Alcoholism, Clinical and Experimental Research*, *38*(7), 2080–2086. doi:10.1111/acer.12440

Reiss, K., Lehnhardt, J., & Razum, O. (2015). Factors associated with smoking in immigrants from non-western to western countries - what role does acculturation play? A systematic review. *Tobacco induced diseases*, *13*(1), 11. doi:10.1186/s12971-015-0036-9

Reiss, K., Sauzet, O., Razum, O., Breckenkamp, J., & Spallek, J. (2014). How immigrants adapt their smoking behavior: Comparative analysis among Turkish immigrants in Germany and the Netherlands. *BMC Public Health, 14*, 844–48. doi:10.1186/1471-2458-14-844

Rhodes, S. D., Mann, L., Simán, F. M., Song, E., Alonzo, J., Downs, M., … Hall, M. A. (2015). The impact of local immigration enforcement policies on the health of immigrant Hispanics/Latinos in the United States. *American Journal of Public Health*, *105*(2), 329–337. doi:10.2105/AJPH.2014.302218

Riosmena, F., Wong, R., & Palloni, A. (2013). Migration selection, protection, and acculturation in health: A binational perspective on older adults. *Demography*, *50*(3), 1039–1064. doi:10.1007/s13524-012-0178-9

Ro, A. (2014). The longer you stay, the worse your health? A critical review of the negative acculturation theory among Asian immigrants. *International Journal of Environmental Research and Public Health*, *11*(8), 8038–8057. doi:10.3390/ijerph110808038

Rosser, F. J., Forno, E., Cooper, P. J., & Celedón, J. C. (2014). Asthma in Hispanics. An 8-year update. *American Journal of Respiratory and Critical Care Medicine*, *189*(11), 1316-1327.

Rottem, M., Geller-Bernstein, C., & Shoenfeld, Y. (2015). Atopy and asthma in migrants: The function of parasites. *International Archives of Allergy and Immunology, 167*(1), 41–46. doi:10.1159/000431360

Rumrich, I. K., & Hänninen, O. (2015). Environmental asthma reduction potential estimates for selected mitigation actions in Finland using a life table approach. *International Journal of Environmental Research and Public Health*, *12*(6), 6506–6522. doi:10.3390/ijerph120606506

Schenker, M., Casta–eda, X., & Rodriguez-Lainz, A. (2014). *Migration and health: A research methods handbook*. Oakland, CA: University of California Press.

Shani, M., Band, Y., Kidon, M., Segel, M., Rosenberg, R., Nakar, S., … Vinker, S. (2013). The second generation and asthma: Prevalence of asthma among Israeli born children of Ethiopian origin. *Respiratory Medicine, 107*, 519–523. https://doi.org/10.1016/j.rmed.2012.12.024

Sharma, M. (2016). *Theoretical foundations of health education and health promotion*. London, UK: Jones & Bartlett Publishers.

Sheikh, A., Steiner, M. F. C., Cezard, G., Bansal, N., Fischbacher, C., Simpson, C. R., … SHELS researchers. (2016). Ethnic variations in asthma hospital admission, readmission and death: A retrospective, national cohort study of 4.62 million people in Scotland. *BMC Medicine*, *14*, 3. doi:10.1186/s12916-015-0546-6

Shin, J. Y., Sohn, K. H., Shin, J. E., Park, M., Lim, J., Lee, J. Y., & Yang, M. S. (2018). Changing patterns of adult asthma incidence: Results from the national health insurance service-national sample cohort database in Korea. *Scientific Reports*, *8*(1), 15052. doi:10.1038/s41598-018-33316-y

Silverberg, J. I., Simpson, E. L., Durkin, H. G., & Joks, R. (2013). Prevalence of allergic disease in foreign-born American children. *JAMA Pediatrics*, *167*(6), 554-560. doi:10.1001/jamapediatrics.2013.1319

Somanna, M. (2016). *Is there a relationship between highest education attained by US residents and their family income?* Retrieved from https://rpubs.com/Monnapppa/180870

Spears, M., McSharry, C., Chaudhuri, R., Weir, C. J., De Wet, C., & Thomson, N. C. (2013). Smoking in asthma is associated with elevated levels of corticosteroid resistant sputum cytokines—an exploratory study. *PLoS ONE 8*(8), 1–10. https://doi.org/10.1371/journal.pone.0071460

Statistics Solutions. (2017). *Cronbach's alpha*. Retrieved from http://www.statisticssolutions.com/cronbachs-alpha/

Streja, L., Crespi, C. M., Bastani, R., Wong, G., Jones, C., Bernert, J., … Tashkin, J. (2014). Can a minimal intervention reduce second hand smoke exposure among children with asthma from low-income minority families? Results of a randomized trial. *Journal of Immigrant Minority Health, 16,* 256–264. doi:10.1007/s10903-012-9713-4

Thakur, N., Oh, S. S, Nguyen, E. A., Martin, M., Roth, L. A., Galanter, J., … Meade, K.

(2013). Socioeconomic status and childhood asthma in urban minority youths: The GALA II and SAGE II studies. *American Journal of Respiratory and Critical Care Medicine*, *188*(10), 1202–1209. http://doi.org/10.1164/rccm.201306-1016OC

UCLA Center for Health Policy Research. (2018). *CHIS data quality*. Retrieved from http://healthpolicy.ucla.edu/chis/design/Pages/data-quality7.aspx

UNICEF. (2016). *Understanding the social ecological model (SEM) and communication for development (C4D).* Retrieved from https://www.unicef.org/cbsc/files/Module_1_-_MNCHN_C4D_Guide.docx

Walters, D. (2015). *California anti-smoking drive cut rates in half*. Retrieved from http://www.sacbee.com/news/politics-government/capitol-alert/article36976518.html

Wang, Y., Ponce, N. A., Wang, P., Opsomer, J. D., & Yu, H. (2015). Generating health estimates by zip code: A semiparametric small area estimation approach using the California health interview survey. *American Journal of Public Health*, *105*(12), 2534–2540.

Warner, R. (2012). *Applied statistics: From bivariate through multivariate techniques: From bivariate through multivariate techniques*. London, UK: SAGE.

Whaley, B. (2014). *Research methods in health communication: Principles and application*. London, UK: Routledge.

Wilson, K. (2016). *HMO enrollment in California: The dynamics of decline, 2004-2015*. Retrieved from https://www.chcf.org/publication/hmo-enrollment-in-california-the-dynamics-of-decline-2004-2015/

World Health Organization. (2016). *Prevalence of tobacco smoking*. Retrieved from http://www.who.int/gho/tobacco/use/en/

Wright-St Clair, V., Reid, D., Shaw, S., & Ramsbotham, J. (2014). *Evidence-based health practice*. South Melbourne, AU: Oxford University Press.

Yakob, B., & Ncama, B. P. (2016). A socio-ecological perspective of access to and acceptability of HIV/AIDS treatment and care services: A qualitative case study research. *BMC Public Health*, *16*, 155. doi:10.1186/s12889-016-2830-6