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Childhood Asthma in the Midwest

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This is to certify that the doctoral dissertation by

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has been found to be complete and satisfactory in all respects,
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Walden University
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Abstract

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MS, A. T. Still University, 2005

BA, Hampton University, 1996

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

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Abstract

In spite of the National Asthma Education and Prevention Program guidelines outlining how to diagnose, treat, and educate asthmatics, asthma morbidity and mortality rates are still mounting. Furthermore, the minority population has disproportionately higher rates of unfavorable outcomes from asthma, thereby diminishing their quality of life. The study's theoretical framework was based on the health belief model and explored associations of asthma control with self-efficacy and asthma education. Few studies focus on asthma inequity. The purpose of this quantitative study was to assess relationships between asthma control, race, asthma education, and healthcare utilization amongst asthmatic children residing in the Midwest. Secondary data from the Centers for Disease Control's Behavioral Risk Factor Surveillance System's Asthma Call-back Survey were used (n=477,221). Participant characteristics were examined using descriptive statistics. A sequence of bivariate and logistic regression analysis was used to test each hypothesis. The findings revealed significant associations amongst asthma control, race, asthma education, and healthcare utilization. In addition, children with uncontrolled asthma have greater visits to the emergency department and to their pediatrician's office due to their asthma symptoms. Moreover, the study results indicated that African American children experienced uncontrolled asthma at a higher rate when compared to other children, consequently decreasing their quality of life. The study showed the need for policy change to expand funding and programs aimed at decreasing uncontrolled asthma by improving asthma education, especially in African American communities, in hope of empowering asthmatics to play a vital role in their health and increasing their quality of life.

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Dedication

I dedicate this completed dissertation to my parents, Hilda and Charles, who showered me with love, encouragement and support since the day that I was born. They have instilled in me that having faith and perseverance will help weather any storm. I love you both!

Acknowledgements

I would like to give thanks to God, who walked with me on this long journey and made this academic achievement possible.

I would like to express sincere gratitude and thanks to my committee chair, Dr. Callahan-Myrick, for her dedicated guidance and encouragement. Also, thank you Dr. Agha for your constructive feedback. You both challenged me to enhance my research and writing skills to express my scholarly voice.

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Chapter 1: Introduction to the Study

Introduction

Asthma is an international public health issue (Lanari, Bottau & Calamelli, 2017). Approximately 39.5 million people in the United States have been diagnosed with asthma (Centers for Disease Control and Prevention [CDC], 2013). Nearly 7 million of those people are children between the ages of 0 and 17 (Carpenter, Lachance, Wilking, & Clark, 2013). Asthma is the most common chronic disease in children (Akinbemi, Simon & Rossen, 2016). The disease greatly impacts children residing in the inner-city (Turyk et al., 2013), affecting African Americans twice as much as whites (Thakur et al., 2013). Furthermore, according to the CDC (2014), African American children are twice as likely to die from complications due to asthma then those who are white. Asthma is a major cause of school absenteeism in children (Hsu et al., 2015). Asthmatic children are absent from school more days than children without asthma (Carpenter et al., 2013). According to the CDC (2014), uncontrolled symptoms are one of the main reasons that children utilize urgent care services, even though asthma is a chronic illness (2014). Over the past 10 years, there have been almost 500,000 hospitalizations, 2 million emergency department visits, and 9 million doctor's visit due to asthma. There have been various surveillance studies and programs to promote education to help control symptoms (CDC, 2014). According to the American Academy of Allergy, Asthma and Immunology (AAAAI, 2015), approximately $38 billion—$2100 per adult and $1000 per child—is spent yearly on asthma-related healthcare costs.

Asthma in the Midwest

Childhood asthma epitomizes an ongoing world health dilemma, and the Midwest is not exempt (Lanari, Bottau, & Calamelli, 2017). Midwestern states include Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Ohio, Nebraska, Wisconsin, North Dakota, and South Dakota, with Chicago comprising the largest city in the region (New World Encyclopedia, 2017). Illinois has high rates of asthma prevalence, morbidity, and mortality when compared to other states (Illinois Department of Public Health [IDPH], 2015). In 2011, about 73,000 emergency room visits and 19,000 hospitalizations in Illinois were attributed to asthma (IDPH, 2015). The IDPH reports that most of the state's death attributed to asthma occurred in the Chicagoland area (2015). The minority population has unequally higher rates of unfavorable health outcomes from asthma (Akinbami, Simon, & Rossen, 2016).

Many Midwestern states like Wisconsin, Kansas, and Michigan have a high prevalence of asthma (Creswell, Vogt, Christenson & Tomasallo, 2017; WebMD, 2017). According to the Indiana State Department of Health (2015), in 2013, greater than one third of the emergency department visits for asthma were by children age 17 and younger. Furthermore, African American residents went to the emergency department for uncontrolled asthma symptoms at a rate of 4.5 times more than those who were white (Indiana State Department of Health, 2015). In 2014, African American residents were hospitalized for asthma at a rate of just over 6 times than white residents (Creswell, Vogt, Christenson & Tomasallo, 2017). A 10-year study in Missouri showed a substantial rise in emergency department visits from children for asthma, with a sizeable amount residing in low-income neighborhoods (Hospital Industry Data Institute [HIDI], 2015).

In inner-city areas, like Chicago, non-whites and those of lower socioeconomic status are disproportionately affected by asthma. The cause has been attributed to the social and psychological stressors of those residing in urban communities and in low socioeconomic environments that adversely impact asthma symptoms and management (Gupta et al., 2013). According to the National Center for Health Housing, 88% of children in Illinois reside in family units that yield an elevated housing burden cost. In addition, one out of every five children in Illinois lives in poverty (2015).

Various asthma researchers have linked social and environmental issues to uncontrolled asthma (Bhan, Kawachi, Glymour & Subramain, 2015). According to Eldeirawi et al. (2016), minorities residing in underserved areas who are exposed to neighborhoods with frequent unlawful acts and criminal behaviors are more prone to have greater days of uncontrolled asthma symptoms, like wheezing. Elderirawi et al. (2016) performed multiple logistic regression on the effects of crime in high prevalence asthma areas in Chicago. The results showed that violent crime was significantly associated with an increase in asthma-related emergency room visits and hospitalizations.

Problem Statement

Asthma is the most common chronic inflammatory disease in children (Vliet et al., 2015). It exhibits a preventable morbidity and mortality in those who have been diagnosed. Moreover, it decreases the quality of life (Gandhi et al., 2013). According to Yu et al. (2013), quality of life relates to the frequency of experiencing of asthma episodes like wheezing. Asthma continues to disproportionately affect minorities and those of lower socioeconomic status (IDPH, 2015). The hospitalization of many children due to poorly controlled asthma symptoms can be avoided with proper asthma education

and management (Hsu et al., 2015). Racial and ethnic disparities for minorities continue to exist where symptoms of asthma are uncontrolled, yielding a vast amount of emergency room visits (Oraka, Iqbal, Flanders, Brinker, & Garbe, 2013). Although there have been school and community based asthma education interventions to improve asthma knowledge and skills, there are few studies and little literature examining factors associated with pediatric asthma and its control in the Midwest.

Purpose of Study

The purpose of this quantitative research was to study pediatric asthma control in the Midwest by utilizing secondary data via the Behavioral Risk Factor Surveillance Survey's Asthma-call Back Survey. In the study, I assessed associations amongst race, asthma control, asthma education, and access to healthcare while exploring contributing factors. SPSS was used to analyze the data using descriptive statistics and multiple logistic regressions. I drew on the health belief model, which holds that education promotes self-efficacy to control asthma symptoms, in turn increasing the quality of life and thereby decreasing morbidity and mortality rates. The results add to those in existing asthma literature linking the quality of asthma education with asthma symptom control. In addition, the results of the study show if there are any correlations among socioeconomic status, asthma education, and asthma control. The study provides information to asthmatics, healthcare providers, and policy makers about obtaining optimal asthma control through various avenues, such as asthma awareness and education. By having pertinent, standardized asthma education, asthmatics will be empowered to maintain tight control of their asthma symptoms via avoidance of triggers, medication compliance, and following an asthma action plan. Furthermore, with

standardized asthma education, healthcare providers will be more likely to provide consistent care to asthmatics regardless of their socioeconomic status. By having control of their asthma, asthmatics will increase their quality of life and decrease their utilization of urgent and emergency care services for asthma control. Furthermore, this study will contribute to positive social change by bringing to the forefront environmental and social predictors of asthma triggers. The results could positively impact care providers' approaches to pediatric asthma patient care by compelling them to use new innovative asthma education methods and techniques. This could empower asthmatics with key information to control asthma symptoms and live a normal life.

Significance of Study

When reviewing current literature, I found little research on pediatric asthma in the Midwest on a multivariate level. This study will contribute to current asthma research by identifying possible risk factors that adversely affect children with asthma. In addition, the information yielded from this study will empower asthmatic children not only residing in the Midwest, but children worldwide by increasing their asthma knowledge. This study will increase knowledge of contributing factors, both avoidable and unavoidable. The overall aim is to expand asthma knowledge in recognition of triggers and early symptoms, and to increase asthma management skills in children. Healthcare providers can take advantage of this study's results when providing care to their asthma patients. Furthermore, the study results are beneficial to stakeholders and policy makers when creating chronic disease guidelines and programs.

Implications for Social Change

The results from this study will go far beyond helping children with asthma in the Midwest. The results will enhance a positive social change by bringing to the forefront any current differences in asthma care and education in the Midwest. The results could aid in new policies and programs that would narrow the gap in racial disparities in asthma morbidity and mortality. In this study, I aimed to identify key contributing factors that coincide with uncontrolled asthma symptoms in hopes of providing ideas for improving conditions of children with asthma that could be used for patient education and health promotion. I hope that the results of this study will promote better control of asthma symptoms. Not only healthcare providers, but also policy makers, public health officials, educators, lung organizations, researchers, and the general public can join together in support of tighter asthma management. Better asthma control has the potential to decrease morbidity and mortality rates.

Research Questions and Hypothesis

The Behavioral Risk Factor Surveillance System's (BRFSS) Child Asthma Call-back Survey (ACBS) is a national standardized questionnaire that is used to assess asthma control nationally. This study was guided by various research questions that I used to examine how asthma affects the quality of life and various asthma control characteristics of children living in the Midwest. To answer the questions, I analyzed secondary data from the 2009 Child ACBS, which is the most recent publically-available weighted data that which includes the Midwest region. The research questions and hypotheses were as follows:

RQ1: What is the relationship between asthma control in African American children in the Midwest when compared with other races?

$H_0$1: There is no relationship between asthma control in African American children in the Midwest when compared with other races.

$H_1$2: There is a relationship between asthma control in African American children in the Midwest when compared with other races.

RQ2: Are there any associations between physician provided asthma education asthma control?

$H_0$2: There is no association between physician provided asthma education and asthma control.

$H_1$2: There is an association between physician provided asthma education and asthma control.

RQ3: What is the relationship between healthcare utilization and asthma control.

$H_0$3: There is no relationship between healthcare utilization and asthma control.

$H_1$3: There is a relationship between healthcare utilization and asthma control.

Operational Definitions

Allergen: Something that causes asthma symptoms (Kanchongkittiphon, Mendell, Gaffin, Wang, & Phipatanakul, 2015).

Asthma: A complex chronic inflammatory disease influenced by genetic and environmental factors (CDC, 2014).

Asthma action plan: An outlined plan provided by the healthcare provider to manage asthma symptoms (Bush & Fleming, 2015).

Asthma control: Asthma status that is assessed based on clinical symptoms, lung function and number of attacks (Vliet et al., 2015).

Asthma exacerbation (asthma attack): Caused by long term hyperactivity and inflammation of the airways causing reversible airflow blockage (CDC, 2013).

Asthma guidelines: Guidelines published by the National Asthma Education and Prevention Program (NAEPP) to diagnose and manage asthma (Friend & Morrison, 2015).

Peak flow: Measures lung volume as air is forcefully blown out of the lungs (Bush & Fleming, 2015).

Health literacy: The ability of one to comprehend basic health information necessary to make sound decisions regarding their health (Federman et al., 2014).

Nebulizer: Delivers asthma medications as an aerosol mist during asthma exacerbations (Kirley & Nguyen, 2014).

Rescue inhaler: Asthma medication inhaler that provides immediate relief of asthma symptoms (Rowland, 2014).

Self management: A person actively participates in managing their disease, thereby reducing adverse health effects (CDC, 2013).

Spacer device: A chamber device that provides adequate spacing to completely distribute asthma medications that are delivered via an inhaler into the lungs (Kirley & Nguyen, 2014).

Spirometry: The favored method for diagnosing and assessing lung function (Banasiak, 2014).

Steroids: A medication used to avert inflammation in the lungs for long-term control of asthma (National Heart, Blood, and Lung Institute [NHBLI], 2016).

Triggers: Exposure to things that stimulate asthma symptoms asthma symptoms (Booker, 2014).

Wheezing: High pitched sound described as a whistle noise heard mainly during expiration and correlates to heightened work of breathing (Booker, 2014).

Theoretical Framework

Self-management and self-efficacy are important in controlling asthma symptoms. Both self-management and self-efficacy enhance the quality of life by decreasing urgent care/emergency department visits, overnight stay in hospitals, and costs attributed to healthcare (CDC, 2013). Asthma exacerbations are considered preventable when one has a good asthma action plan in place (Gupta et al., 2013). This dissertation is based upon the health belief model, which holds that one will change to healthy habits if there is a perceived threat or possibility of a serious health outcome.

Assumptions

I assumed that all participants had been properly diagnosed with asthma and that each participant in the BRFSS ACBS has answered each question honestly.

Limitations

There are some limitations to using secondary data. Data sets may provide excess information that may not be pertinent to the research at hand. This is because the data was gathered to meet the initial researcher's study objectives, which may vary from another researcher's hypotheses. Furthermore, data sets may have been produced a while ago, and thus may not account for any advancement in its field that could affect results.

The BRFSS's ACBS is a self-report telephone survey in which several biases could affect the overall outcome of study.

Summary

In Chapter 2, I offer a review of the literature regarding asthma physiology, asthma classification, national asthma management guidelines, and barriers to treating asthma. In addition, I review the financial impact of asthma in the United States and the various types of asthma interventions currently in use. In Chapter 3, I explain the methodology I used for this quantitative study of secondary data from the BFRSS's ACBS to examine how asthma affects children living in the Midwest. The results and implications of the study will be discussed in Chapters 4 and 5 respectively.

Chapter 2: Literature Review

Introduction

Asthma is on the rise and is the primary cause of missed school and hospitalizations for children in the United States. Asthma is the number one chronic disease among children, and it is estimated to impact over 350 million people worldwide by 2025 (Raanan et al., 2015). Asthma is a true public health concern because it not only affects the children who have asthma, but also affects their families. Uncontrolled asthma is responsible for school absenteeism, acute medical visits, hospitalizations, and missed work for parents of asthmatic kids (Carpenter, Lachance, Wilkin, & Clark, 2013). Some research has shown that poorly controlled asthma can affect a child's social and mental skills (Al-Anazi et al., 2015). Furthermore, asthma disproportionately affects minorities (Holsey, Collins, & Zahran, 2013). African Americans had a much higher prevalence of asthma in the United States than Caucasians from 2008-2010 (Akinbami et al., 2016). Non-whites also have more uncontrolled asthma symptoms compared to whites (Radhakrishna & Hew, 2014). In addition, children with asthma in urban areas are dying at a higher rate than others (Thakur et al., 2013). Studies show that those living in poverty and who are exposed to cockroaches, dust mites, stress, and violence have greater rates of asthma (UpToDate, 2015). Controlling asthma symptoms is a multi-factorial process that entails minimizing daily/nightly asthma symptoms, activity limitations, and use of immediate symptom relief inhaler (Gandhi et al., 2013). Studies continue to show that uncontrolled asthma symptoms decrease the quality of life (Ghandi et al., 2013). Although national guidelines for diagnosing and treating asthma exist, asthma morbidity and mortality are still prevalent (Friend & Morrison, 2015).

Literature Search Strategy

I reviewed the scholarly literature to gain a better understanding of the prevalence and impact of asthma in children. To gather materials, I used the following electronic databases and websites: Medline, PubMed, Google Scholar, CINAHL, UpToDate, NHBLI, CDC, Academic Search Complete, and Health Science: A SAGE Full-Text Collection. I used various search terms, including: *children with asthma, asthma disparities, asthma management, self-efficacy, quality of life, asthma in the Midwest, health belief model, BRFSS, Asthma Call-back Survey,* and *minorities with asthma*.

Theoretical Framework

The health belief model served as this study's theoretical basis. The theory holds that encouraging healthy behaviors and boosting self-efficacy will decrease perceived barriers while promoting good health conscious actions (Hayden, 2014). Programs and interventions are often developed using a particular theory or model. Theories and models aid in understanding human behavior, and they help researchers identify processes to change behaviors. Various programs and interventions that encouraged healthy behavior changes use the health belief model (HBM; Hayden, 2014).

Health Belief Model

Social psychologist Kurt Lewin created the HBM in the 1950s. Initially, researchers used it to examine health behavior modification, motivation, and/or lack of motivation for screening and preventive disease measures (Riekert, Ockene and Pbert, 2013). In the late 1980s, the addition of self-efficacy, one's belief that they can achieve something, enhanced the HBM. The HBM is now the basis of various health education

programs and interventions pertaining to preventive measures and at-risk actions and behaviors (Hayden, 2014).

Widely used as the foundation of several culturally diverse programs and interventions (Huff, Kline & Peterson, 2015), the HBM holds that three things transpire. First, there is a real health problem. Second, there is a definite perceived threat that can cause serious health issues or death. Finally, there is a great advantage to adhering to the intervention, program, or recommendations, regardless of the cost (Riekart et al., 2013). In this study, the perceived threat is, at a minimum, an asthma attack. A major threat would be death. Health education programs and interventions that target personal factors have been proven effective. Some contributing factors to behavior change include: (a) individual factors of health awareness/education, genetics, personal motivation, and age; (b) social/cultural factors of beliefs and lifestyles; (c) socioeconomic factors including access to healthcare, annual income, and the social stressors of violence and discrimination; (d) political factors involving policies and laws; and (e) environmental factors such as air pollution and natural disasters (Edberg, 2015). Vazini & Barati (2014) explained that knowledge through patient education and plays a key role in behavior change. People can make educated decisions about taking or avoiding risks when they feel in control of their disease or condition. Self-management is the key and is warranted to aid in decreasing asthma exacerbations and keeping symptoms under control (Pearson, Goates, Harrykissoon, & Miller, 2014). The following flow chart represents the HBM.

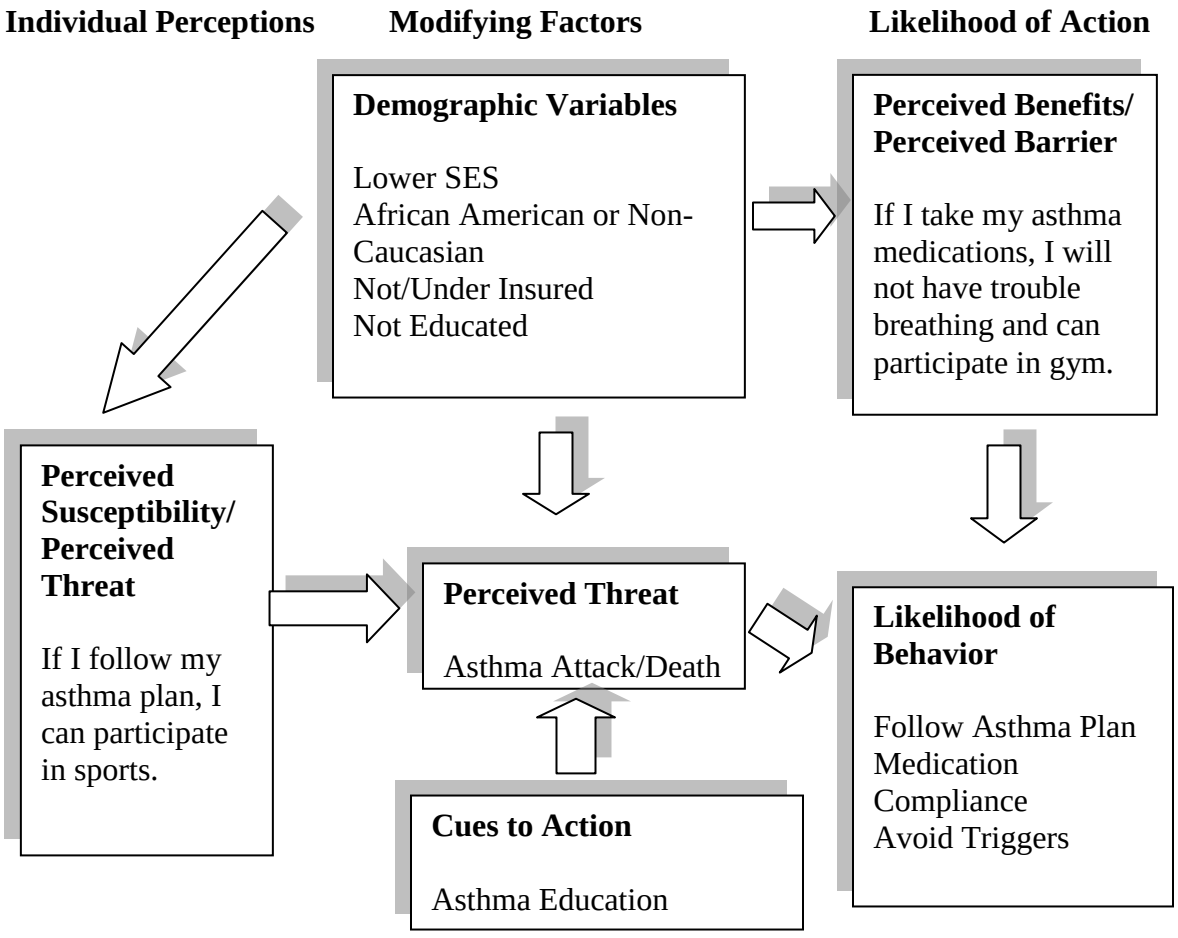

Figure 1. Health belief model.

Literature Review

Asthma Physiology

Asthma is a chronic respiratory disease that causes hyper-responsiveness and sporadic reversible airway obstruction (Akinbami et al., 2015). The people that asthma afflicts may be non-symptomatic for days to months and may have periods of exacerbations or attacks when aggravated by triggers (IDPH, 2015). During exacerbations, bronchospasms in the lungs can cause cough, wheeze, shortness of breath, and chest discomfort (UpToDate, 2015). With education and access to quality healthcare, asthma morbidity and mortality can be minimized (Friend & Morrison, 2015).

The normal process of breathing consists of the inhalation of oxygenated air into the lungs and the exhalation of carbon dioxide (UpToDate, 2015). When air is inhaled through the nose or mouth it travels down the trachea, also known as the windpipe. The trachea is connected to the lungs via large tube-like structures called bronchi. The bronchi branch into smaller tube-like structures known as bronchioles. Bronchioles branch into alveoli, where air is exchanged. During an asthma attack or exacerbation, the bronchi and bronchioles become inflamed causing swelling of the bronchial wall. The muscles of the airway constrict and spasm, causing narrowing of the airway. Mucus is then secreted in the inflamed and constricted bronchioles, making airway exchange and breathing difficult (UpToDate, 2015).

Asthma Diagnosis

The NAEPP Expert Panel Report provided descriptive information about asthma (NHLBI, 2015). Many other diseases such as bronchitis and emphysema have symptoms that mimic those of asthma. Various tests are used to assess lung capacity and to diagnose

asthma. Peak flow measures, which look at how much air is forced out of the lungs, are used at baseline and during exacerbations to assess lung capacity. Although peak flow measures are helpful, these values alone cannot diagnose asthma. Pulmonary function tests (PFTs) are used to examine lung capacity, compliance, and gas exchange. It is a helpful tool used to diagnose asthma. Patients are instructed to take a deep breath in and forcefully exhale out. This forced air that is exhaled is measured and timed (NHLBI, 2015). The methacholine inhalation challenge test determines if someone is asthmatic. It is commonly used because it has little adverse effects and is sensitive for diagnosing asthma (UpToDate, 2015). This five stage procedural test assesses a patient's baseline graphed lung function or spirogram, and their spirogram with various aerosol concentrations of methacholine. If there is a 20% decrease in the forced expiratory volume in one second (FEV_1), then there is bronchial hyper-reactivity and thus a positive test. This decrease in FEV_1 shows an obstructive disease. Improvement in this obstructive pattern showing an increase in FEV1 greater than 12% after the use of a short-acting bronchodilator is classic in asthmatics. A person is diagnosed with asthma when an inhaled bronchodilator is given and airway obstruction is reversed (UpToDate, 2015).

Asthma Triggers

There are many exposures that exacerbate asthma symptoms, from those found in the environment (Banda et al, 2013) to socioeconomic factors (Gupta et al., 2013). Studies have shown that minorities who reside in low-income communities are disproportionately exposed to environmental health hazards (Gray & Johnson, 2015). Urban children from low income households are commonly exposed to various outdoor and indoor pollutants that aggravate asthma symptoms (Caroll, 2013). Trees, grass, and

ragweed are well-known asthma and allergy triggers (UpToDate, 2015). In addition, there is a link between air pollution produced by traffic and children with asthma (MacIntyre et al., 2014). Lower socioeconomic factors like rodents, cockroaches, and stress provoke asthma symptoms (Gray, Johnson, Boone, & Schoenfish-Keita, 2013). There is a strong relationship between poverty and asthma morbidity (Turyk et al, 2013). According to Turyk et al. (2013), those of lower social economic status and minorities have differences in health education, access to proper healthcare, and triggers (tobacco smoke, water leaks, and poor housing conditions).

Asthma Disparities

In spite of national asthma guidelines, asthma morbidity and prevalence in minority children is startling (Gupta et al., 2013). African American children have a higher asthma prevalence rate than those of any other race in the United States (Gupta et al., 2013). Asthmatic children of lower socioeconomic status who live in underserved communities have higher emergency room visits and hospitalization rates (Gong et al., 2014). According to Cohen and Celedon (2016), African American children seek treatment for uncontrolled asthma in the emergency room 2.6 times greater than white children (2016). Furthermore, African American children are dying from asthma at a rate 4.1 times higher than white children (2016).

Various researchers have tried to uncover the cause of asthma disparities (Gong et al., 2014). Asthma disparities are a result of both amendable and non-amendable risk factors (Cohen & Celedon, 2016). Studies continue to show that minorities with asthma have a greater chance of dying from uncontrolled asthma than individuals of other races (Bhan, Kawachi, Glymour, & Subramania, 2015). Access to routine healthcare and

variations in income and living conditions amongst diverse ethnicities impact asthma control and contribute to disparities. Environmental conditions, like rodents, roaches, and air pollution trigger asthma symptoms (Bhan et al., 2015).

The "asthma epidemic" has become a global challenge (Akinbami, Simon, & Rossen, 2016). It is crucial caregivers understand asthma to provide organized asthma care (Bacharier & Szefler, 2017). Avoidance of triggers, recognition of symptoms, and proper management techniques will help improve asthma outcomes (Bacharier & Szefler, 2017). NAEPP's asthma guidelines were issued by the National Institutes of Health (NIH) to properly diagnose, educate, and manage asthma, but not all providers are adhering to them (Ghandi et al., 2013). The chief objective in asthma management is to eliminate asthma symptoms (Brand et al., 2015); yet, racial and ethnic inequalities in asthma outcomes remain (Bhan et al., 2015). The disparities amongst races and ethnicities in children with asthma remain a public health challenge (Oraka, Iqbal, Flanders, Brinker, & Garbe, 2013).

Asthma Guidelines

NAEPP. Pediatric asthma awareness is increasing (Luciano et al., 2014). Asthma is widespread and there are recommendations to diagnose and manage it (Bush & Fleming, 2015). The NAEPP was put together in the early 1990s by the NHLBI (2015), and is composed of recommendations updated in 1997, 2002, and 2007, which are considered the "gold standard" of asthma management. The evidence-based guidelines were devised, overall, to control asthma symptoms and ultimately decrease morbidity and mortality. They provide a universal avenue for healthcare providers to diagnose and treat asthma symptoms (Gandhi et al., 2013).

The asthma guidelines provide a step by step method of handling those with asthma. The guidelines incorporate patient education, diagnostic tools, and management plans (Bush & Fleming, 2015). The main objective is to use evidence-based medicine to outline a common standard of asthma care, including diagnosis, classification, and control of asthma. Moreover, the guidelines deal with avoidance of asthma triggers, approaches to patient education for tighter asthma control, and techniques to monitor asthma symptoms. When these guidelines are adhered to, research has shown that asthma symptoms are controlled (NHLBI, 2015).

Classifications

According to the NAEPP, in order to start the appropriate treatment, proper classification of asthma diagnosis is vital (NHLBI, 2015). Symptom severity is assessed before categorizing an asthmatic based on their symptoms into the intermittent, mild, moderate, or persistent category (see Figure 2). A child is classified as having intermittent asthma if symptoms occur less than or equal to two days a week, wakes them less than two nights a month, and the symptoms do not hinder routine activities. The next category, persistent asthma, is for those who may experience two or more asthma attacks that necessitate oral steroids or for those who have more than four wheezing episodes each month that last more than one day. The persistent classification is broken down into mild, moderate, and severe and is based on symptom severity. Children with symptoms transpiring between two and six days a week, waking one to four nights a month, and only slightly hampering daily activities, are considered to have mild persistent asthma. Children with symptoms occurring daily, waking three to six nights a month, and limiting daily activities most of the time are classified as having moderate persistent asthma.

Children whose symptoms are ongoing throughout the day and night and greatly impact routine daily activities are categorized as having severe persistent asthma (NHLBI, 2015).

Components of Severity		Classifying Asthma Severity and Initiating Therapy in Children							
		Intermittent		Persistent: Mild		Persistent: Moderate		Persistent: Severe	
		Ages 0-4	Ages 5-11	Ages 0-4	Ages 5-11	Ages 0-4	Ages 5-11	Ages 0-4	Ages 5-11
	Symptoms	≤ 2 days/week		>2 days/week but not daily		Daily		Throughout the day	
Impairment	Nighttime awakenings	0	≤ 2x/month	1-2x/ month	3-4x/month	3-4x/ month	>1x/week but not nightly	>1x/week	Often 7x/week
	Short-acting β-agonist use for symptom control	≤ 2 days/week		>2 days/week but not daily		Daily		Several times per day	
	Interference with normal activity	None		Minor limitation		Some limitation		Extremely limited	
	Lung function • FEV_1 (predicted) or peak flow personal best • FEV_1/FVC	N/A	Normal FEV_1 between exacerbations >80% >85%	N/A	>80% >80%	N/A	60-80% 75-80%	N/A	<60% <75%
Risk	Exacerbations requiring oral systemic corticosteroids (consider severity and interval since last exacerbation)	0-1x/year		≥2 exacerbations in 6 months requiring oral systemic corticosteroids, or ≥4 wheezing episodes/1 year lasting >1 day AND risk factors for persistent asthma	≥ 2x/year Relative annual risk may be related to FEV_1				

Figure 2. Classification of asthma severity in children. Adapted from "Guidelines for Diagnosis and Management of Asthma" by NHLBI, 2016. Retrieved from http://www.nhlbi.nih.gov/guidelines/asthma/. Reprinted with permission.

Pharmacotherapy

After a person's asthma is classified, proper medications are chosen to best control their asthma symptoms. The main objective of pharmacotherapy is to minimize asthma attacks by keeping symptoms in check. A "stepwise" approach is utilized to capture the best medication regimen to treat the symptoms (See Figure 3). All medications have side effects. The recommendations express the importance of continuous monitoring of asthmatics once placed on medications. This is to reassess their symptoms and note any adverse effects from medication that they may experience. Inhaled corticosteroids have proven to be beneficial in controlling asthma symptoms

long-term. They correct airway obstruction, decrease asthma symptoms, avert exacerbations, and help alleviate symptoms from interfering with routine activities.

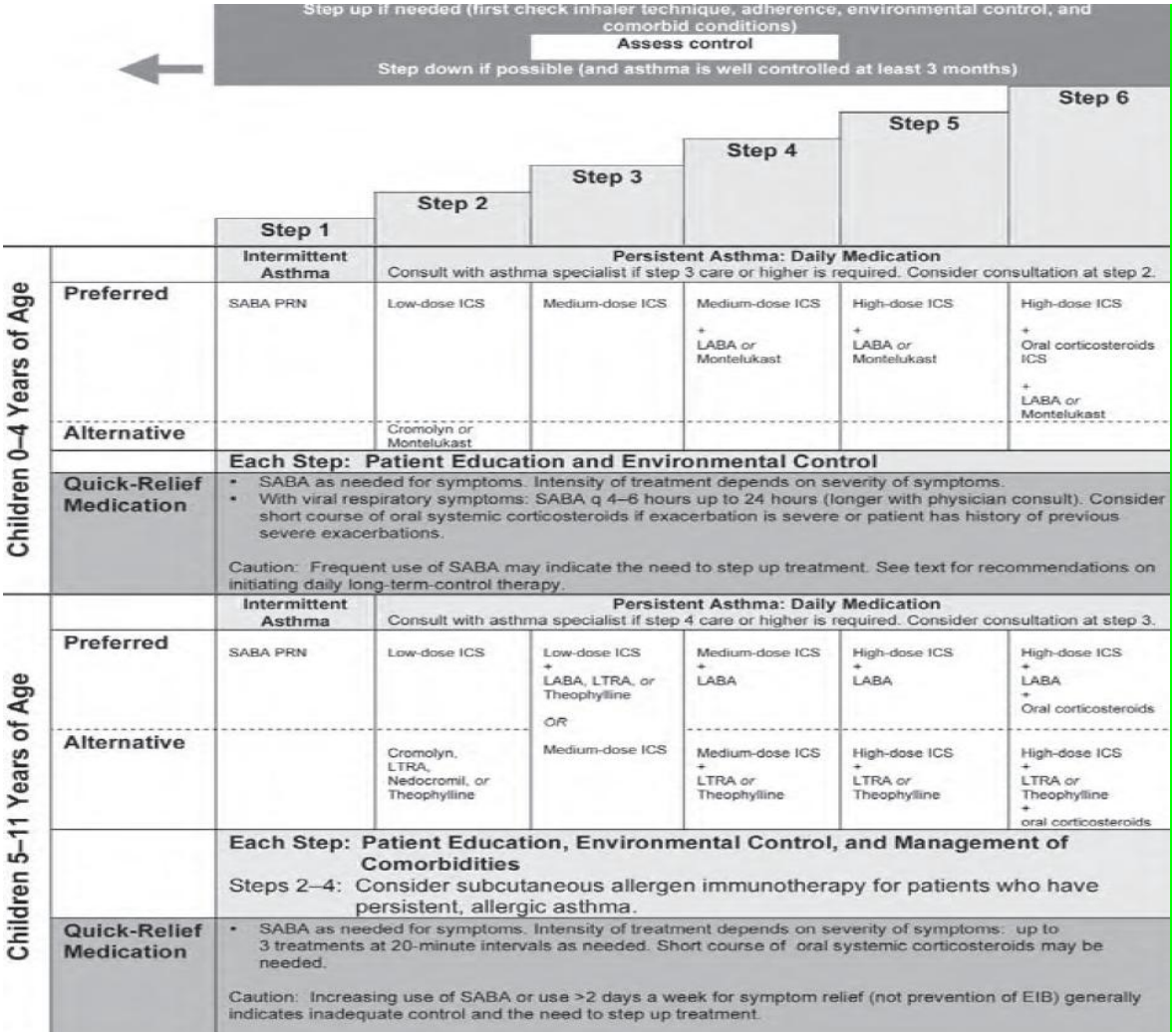

Figure 3. A "Stepwise" Approach to Treating Asthma Symptoms. Adapted from "Guidelines for Diagnosis and Management of Asthma" by NHLBI, 2016. Retrieved from http://www.nhlbi.nih.gov/guidelines/asthma/. Reprinted with permission

However, the addition of steroids in children is cautioned because of potential adverse effects. Long term steroid use has been linked with oral fungal infections, increased thirst, sore throat, stunting of growth, skin changes, and osteopenia (NHLBI, 2015). The guidelines created by the NAEPP aid in universal asthma care from diagnosis to management. It helps providers properly assess asthma symptoms and properly classify and treat asthma patients (Sheares et al., 2015). The guidelines recommend referral to allergy and asthma specialists when the patient has: uncontrolled asthma symptoms despite asthma therapy for 6 months, near death experience secondary to an asthma attack, co-morbidities like acid reflux, and oral steroid use more than twice a year (NHLBI, 2015). Regardless of the evidence-based national asthma guidelines, healthcare providers are not adhering to the recommendations (Friend & Morrison, 2015). Asthma symptoms are preventable; yet, it continues to decrease the quality of life and fatally impact those it afflicts (Awan & Munir, 2015).

Barriers to Asthma Control

Some barriers to asthma control are at the healthcare level. According to Coutinho and Koinis-Mitchell (2013), providers fail to spend the time it takes to educate and thoroughly care for patients with asthma. Providers may lack developing a rapport with the child and their caregiver. In addition, poor communication with their patients and parents due to language barriers or decreased literacy impedes controlling asthma symptoms (Coutinho & Koinis-Mitchell, 2013). Furthermore, healthcare providers may want to write for generic prescriptions or recommend pharmaceutical program assistance for patients who cannot afford their medications instead of prescribing brand medications which are more expensive (Coutinho & Koinis-Mitchell, 2013).

Cohen and Celdon (2016) found that being unemployed, uninsured and underinsured were barriers to asthma control. Those without healthcare coverage do not receive preventive care; and, those who are unemployed or employed but receive a low paying salary, lack funds to pay for office visits (Cohen & Celdon, 2016). Caregivers may not arrange for routine pediatrician appointments for their child because they do not have the co-payment for the visit or funds for a prescription (Coutinho & Koinis-Mitchell, 2013). Lack of transportation or fear of taking time off of work could lead caregivers away from preventative healthcare and routine doctor visits (Coutinho & Koinis-Mitchell, 2013). Psychosocial stressors also impede asthma control (Cohen & Celdon, 2016). Fear of being a victim of crime prevents the use of public transportation or traveling through certain neighborhoods thereby obstructing asthmatics to see their physician regularly or attend asthma education sessions (Cohen & Celdon, 2016). Additionally, Coutinho and Koinis-Mitchell, (2013) explained that caregivers' and parents' beliefs about home remedies, prescription medications and their side effects could pose as barriers to asthma control. A major contributor to poor asthma control is lack of health literacy and being illiterate (Apter et al., 2013). Caregivers or parents who lack an education may be unable to read and understand what is presented by healthcare providers. This causes lack of allegiance to the overall asthma management plan (Apter et al., 2013). Health literacy, one's ability to understand essential information regarding a health condition, is vital to chronic disease self-management (Federman et al., 2014).

Asthma Effects on Healthcare Costs

The direct and indirect costs of asthma are expensive (Nguyen, Nadkarni, Sankari, Mital, Lye, & Tan, 2017). Direct costs are funds that are utilized on managing asthma;

while, indirect costs are related to lost funds secondary to the disease, like missing work or school (Pearson et al., 2014). The annual expense for asthma is approximately $56 billion (Gray & Johnson, 2015). The CDC estimates that of the $56 billion, $50.1 billion is due to medical expenses, $3.8 billion is a result of lack of productivity and $2.1 billion as a result of death (CDC, 2013). In the United States, annually, asthma costs about $3500 per person diagnosed with asthma. This is a 6% increase in cost from 2002 (AAAAI, 2015). There are an estimated 14 million days of school missed by children with asthma annually, yielding less pay for parents due to missed work (Pawankar, 2014). Asthma expenditure is large and policies decreasing its' burden are essential (Bhan et al., 2015).

Self-Efficacy

The models and theories that were previously discussed in Chapter 1 are based on self-efficacy. Hsieh and Tsai (2013) explain self-efficacy as the way people view their potential to reach a certain goal with the skill set they have. It is the view of self assurance when it comes to motivation, actions, and environment. In other words, if a person truly considers themselves to have good skill set, then they believe that the desirable outcome is attainable. If they do not feel confident in their own skills, they perceive the goal as unachievable (Callander & Schofield, 2016).

If people feel positive that they can successfully reach their goal, then it is essential that they have confidence that they can (Hsieh & Tsai, 2013). Self-efficacy is greatly boosted by experience from past dealings with recognizing asthma exacerbations and action plans (Ingram et al., 2013). Asthmatics fail to control their asthma symptoms because of lack of self-efficacy (Callander & Schofield, 2016).

Asthma is a disease that requires self-management and self-efficacy to decrease symptoms (CDC, 2013). It encourages behaviors necessary to attain a certain goal (Hsieh & Tsai, 2013). Self-efficacy and self-management develop with experience as children with asthma and their caregivers make daily choices that affect their condition (Brown, Gallagher, & Fowler, 2013). A longitudinal study that examined adults with asthma showed that those who dropped into income poverty had low self-efficacy thereby having poorly controlled asthma. Specialized asthma education is crucial for this population to management asthma symptoms (Callander & Schofield, 2016). Self-management education yields a proficient self-manager and thus improves asthma outcomes (Brown et al., 2013). Self-efficacy empowers those to have some control of their disease through various behaviors (Hsieh & Tsai, 2013).

Patient Education

Patient education is a key component of self-efficacy and self-management. By providing important information about a disease, individuals can be active and alter their behavior accordingly (Awan & Munir, 2015). Managing asthma is multifaceted involving actions and skills that focuses preventing symptoms and dealing with exacerbations (Yu, Tsai, Huang, & Liu, 2013). The National Asthma Education and Prevention Program Expert Panel encourage healthcare providers to incorporate self-management techniques into normal visits of patients with asthma (Gandhi et al., 2013). Increasing asthma knowledge, like how to identify identifying triggers, medication compliance and following asthma action plans, build the confidence of asthma patients and increases the quality of life (Callander & Schofield, 2016). Furthermore, the National Health, Lung, and Blood Institute (NHLBI) expresses the importance of an on-going team work

between the families of children with asthma and their healthcare provider to achieve the most favorable asthma outcomes (Coutinho & Koinis-Mitchell, 2013).

Patient education, when treating chronic diseases like asthma, is crucial to controlling symptoms. By learning about trigger avoidance and proper medication use, asthmatic children and their parents are empowered to manage this chronic airway disease rather than being frightened of the disease and its potential to cause serious illness (Al-Anazi et al., 2015). Parents and caregivers are liable for the asthma management of school age children. But, as the child gets older and reaches a higher psychomotor and cognitive level, parents and caregivers should promote self-management to build the child's confidence in managing their asthma (Ekim & Ocakci, 2013). Teenagers are characterized by a distinctive phase heading into independence and adulthood which predominantly influences the management of their asthma. This transitional stage of managing their own asthma has been challenging (Gupta et al., 2013). Only 20% of adolescents in Black and Latino communities exhibited favorable compliance with asthma medications in Chicago (Gupta et al., 2013).

Asthma education is essential for individuals if they are to have a high sense of self-efficacy (Callander & Schofield, 2016) and confidence in self management, which should both be on-going throughout the course of the disease (Ekim & Ocakci, 2013). Asthma knowledge aids in understanding the physiology of the disease, avoidance of triggers, and proper use of medications. Furthermore, it decreases care for acute asthma attacks and increases the quality of life. Effective asthma education must be geared toward that specific individual, taking into account culture, age, and literacy (Callander & Schofield, 2016). Gandhi et al. (2013) divulged that asthmatic children and their parents

who have had good asthma education by their provider tend to have greater self efficacy and better asthma outcomes, including improved quality of life. Ekim and Ocakci (2013) state that self efficacy builds self confidence in children with asthma allowing them to effectively management their symptoms. Asthma education is essential for patient self-management and needed to achieve the greatest quality of life of those with asthma (Awan & Munir, 2015).

Educational Interventions for Asthma Control

There is an urgent need to gain control of asthma management (Carpenter, Lachance, Wilkin, & Clark, 2013). Education interventional programs that promote self-management prove beneficial in decreasing morbidity and mortality (Pawankar, 2014). A year long, home-based intervention performed in Chicago on children with asthma was effective at decreasing asthma symptoms. Furthermore, this intervention also reduced the occurrence of asthma triggers and enhanced asthma management amongst its participants (Turyk et al., 2013). School-based asthma intervention programs are advantageous. The Childhood Asthma Linkages in Missouri (CALM) school-based interventional program incorporated asthma education, training and sharing of asthma action plans with school nurses (Carpenter et al., 2013). After 1 year, those who took part showed marked improvement in asthma management. There was a decrease in asthma symptoms during the day from 5.8 to 2.7 days; and, there was a lowering of nighttime awakenings from asthma symptoms from 3.0 nights to 1.2 nights. In addition, urgent care use and missed days of school were also reduced (Carpenter et al., 2013).

Summary

Approximately 300 million people suffer from asthma worldwide (Pawankar, 2014). Although asthma is a chronic disease affecting the airways (Walker, 2013), it is controllable (CDC, 2015). Once symptoms are managed, the quality of life is improved (IDPH, 2015). The National Asthma Education and Prevention Program (NAEPP) have guidelines to diagnose and treat asthma, but studies show that healthcare providers are not adhering to these guidelines. While only 34.2% of those diagnosed with asthma admit to getting an asthma action plan, 49.3% state that they are not given information on asthma triggers (Friend & Morrison, 2015). Children with public insurance have less access to specialty care because providers are not accepting patients who do not have commercial insurance (Coutinho & Koinis-Mitchell, 2013). Policies and laws that promote providers accepting all patients would open up the doors to specialty care to children with asthma on public insurance (Rhodes et al., 2013). Adhering to an asthma plan and managing asthma symptoms demands major dedication from both parent and child (Ekim & Ocakci, 2013). The asthma guidelines developed by the NAEPP are evidence-based recommendations for standardized asthma care based on asthma symptoms. If the recommendations are followed by all healthcare providers, universal asthma care can help decrease the asthma symptoms regardless of race, ethnicity, and socioeconomic status (Vliet et al., 2015). Various asthma management strategies and guidelines have been created, yet the goal to decrease asthma symptoms has not been met (Gandi et al., 2013). Only a small amount of studies examine pediatric asthma in the Midwest. This study will enhance current asthma literature by bringing to light factors that affect pediatric asthma control status.

The methodology of the proposed study to examine asthma in children living in the Midwest by use of secondary data from the 2009 Behavior Risk Factor Surveillance System's (BRFSS) Asthma Call-back Survey (ACBS) will be discussed in Chapter 3. The results and implications of the study will be discussed in Chapters 4 and 5 respectively.

Chapter 3: Research Design and Methodology

Introduction

Although there are long-established national guidelines on asthma management, controlling asthma symptoms continues to be a major dilemma in the United States, especially amongst children of lower socioeconomic status (Kangovi et at., 2013). According to the Asthma and Allergy Foundation, Chicago, Illinois ranks in the top 10 cities in the United States and ranks 2nd regionally for elevated prevalence of uncontrolled asthma (2015). Asthma affects approximately 150,000 children in Chicago, with its most significant impact on African Americans (Hedge et al., 2017). Uncontrolled asthma symptoms, like wheezing and chest tightness, impinge on the quality of life of those it affects (Gandhi et al., 2013). The NHLBI (2016) has defined asthma control as (a) reducing and preventing asthma symptoms; (b) minimizing and eliminating the need for visiting an emergency department, urgent care facility, or hospital; (c) reducing the need to use a rescue inhaler; and (d) expanding proper asthma education and knowledge. This chapter includes an overall synopsis of this study's methodology. The chapter will outline the study's purpose and rationale. In addition, I describe the research design, setting, sample, instrumentation, data analysis, and participants' rights.

The purpose of this quantitative study was to examine asthma control in children residing in the Midwest. Uncontrolled asthma symptoms have a great impact on the quality of life. My goal was also to identify any differences in asthma education and asthma control amongst African American and children of other races while considering age groups (ages 0-9, and 10 and over) and socioeconomic status. The BRFSS and ACBS were used nationally to assess asthma control by analyzing asthma symptoms, education,

management, and healthcare utilization of children and adults by state. I used secondary data from the 2009 BRFSS ACBS to examine asthma control and how asthma affects the quality of life of children in the Midwest. I assessed the asthma data in respect to race, age, insurance coverage type, socioeconomic status, asthma symptoms, asthma education, and healthcare utilization. In this chapter, I discuss the research design, rationale, and variables. In addition, I offer a thorough explanation of the methodology and describe the target population, data set, and sampling strategy. Furthermore, I explain instrumentation validity/reliability, data analysis, and ethical considerations.

The following research questions and hypotheses were explored:

1. What is the relationship between asthma control in African American children in the Midwest when compared with other races?

   $H_0$1: There is no relationship between asthma control in African American children in the Midwest when compared with other races.

   $H_1$1: There is a relationship between asthma control in African American children in the Midwest when compared with other races/ethnicities.

2. Are there any associations between physician provided asthma education and asthma control?

   H_{02}: There is no association between physician provided asthma education and asthma control..

   H_1: There is an association between physician provided asthma education and asthma control.

3. What is the relationship between healthcare utilization and asthma control?

$H_0$3: There is no relationship between healthcare utilization and asthma control.

$H_1$3: There is a relationship between healthcare utilization and asthma control.

Research Design, Rationale, and Approach

A quantitative, cross-sectional research design was appropriate for this study to assess and identify any associations in children with asthma in the Midwest by using the 2009 BRFSS and Child ACBS dataset. According to Mann (2017), researchers use cross-sectional studies to examine information at one point in time and infer causations. While qualitative research aids in expanding theories, the sample size is usually small and doesn't allow the researcher to infer causations (Mann, 2017). In this study, I used secondary data, which was beneficial because it was easily assessable, not costly, and gathered over an extensive time (Institute for Work Health [IWH], 2016).

Study Variables

Dependent variable. Asthma control was the dependent variable. I assessed asthma control using 2009 ACBS questionnaire data gathered from two questions in Section 4: Asthma Symptoms, one question from Section 5: Healthcare Utilization, and one question from Section 10: School Related Asthma. The questions were as follows:

- 4.1: During the past 30 days, on how many days did CHILD have any symptoms of asthma?
- 4.5: During the past 12 months' has CHILD had an episode of asthma or asthma attack?

- 5.6: During the past 12 months, would you say CHILD limited his/her usual activities due to asthma not at all, a little, a moderate amount, or a lot?
- 10.5: During the past 12 months, about how many days of school did he/she miss because of his/her asthma (2016)?

Independent variables. The independent variables in this study were gender, age, parental/guardian's marital status, parental/guardian's education level, parental/guardian's employment status, number of children in household with participant, and insurance type. Gender and age were examined via data from 2009 BRFSS questions listed in Module 25.

- 25.1: What is the birth month and year of the child?
- 25.2: Is the child a boy or a girl?

Parental, guardian, and household demographics were assessed by examining data that corresponded with the following questions from the 2009 BRFSS Questionnaire in *Section 12 Demographics*:

- 12.6: Are you ….Married/Divorce/Widowed/Separated/Never Married or Member

  of Unmarried Couple?
- 12.7: How many children under age 18 live in your household?
- 12.8: What is the highest grade or year of school that you completed?
- 12.10: Is your annual household income from all sources…Less than $25,000/Less

  than $20,000/Less than $15,000 or Less than $10,000.

Health insurance coverage was assessed by examining questions in *Section 5 Healthcare Utilization* of the 2009 ACBS Questionnaire:

- 5.1: Does CHILD have any kind of healthcare coverage, including health insurance, prepaid plans such as HMOs, or government plans such as Medicare or Medicaid?
- 5.2: What kind of healthcare coverage does (he/she) have? (i.e. parent's employer, Medicaid/Medicare, CHIP, other).

Confounding variables and covariates. Race, asthma education, and healthcare utilization were confounding variables. I examined all of these using data from the ACBS questionnaire.

I examined race using data from a Question 25.5: Which one of these groups would you say best represents the child's race?

For health education data, I used responses to the following questions in Section 6: Knowledge of Asthma/Management Plan:

- 6.1: Has a doctor or other healthcare professional ever taught you or CHILD how to recognize early signs or symptoms of an asthma episode?
- 6.2: Has a doctor or other healthcare professional ever taught you or CHILD how what to do during an asthma episode or attack?
- 6.4: Has a doctor or other healthcare professional ever given you or CHILD an asthma action plan?

Health insurance coverage was assessed by examining questions in *Section 5 Healthcare Utilization* of the 2009 Illinois ACBS Questionnaire, access to healthcare will

be assessed by examining questions from *Section 5 Healthcare Utilization* of the 2009 ACBS Questionnaire:

- 5.7: During the past 12 months how many times did he/she see a doctor or other healthcare professional for a routine checkup for his/her asthma?
- 5.9: During the past 12 months, how many times did he/she visit an emergency department or urgent care center because of his/her asthma?

The Asthma Call-back Survey

The BRFSS was started by the CDC in 1984 with the objective of examining health-associated risk behaviors, chronic diseases, and utilization of preventive services among adults ages 18 and older in 15 states. Currently, all 50 U.S. states participate in the BRFSS. The BRFSS questionnaire is created by an assembly of BRFSS state coordinators and CDC staff and is then approved by all state coordinators. It is the largest on-going health survey system in the world. The BRFSS is an influential instrument for steering and initiating health promotion and prevention policies and programs. The survey is composed of a standardized questionnaire, optional modules, and some state-added questions. In 2005, the ACBS was initiated in three states as a trial study. The ACBS is a detailed asthma survey constructed and funded by the Air Pollution and Respiratory Health Branch in the National Center for Environmental Health. The ACBS is conducted 2 weeks after the BRFSS survey to those who confirm an asthma diagnosis. After the 2005 pilot, it has been utilized yearly in both adult and children with asthma in those states that chose to participate (CDC, 2015).

Sample and Setting

Chicago, Illinois sits at the top of the list of cities with uncontrolled asthma, with "worse than average" for emergency department visits for asthma (AAFA, 2015). In addition, other Midwestern cities like Detroit, Michigan, Cleveland, Ohio, Indianapolis, Indiana, St. Louis, Missouri, and Milwaukee, Wisconsin were in the top 26% of the 100 most populated cities studied to have a greater prevalence to have uncontrolled asthma symptoms (AAFA, 2015). I examined data from these Midwestern states of the 2009 BRFSS and ACBS to answer this study's research questions and hypothesis. Inclusion criteria for this study was those children who answered "Yes" to Question 1 of Module 26 of the 2009 BRFSS, "Has a doctor, nurse or other health professional ever told you that the child has asthma?"

Original Data Collection and Analysis Procedures

The BRFSS survey was performed by each state's department of public health via random digit dialing continuously throughout the year of 2009. A standardized questionnaire script was used to collect data from participants. Participants were given a variety of answers to choose from. The modules at the end of the BRFSS included questions on children in the household and asthma prevalence of these children. In Module 25, questions regarding the child's sex, race, and ethnicity were asked. The first question was used to obtain the sex of the child: "Is the child a boy or a girl?" Other questions within this module were used to obtain "the race of the child" and how the participant was "related to the child." Furthermore, in Module 26, participants were asked if "the child still has asthma."

Two weeks after participating in the BRFSS, those respondents who reported having been diagnosed with asthma were eligible for the ACBS. States randomly selected children between the ages of 0 and 17. If they had been diagnosed with asthma, the child was eligible for the ACBS. Only the parent or child could participate in the ACBS, even if both had a diagnosis of asthma. I analyzed the data from the 2009 Child ACBS.

Informed consent was obtained by the interviewer prior to the start of the survey. Each child or guardian in this study was asked the exact same questions from an approved standardized yearly ACBS. In this study, I assessed how asthma affects the quality of life of asthmatic children residing in midwestern states by examining data gathered from responses to questions on the 2009 Child ACBS, specifically those dealing with asthma symptoms, asthma education, healthcare coverage, and healthcare utilization.

Instrumentation and Validity

The BRFSS and ACBS was part of major, ongoing nationwide research by the CDC and state health departments. All 50 states, along with the United States territories and District of Columbia, participated. The BRFSS and ACBS provided self-reported data on chronic illness and health related higher risk behaviors. Furthermore, it examined preventive measures and some disease-specific education. It has been deemed valid and trustworthy. When the BRFSS started in 1984, it utilized a stratified sampling method to weight data. In 2006, the CDC piloted a more complex method of weighing data called iterative proportional fitting or raking. Raking was different from post-stratification in that it makes correction for each individual variable until the sample weights signify the population. It permitted use of vast demographic variables like marital status and

education level while decreasing the incidence of bias and allowing for representativeness of estimates (CDC, 2016).

Participant's Rights

Ethical consideration of each participant was taken very seriously. The identity of each participant and their responses were confidential. Each participant gave informed consent prior to the start of the survey. The data obtained from the original study, ACBS, was made available to the public without listing identifying factors of the participants. In my study, I have presented data without any identifying factors of the participants.

Data Analysis Plan

The BRFSS and ACBS are part of a collaborative effort between the CDC and state health departments. For this study, datasets listed online at https://www.cdc.gov for all the Midwest states for the 2009 BRFSS and Child ACBS were examined to address this study's research questions and hypotheses.

SPSS Statistics 23 was used in this study to analyze the 2009 BRFSS and Child ACBS datasets to address all research questions and hypotheses. Results of descriptive statistics are shown in a table to display characteristics of the variables used in the study. Chi-square analysis to assess the significance of association was performed between the variables and asthma control. Furthermore, Cramer's V was evaluated to assess the strength of these associations. I performed a series of bivariate and logistic regression analysis to assess individual associations and predictors of asthma control. Statistical tests are at an alpha level of significance of 0.05. The odds ratio, confidence interval (95%) and p-values are listed in corresponding analysis tables. P-values ≤ 0.05 are considered statistically significant. I took into consideration the chance of bias as the broad age range

could be an effect modifier and influence the overall results (Roditi, Veliny & Shin, 2015). Therefore, ages were examined in two ranges when associations were assessed.

Summary

In Chapter 3, I presented a synopsis of the research design and rationale. The methodology of this study was discussed in detail. The data set and instrumentation used to obtain the study sample were identified. Furthermore, the operationalization approach, data analysis plan, threats to validity and ethical considerations were discussed. The results of this study will be discussed in Chapter 4.

Chapter 4: Results

Introduction

Many children have uncontrolled asthma impeding their quality of life (Holley et al., 2017). A majority of Midwestern cities like Chicago, Detroit, and St. Louis exhibit especially high rates of pediatric uncontrolled asthma (AAFA, 2015). When uncontrolled, asthma symptoms cause children to miss school, skip out on physical activities, and wake up at night, thus significantly impacting their quality of life (Gandhi et al., 2013). Given the high prevalence of asthma worldwide, the purpose of this quantitative study was to examine asthma control in children residing in the Midwest. In this chapter, I present the results of the analyses described in the previous chapter. The characteristics of the participant sample are described in terms of the data used in each research question. Following the presentation of each research question's descriptive information, I present the results of the main analyses to answer each aspect of the guiding research questions.

Data Collection

Approval from Walden University's Institutional Review Board (IRB) was obtained prior to collecting and analyzing data (01-12-17-0121833). Data were drawn from the 2009 BRFSS and ACBS to access the variables pertaining to asthma-related quality of life and education, insurance coverage and type, and race. The initial data set contained data from the entire United States. The first procedure in data cleaning consisted of removal of all participants who did not live in the Midwest, which reduced the sample to a total of 717. Of these 717, 100% responded "Yes" to Question 1 of Module 26, which asked, "Has a doctor, nurse, or other health professional ever told you that the child has asthma?" Because all 717 respondents met this inclusion criterion, no additional data had

to be removed and these respondents composed the final sample. Weights were applied to final sample, as assigned by the BRFSS, to allow for further generalization and resulted in an effective sample size of 477,221. Although weights were applied to the final sample, not all of the weighted sample could be used in the analysis because some participants did not provide each response necessary for every analysis. Once the final data set was identified, I had to transform several variable based on responses. For example, the BRFSS question on race indicated that respondents were mostly African American or White, with only a few categorized into a third category of "other." For use in the following analyses, this "other" group was not large enough to allow accurate analysis, and this group had to be merged into one of the other race groups. The resulting variable consisted of one group of African American children and one group of children in the "other" category. Similarly, any other variables with several categories that were either underrepresented or did not lend to interpretable results were condensed, as shown in Table 1. Finally, a dependent variable for asthma control had to be constructed. To be placed in the *controlled asthma* group, a participant could not report any instance of asthma episodes, days with symptoms, or days with limited activity due to symptoms during the period under question. If none of these were reported, I placed participants into the *controlled asthma* group, while those who reported one or more of any of these were likewise placed in the *non-controlled asthma* group.

Results

Description of the Sample

Demographic and descriptive information about participants are shown in Table 1. This table shows the frequency distribution and percentage of participants for each variable. Of the 477,211 participants, male children composed just over one half (56.4%) of the sample size. Male children exhibited the greatest control of asthma symptoms (61.9%) when compared to female children (43.6%). 55,623 (13.3%) of the participants were African American of which 31,439 (56.5%) had uncontrolled asthma. Children age 10 and older (56.4%) had the best control of their asthma symptoms. The greatest proportion of children with controlled asthma symptoms had parents who were married (81%), employed (68%), income greater than $50,000 (73%), and employer health insurance (79%). In addition, within the last year, the children with controlled asthma symptoms had routine check-ups (52%), were taught to recognize asthma symptoms (73%), taught what to do during an asthma attack (73%), and given an asthma action plan (34%). Furthermore, children with controlled asthma symptoms only visited the emergency department a small amount (3%) of times for their asthma symptoms when compared to those with uncontrolled asthma symptoms (27%).

Chi-square analysis results are displayed in Table 1. Each variable was considered statistically significant as their p value was ≤ 0.001, thereby showing a relationship with asthma control. Based on Cramer's V, education showed the weakest association (0.008) to having controlled asthma, while having one or more routine check-ups ha the strongest association (0.337) to having controlled asthma symptoms.

Table 1

Descriptive Statistics for Weighted Sample Based on Asthma Control

	Not controlled		Controlled			
Variable	*n*	%	*n*	%	X^2	*P*
Gender					13,961.14	<0.001
Male	89,564	38.1	145,746	61.9		
Female	102,776	56.4	79,306	43.6		
Age (year)					4,663.74	<0.001
0 – 9	91,684	63.9	84,532	36.1		
10 - 17	104,067	43.6	122,415	56.4		
Marital status					574.71	<0.001
Married	149,986	44.9	184,080	55.1		
Other	42,449	49.5	43,361	50.5		
Education					25.33	<0.001
High school or below	50,577	46.4	58,455	53.6		
Some college	140,942	45.5	227,247	54.5		
Income					4,892.09	<0.001
< $25,000	22,772	39.1	35,496	60.9		
$25,000-50,000	30,376	59.8	20,412	40.2		
>$50,000	132,065	46.2	154,040	53.8		
Employment					590.12	<0.001
Employed	123,452	44.6	153,441	55.4		
Other	67,940	48.6	71,982	51.4		
Children					884.23	<0.001
One child	66,923	42.9	89,222	57.1		
Two or more children	125,511	47.6	138,220	52.4		
Insurance type					1,771.96	<0.001
Parents employer	130,921	44.3	164,297	55.7		
Other	47,794	52.3	43,640	47.7		
Race					3,046.25	<0.001
African American	31,439	56.5	24,184	43.5		
Other	159,395	44.0	202,854	56.0		
Taught to recognize symptoms					25,238.51	<0.001
Yes	177,770	51.8	165,651	48.2		
No	14,122	19.4	58,559	80.6		

(table continues)

Variable	Not Con n					
Taught what to do during attack					27,770.945	<0.001
Yes	178,957	52.3	163,488	47.7		
No	13,477	18.4	59,698	81.6		
Given action plan					19,239.28	<0.001
Yes	106,231	58.3	75,878	41.7		
No	85,773	36.7	147,832	63.3		
Routine checkups (last 12 months)					39,386.70	<0.001
None	31,712	30.1	73,751	69.9		
One or more	160,091	66.5	80,657	33.5		
Emergency room visit (last 12 months)					37,826.36	<0.001
Yes	52,180	92.7	4,138	7.3		
No	140,225	48.1	151,053	51.9		

Before conducting the main analyses, I conducted several simple logistic regressions to evaluate the relationship between the study's covariates and the outcome of asthma control. Potential control variables included gender, age, parents' marital status, parents' education, household income, parents' employment, number of children in the household, and type of insurance. To begin data exploration, I first examined each covariate individually. These results are displayed in Table 2.

Table 2

Simple Logistic Regression of Covariates Predicting Controlled Asthma

Source	Unadjusted O.R.	C.I. (95%)
Gender		
Girl	0.47	(0.47-0.48)***
Boy	1.00[b]	
Age[a] (year)		
0 – 9	0.65	(0.64-0.66)***
10 – 17	1.00[b]	
Marital Status		
Married	1.20	(1.18-1.22)***
Other	1.00[b]	
Education		
At least some college	1.04	(1.02-1.05)***
High school and below	1.00[b]	
Income[c]	0.95	(0.95-0.96)***
Parent employment		
Employed	1.17	(1.16-1.19)***
Other	1.00[b]	
Number of children		
Two or more children	0.83	(0.82-0.84)***
One child	1.00[b]	
Insurance type		
Parent's employer	1.38	(1.36-1.40)***
Other	1.00[b]	

Note. $*p < .05$,$**p < .01$,$***p < .001$. [a]Age is categorical. [b]1.00: reference value. [c]Income treated as ordinal.

Gender. Results of logistic regression of asthma control on gender, where males were considered the reference category concluded that gender was a significant predictor, $OR = 0.47$ $\chi^2(1) = 14011.54$, $p < .001$, Nagelkerke $R^2 = .04$, indicating that the child's gender was a significant covariate in terms of assessing asthma control. The outcomes indicated that approximately 4% of the variance in group placement could be predicted from knowledge of a child's gender. This resulted in a rejection of the null hypothesis, that there was a relationship between gender and control of asthma, and indicated that females were less likely to have controlled asthma than males.

Age. Results of logistic regression of asthma control on age, $OR = 0.65$ $\chi^2(1) = 4666.68$, $p < .001$, Nagelkerke $R^2 = .02$, indicated that the child's age was a significant covariate in terms of assessing asthma control. The outcomes indicated that approximately 2% of the variance in group placement could be predicted from knowledge of a child's age.

Parents' marital status. Results of logistic regression of asthma control on parents' marital status resulted in significant findings, $OR = 1.20$ $\chi^2(1) = 573.35$, $p < .001$, Nagelkerke $R^2 = .00$, indicating that the parents' marital status was a significant covariate in terms of assessing asthma control. However, the outcomes indicated that approximately 0% of the variance in group placement could be predicted from knowledge of the parents' marital status, meaning that it was not a highly influential covariate, but was still likely to be related to asthma control.

Parental education. Results of logistic regression of asthma control on parents' education, where the reference category was "high school or below," $OR = 1.04$ $\chi^2(1) = 25.32$, $p < .001$, Nagelkerke $R^2 = .00$, concluded that the parents' education was a

significant covariate in terms of assessing asthma control. However, similar to the results for marital status, the outcomes indicated that approximately 0% of the variance in group placement could be predicted from knowledge of the parents' education, meaning that it was not a highly influential covariate, but was still likely to be related to asthma control. There was a relationship between parental education and asthma control. Children with asthma who had parents with "some college" education were more likely to have controlled asthma than those who had parents with a high school education or below.

Parental income. Results of logistic regression of asthma control on parents' income resulted in significant findings, $OR = 0.95$ $\chi^2(1) = 118.48$, $p < .001$, Nagelkerke $R^2 = .00$, indicating that the parents' income was a significant covariate in terms of assessing asthma control. However, similar to the results for marital status and education, the outcomes indicated that approximately 0% of the variance in group placement could be predicted from knowledge of the parents' income, meaning that it was not a highly influential covariate, but was still likely to be related to asthma control. As the variable of income was continuous and measured in income categories, there was no reference category. As such, the *OR* of 0.95 implied that each increase in to next higher income category corresponded with an increase in the odds of having controlled asthma by a factor of 0.95.

Parental employment status. Results of logistic regression of asthma control on parents' employment status, $OR = 1.17$ $\chi^2(1) = 589.59$, $p < .001$, Nagelkerke $R^2 = .00$, indicated that the parents' employment status was a significant covariate in terms of assessing asthma control. However, similar to the results for the previous parental demographic features, the outcomes indicated that approximately 0% of the variance in

group placement could be predicted from knowledge of the parents' employment status, meaning that it was not a highly influential covariate, but was still likely to be related to asthma control. Results show a positive relationship between parental employment status and asthma control. Children with asthma who had parents who were employed were more likely to have controlled asthma than those who had parents who were not employed.

Children in household. Results of logistic regression of asthma control on the number of children in the household resulted in significant findings, $OR = 0.83$ $\chi^2(1) = 885.77$, $p < .001$, Nagelkerke $R^2 = .00$, indicating that the number of children in the household was a significant covariate in terms of assessing asthma control. However, the outcomes indicated that approximately 0% of the variance in group placement could be predicted from knowledge of the number of children in the household, meaning that it was not a highly influential covariate, but was still likely to be related to asthma control. There was no relationship between the number of children in the household and asthma control. Asthmatic children residing in households of two or more children were less likely to have controlled asthma than those children with asthma who resided in a household with one other child. The results indicated that the null hypothesis should be rejected.

Insurance type. Results of a final logistic regression of asthma control on the type of insurance covering a child resulted in significant findings, $OR = 1.38$ $\chi^2(1) = 1{,}768.01$, $p < .001$, Nagelkerke $R^2 = .01$, indicating that the type of insurance was a significant covariate in terms of assessing asthma control. The outcomes indicated that approximately 1% of the variance in group placement could be predicted from knowledge

of the type of insurance. There was is a relationship between insurance type and asthma control. Children with asthma who had insurance provided by their parents' employer were more likely to have controlled asthma than those children with asthma who did not. The results indicated that the null hypothesis should be rejected.

All covariates. After assessing each bivariate model for the covariates of interest, a full model was constructed to determine the combined predictive ability of each covariate simultaneously. This analysis allowed the researcher to determine which control variables were still significant when accounting for the predictive ability of each of the other covariates. In this analysis, any covariates that lose significance would indicate that their effect was better explained using one or more of the other covariates. This analysis was also significant, $\chi^2(8) = 7249.57$, $p < .001$, Nagelkerke $R^2 = .10$, and indicated that the combined predictive ability of all eight covariates could correctly predict 10% of the variance in asthma control versus non control group placement. As all eight of the covariates retained significance, they were all uniquely important to the ability to predict group placement, and all remained in future models as controls. Table 3 includes the results of this final preliminary analysis.

Table 3

Multiple Logistic Regression for all Control Variables Predicting Asthma Control

Source	Adjusted O.R.	C.I. (95%)
Gender		
Female	0.52	(0.51-0.53)***
Male	1.00[b]	
Age (year)		
0 - 9	0.76	(0.75-0.77)***
10 - 17	1.00[b]	
Marital status		
Married	0.66	(0.64-0.67)***
Other	1.00[b]	
Education		
At least some college	0.66	(0.65-0.67)***
High school and below	1.00[b]	
Employment		
Employed	1.04	(1.02-1.05)***
Other	1.00[b]	
Income[c]	0.74	(0.73-0.76)***
Num. children		
Two or more children	0.62	(0.61-0.63)***
One child	1.00[b]	
Ins. Type		
Parent's employer	2.5	(2.4-2.5)***
Other	1.00[b]	

Note. $\chi^2(8) = 7{,}249.57$ $p < .001$, Nagelkerke $R^2 = .10$, *p<.05,**p<.01,***p<.001.
1.00[b]: reference value, Income[c] treated as ordinal

Research Question 1

What is the relationship between asthma control in African American children in the Midwest when compared with other races?

$H_0$1: There is no relationship between asthma control in African American children in the Midwest when compared with other races.

$H_1$1: There is a relationship between asthma control in African American children in the Midwest when compared with other races.

Research Question 1 consisted of the examination of the control of asthma, which would be indicative of the quality of life, as it pertains to control over the symptoms and activity limitations. Multivariate logistic regression modeling was appropriate to determine the relationship between race and asthma control while controlling for the covariates of interest. The analysis indicated that a logistic regression model including covariates and race was significantly predictive of asthma control, $\chi^2(9) = 28{,}477.12$, $p < .001$, Nagelkerke $R^2 = .11$.

In comparison to the model with all eight covariates, the addition of race did not allow for more of the variance in asthma control to be predicted, though race itself was a significant predictor (Wald = 8489.43, $p < .001$, $OR = 0.52$). The odds ratio for the variable of race was less than one, indicating a negative relationship (also shown by the negative *B* value). This indicated that children who were African American were less likely to have controlled asthma even after holding the control variables constant.

Table 4

Multivariate Logistic Regression for Race and Controls Predicting Asthma Control

Source	Adjusted O.R.	C.I. (95%)
Gender		
Female	0.52	(0.51-0.52)***
Male	1.00[b]	
Age (year)		
0 - 9	0.79	(0.75-0.77)***
10 - 17	1.00[b]	
Marital status		
Married	0.58	(0.56-0.59)***
Other	1.00[b]	
Education		
At least some college	0.67	(0.67-0.68)***
High school and below	1.00[b]	
Employment		
Employed	1.02	(1.00-1.04)***
Other	1.00[b]	
Income	0.75	(0.74-0.76)***
Num. children		
Two or more children	0.65	(0.64-0.66)***
One child	1.00[b]	
Ins. Type		
Parent's employer	2.24	(2.28-2.40)***
Other	1.00[b]	
Race		
Black or AA	0.71	(0.70-0.73)***
Other	1.00[b]	

Note. $\chi^2(9) = 28{,}477.12$, ***$p < .001$, Nagelkerke $R^2 = .11$

Research Question 2

Are there any associations between physician provided asthma education and asthma control?

$H_0$2: There is no association between physician provided asthma education and asthma control.

$H_1$2: There is an association between physician provided asthma education and asthma control.

Research Question 2 considered the concept of asthma education, which was operationalized as three variables. These variables included being taught to recognize early signs or symptoms of an asthma attack, being taught what to do during an asthma episode or attack, and being given an asthma action plan. This analysis constituted the second main binary logistic regression, and indicated that the model including the covariates of interest and asthma education were significantly predictive of asthma control, $\chi^2(11) = 55168.36$, $p < .001$, Nagelkerke $R^2 = .20$. In comparison to the model with all eight covariates, the addition of asthma education variables allowed for an additional 20% of the variance in asthma control to be predicted, and each of the three aspect of asthma education were found to be individually significant predictors ($p < .001$ for all).

Examination of each asthma education variable showed a negative relationship, exemplified by the negative *B* values and odds ratios below a value of one. This indicated that being taught to recognize symptoms (Wald = 3,546.32, $p < .001$, $OR = 0.41$), being taught what to do during an asthma attack (Wald = 3,380.57, $p < .001$, $OR = 0.40$), and being given an action plan (Wald = 1,750.92, $p < .001$, $OR = 0.72$) all corresponded with

a higher likelihood of having uncontrolled asthma. Table 5 provides individual statistics for this regression's results.

Table 5

Multiple Logistic Regression for Asthma Education and Controls Predicting Asthma Control

Source	Adjusted O.R.	C.I. (95%)
Gender		
Female	0.48	(0.47-0.49)***
Male	1.00[b]	
Age(year)		
0 - 9 10 - 17	0.71	(0.69-0.72)***
Marital status		
Married	0.60	(0.59-0.62)***
Other	1.00[b]	
Education		
At least some college	0.69	(0.68-0.71)***
High school and below	1.00[b]	
Employment		
Employed	1.01	(1.02-1.06)*
Other	1.00[b]	
Income[c]	0.84	(0.83-0.86)***
Num. children		
Two or more children	0.56	(0.55-0.57)***
One child	1.00[b]	
Ins. Type		
Parent's employer	2.11	(2.05-2.16)***
Other	1.00[b]	
Taught recognize symptoms		
Yes	0.41	(0.40-0.42)***
No	1.00[b]	
Taught what to do during attack		
Yes	0.40	(0.39-0.41)***
No	1.00[b]	
Given action plan		
Yes	0.72	(0.71-0.73)***
No	1.00[b]	

Note. $\chi^2(11) = 55{,}168.36$, $p < .001$, Nagelkerke $R^2 = .20$

Research Question 3

What is the relationship between healthcare utilization and asthma control?

$H_0$3: There is no relationship between healthcare utilization and asthma control.

$H_1$3: There is a relationship between healthcare utilization and asthma control.

Data for healthcare utilization for this research question came from two items on the BFRSS, including number of emergency room visits in the past 12 months and number of routine checkups in the past 12 months. Based on the number of response categories for these variables, the small response rate for the other numbers of visits could not be used as distinct groups, and were combined into an "other" category. This resulted in the number of emergency room visits and routine checkups to be reduced to two categories, resulting in a binary variable for each, which included a 'none' and 'one or more' group. This analysis constituted the third and final logistic regression, and indicated that the model including the covariates of interest and healthcare utilization were significantly predictive of asthma control, $\chi^2(10) = 76{,}535.07$, $p < .001$, Nagelkerke $R^2 = .31$. In comparison to the model with all eight covariates, the addition of healthcare utilization variables allowed for an additional 31% of the variance in asthma control to be predicted, and both aspects of healthcare utilization were found to be individually significant predictors ($p < .001$ for all).

Examination of each healthcare utilization variable showed a negative relationship, exemplified by the negative *B* values and odds ratios below a value of one.

Both variables for the utilization of healthcare were continuous, meaning that each unit increase corresponded with an additional routine checkup or visit to the ER. This indicated that a greater number of ER visits (Wald = 16,904.34, $p < .001$, $OR = 0.10$) or routine checkups (Wald = 13,625.24, $p < .001$, $OR = 0.33$) corresponded with a greater likelihood of being in the non-controlled asthma group. Table 6 provides individual statistics for this regression's results.

Table 6

Multiple Logistic Regression for Healthcare Utilization and Controls Predicting Asthma Control

Variable	Adjusted O.R.	C.I. (95%)
Gender		
Female	0.41	(0.41-0.42)***
Male	1.00[b]	
Age(year)		
0 - 9	1.06	(1.04-1.08)***
10 - 17	1.00[b]	
Marital status		
Married	1.09	(1.06-1.12)***
Other	1.00[b]	
Education		
At least some college	0.76	(0.74-0.77)***
High school and below	1.00[b]	
Employment		
Employed	0.90	(0.88-0.92)***
Other	1.00[b]	
Income[c]	0.47	(0.46-0.48)***
Num. children		
Two or more children	0.54	(0.53-0.55)***
One child	1.00[b]	
Ins. Type		
Parent's employer	2.63	(2.55-2.70)***
Other	1.00[b]	
Number of ER visits		
One or more	0.10	(0.09-0.10)***
None	1.00[b]	
Number of routine checkups		
One or more	0.33	(0.33-0.34)***
None	1.00[b]	

Note. $\chi^2(10) = 76{,}535.07$, ***$p < .001$, Nagelkerke $R^2 = .31$

Summary

The purpose of this chapter was to present the results of the analyses described in Chapter 3. A series of logistic regressions were used for hypothesis testing. Results indicated that race, asthma education, and healthcare utilization all corresponded with the likelihood of having controlled asthma. More specifically, Black or African Americans children, as well as those who are taught to recognize asthma symptoms, taught what to do during an attack, or given an action plan were all more likely to have non-controlled asthma. Similarly, the greater number of ER visits or routine checkups a child with asthma had in the past year, the less likely they were to have controlled asthma. These results will be discussed within the context of the relevant literature in the next chapter. Additionally, the strengths and limitations of the present study will be discussed. Finally, directions for future research will be given.

Chapter 5: Discussion

Introduction

The purpose of this study was to use secondary data from the 2009 BRFSS ACBS to examine asthma control and how asthma affects the quality of life of children with asthma residing in the Midwest. In addition, I considered specific demographics of each participant as they relate to asthma control to assess how asthma impacted the participant's quality of life. This study is unique because I specifically targeted children with asthma living in the Midwest. In this study, I found that race, asthma education, and healthcare utilization all were statistically significant ($p<0.001$) when associating with asthma control. Principally, African American children were more likely to have non-controlled asthma compared to children of other races. Furthermore, the greater number of ER visits or routine checkups a child with asthma had in the past year, the less likely they were to have controlled asthma. Also, children more likely to have non-controlled asthma were those who were taught to recognize asthma symptoms, taught what to do during an attack, or given an action plan. According to The CDC, asthma symptoms that disturb routine daily activity like sports, work, or school, are considered to also impact quality of life. Studies have shown that those of a certain race or ethnicity, education level, and household income were at an increased risk of having asthma. Although there is no cure for asthma, its symptoms are preventable (CDC, 2014). Friend and Morrison (2014) noted that the NAEPP guidelines give healthcare providers direction for asthma management on proper diagnosing, patient education, asthma trigger awareness, creating an asthma action plan and appropriate medication use. But, studies continue to show that

healthcare practitioners are not following the NAEPP Guidelines (Friend & Morrison, 2014). I performed this study to identify any differences in asthma education and asthma control between African American children with asthma and asthmatic children of other races.

Interpretation of Findings

I used the most recent weighted data from the 2009 BRFSS Child ACBS of states in the Midwestern Region. Descriptive statistical findings showed that more African American children (56.5%) experienced uncontrolled asthma when compared to other races (44.0%). Multivariate logistic regression confirmed that African Americans were less likely to have controlled asthma when compared with others. This study result coincides with current literature that insist that African Americans are inversely affected by adverse asthma outcomes, with African Americans dying from uncontrolled asthma symptoms at a rate of 7 times more than Caucasians (Akinbami et al., 2016). Asthmatics aware of asthma triggers and skilled with how to deal with an asthma attack will have better control of their symptoms, feel healthy, and improve their quality of life (Bazini & Barati, 2014). Yet, multiple logistic regression analysis results from this study showed that those who received asthma education were less likely to have controlled asthma. This could be explained by the need for healthcare providers to teach these children how to recognize symptoms, what to do during an asthma attack, and who to use their asthma action plan due to their uncontrolled asthma. Multiple logistic regression results showed that those with uncontrolled asthma symptoms had greater visits to the emergency department for their asthma. In addition, they also visited their pediatrician more for routine visits for asthma than those who had controlled asthma symptoms. These results

are consistent with asthmatic seeking medical attention for their uncontrolled symptoms at an urgent care facility, emergency department, walk-in appointment at their pediatrician's office, or routine follow-up for uncontrolled asthma symptoms. I used a publicly available dataset from the CDC's BRFSS ABCS to study how race, asthma education, and healthcare utilization relate to asthma control in children residing in the Midwest. The use of this national dataset yielded a large sample size allowed for a low margin of error and increased the power to detect differences as seen by the narrow confidence intervals. Unfortunately, this can cause the overlap of confidence intervals magnifying the strength of the association. Multiple logistic regression indicated that race, asthma education, and healthcare utilization all were associated and predictive of asthma control. Moreover, the study results indicate that Black or African American children were more likely to have uncontrolled asthma symptoms, thereby having a decreased quality of life.

Limitations of the Study

The purpose of this quantitative study was to use 2009 BRFSS ACBS data to assess asthma control while identifying any differences between African American children living in the Midwest. There were some limitations to this study. First, the Child ACBS is not mandatory and not all states participate. Results may only represent those respondents for that year in participating states. Second, I used self-reported responses from children and parents, which are dependent on memory of the amount and severity of each episode when asthma symptoms were experienced. Third, I examined secondary data from a survey that randomly selected participants. This makes selection bias a potential threat because those participants who refused may have had uncontrolled

asthma symptoms, and would have added data would alter study results. In addition, such variables like household income, education level, and insurance type are sensitive to some and could cause participants not to answers to these questions honestly (Liu, Li, & Walker, 2014). Last, I did not examine or identify environmental triggers such as pollen, mold, smoke, and cockroaches.

Recommendation for Action and Further Research

Asthma is the major health concern, despite being one of the most common childhood diseases (Friend & Morrison, 2014). Furthermore, disparities still exist in healthcare due to race, ethnicity, income, and education (Liu et al., 2014). The main objective of asthma treatment is to control asthma symptoms, incite early recognition, and avoid asthma triggers (Brandet et al., 2015). The NAEPP established guidelines on asthma management, including providing each asthmatic with an asthma plan. This plan outlines steps to manage asthma triggers and symptoms for each asthma patient based on their asthma history, allowing each asthmatic to be directly involved in their asthma management (Sheares, Mellins, & Dimango, 2015).

According to the CDC (2014), asthma is a manageable lifelong disease. Asthma symptoms can disrupt daily activities like sports or school. It is essential that asthmatics know how to manage their asthma, thus making asthma education key to controlling asthma symptoms. It is crucial that providers devise an individual asthma action plan to each child with asthma. Having access to healthcare and asthma education are vital to controlling asthma symptoms (CDC, 2014). Community-based, culturally-sensitivity asthma education and management programs will help provide a comfortable environment for learning (Coutinho & Koinis-Mitchell, 2013). More funding and

programs are needed to provide families of children with asthma with evidenced-based asthma management, including education, healthcare, and environmental control information. Furthermore, programs instructing providers who care for children with asthma would help tighten asthma control and increase the quality of life of children with asthma (Health and Hospital Network, 2014). Future researchers should concentrate on various asthma triggers and medication use in children in the Midwest as these relate to various races, ethnic groups, and socioeconomic demographics. In addition, a longitudinal study where children keep a symptom diary may help accurately monitor symptoms. Further longitudinal research is needed to examine the relationship between asthma education, asthma control, and socioeconomic status to identify any differences amongst various races and ethnic groups.

Implications for Social Change

The study findings brought to light how asthma affects the quality of life of children in the Midwest by yielding possible associations between uncontrolled asthma symptoms and race, asthma education, healthcare utilization, and insurance type. The results of the study showed the need for positive social change in asthma education and management for all races and ethnicities, despite their socio-economic status. The study was aimed to promote positive social change through encouragement of more funding, interventions, programs for asthma awareness, asthma education, and access to healthcare. The study results point to the need to decrease the gap in asthma disparities and aligns Healthy People 2020. One asthma goal for Healthy People 2020 is to increase the amount of asthmatics that receive proper asthma management as outlined by the NAEPP guidelines. Other objectives of Healthy People 2020 are to lessen the amount of

children utilizing the emergency department for uncontrolled asthma. Findings of this study could influence public health officials, community healthcare workers, policy makers, colleagues, state-wide organizations, and those affected by asthma to demand change until asthma prevalence decreases. CDC's National Asthma Control Program aims to decrease uncontrolled asthma symptoms, not only through state funding, but also for asthma surveillance, devising programs for targeted at risk populations and developing asthma related programs. This study brings to light the need for additional avenues to present asthma education to the asthma population to empower asthmatics to be active participants in minimizing their asthma symptoms.

Conclusion

This study contributes to current literature on pediatric asthma and how it affects the quality of life. The study results pointed to significant associations between race, uncontrolled asthma symptoms, and emergency department visits. Furthermore, findings of this study showed significant associations between uncontrolled asthma symptoms and being African American. Asthma is serious, especially when it comes to children (IDPH, 2014). Asthma in kids is linked to preventable morbidity and mortality, and decreased quality of life (Al-Anazi et al., 2015). According to the CDC (2014), 3 out of 5 people alter their routine due to asthma. Furthermore, 1 out of 2 children miss school yearly due to uncontrolled asthma symptoms. Various studies have shown that disparities in asthma control are multi-factorial and involve individual, cultural, or systematic elements (CDC, 2013).

Asthma education is needed, especially amongst those with the disease. The HBM and self–efficacy are used extensively in public health programs involving preventive and

chronic diseases, and both are theoretically aligned with this study. One's outlook on asthma, or perceived threat, plays an immense role in controlling asthma symptoms. Self-management of asthma symptoms is significant and directly affects the quality of life of asthmatics. Asthma knowledge an education is imperative for self-efficacy and self-management to keep asthma symptoms at bay.

Controlling asthma symptoms in children continues to be a dilemma worldwide. Uncontrolled asthma symptoms affect the quality of life of children, causing more frequent asthma symptoms and missed days of school (Miadich et al., 2015). Vliet et al. (2015) related asthma control to asthma symptoms and asthma attacks. Effective asthma management consists of efficient asthma education (Coutinho & Koinis-Mitchell, 2013). The NAEPP has suggested guidelines on asthma management for all age group which includes asthma education and how to individualize asthma plans (Friend & Morrison, 2014). Asthma morbidity and mortality in children is preventable. The demand is high for more asthma education interventional programs aimed at children to increase asthma knowledge, thereby enhancing asthma self-management and improving quality of life (Gupta et al., 2013).

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