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Association Between Medication Adherence and Asthma Among Latinos in The United States

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This is to certify that the doctoral study by

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Abstract

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MPH, Ponce Health Science University, 2018

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Doctoral Study Submitted in Partial Fulfillment

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Abstract

Prior research has shown that Latinos in the United States face disproportionate challenges in managing their asthma symptoms. Therefore, this study aimed to identify factors that may influence medication adherence and asthma episodes among Latinos in the United States and was guided by Andersen's health behavior theory. Data from Latinos who participated in the National Health Interview System in 2020 were analyzed using correlation and logistic regression. Findings indicated that nearly 23% of respondents reported an asthma episode. Approximately 25% of the sample reported an asthma episode during the last 12 months. A total of 43.6% of the sample reported not taking medication every day. Study findings indicated that there were no associations between asthma episodes and medication adherence ($p = .11$), asthma episodes and health insurance ($p = .37$), or asthma episodes and living in rural/urban areas ($p = .17$). Logistic regression models did not find a significant relationship between medication adherence, living in urban/rural areas, medication cost, education level, gender, or age on participants' likelihood of having an asthma episode. For long-term social change, it is important to educate future generations on how to prevent asthma to help them identify early signs of asthma episodes and use the correct medication at the correct time to decrease asthma episodes.

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Section 1: Foundation of the Study and Literature Review

Asthma is a widely recognized chronic respiratory disorder that is increasingly prevalent, affecting an estimated 300 million people worldwide. This figure has been on a steady incline over the past few decades, despite significant advancements in medical technology and treatments (Chongmelaxme et al., 2020; George et al., 2023). These advancements encompass various tools and techniques to manage the condition, including the development of nebulizers, spacers, inhalers, and specialized medications. However, even in the face of these medical strides, chronic asthma episodes continue to be a pervasive issue among individuals across all age groups, further underscoring this prevalent health concern's persistent and wide-ranging impact (Mes et al., 2018).

In the United States, asthma is a significant health concern, affecting around 25 million people, roughly one in every 13 individuals (Asthma and Allergy Foundation of America, 2021). The annual economic burden of asthma in the United States between 2008 and 2013 was estimated at $81.9 billion, with 61% being medical costs and the rest attributed to absenteeism or mortality. George et al. (2023) stated that the total economic burden of uncontrolled asthma in the United States over the next 20 years is projected to be $963.5 billion, including indirect costs. During the same period, adults and adolescents are expected to lose over 15 million quality-adjusted life years due to uncontrolled asthma (George et al., 2023).

On average, asthma accounts for 11 deaths daily in the United States, and in 2020, it claimed 4,145 lives (Amin et al., 2020; Gray et al., 2018). While most patients can manage their asthma, an estimated 5%–10% struggle with uncontrollable symptoms and

frequent complications (Jia et al., 2020). Nearly all of these deaths could have been prevented with proper treatment and care. The disease disproportionately affects the Latino population (George et al., 2023; U.S Department of Health and Human Services Office of Minority Health; 2022).

Various factors explain why U.S. Latinos are more prone to asthma. Income, for instance, is a determinant, with research suggesting that adequate income and earnings are crucial for the effective treatment of asthma (Chongmelaxme et al., 2020; McQuaid, 2018). Vesely et al. (2019) study found that lower income often correlates with residency in areas of high pollution, including those near factories, power plants, and major roads, increasing the risk of asthma. Other risk factors include expensive treatments, lack of awareness, and low wages, which limit access to employer-provided health insurance or accessible medical facilities (Örnek et al., 2012).

The data underscore the disproportionate burden of asthma on Latinos in the United States, who experience the highest asthma rates, associated fatalities, and hospitalizations (Gaffney, 2022). As Amin et al. (2020) noted, these high morbidity and mortality rates can be effectively reduced with appropriate treatment strategies. However, Latinos face disproportionate challenges in managing their asthma symptoms (Kim et al., 2020). This study aimed to assess the association between medication adherence and asthma among Latinos in the United States.

Various socioeconomic factors, including race and insurance status, have been linked to the risk of hospitalization and uncontrolled asthma (George et al., 2023). Identifying patients at higher risk and applying proactive, targeted interventions can

significantly reduce asthma-related morbidity and mortality. However, more extensive longitudinal studies examining factors contributing to asthma exacerbations are needed (George et al., 2023). In a recent study, Mindrila and Balentyne (2023) used explanatory variables to determine factors that could predict or explain a response parameter. These variables were chosen because they were independent from other factors. The study examined several explanatory variables, such as gender, age, education level, geographic location, health insurance coverage, medication adherence, and inability to afford prescription medication.

A considerable burden of asthma is disproportionately carried by the Latino community in the United States, which faces the highest rates of asthma, associated deaths, and hospitalizations (Gaffney, 2022). Though Amin et al. (2020) suggested that these high morbidity and mortality rates could be substantially curtailed with the correct treatment strategies, Latinos are disproportionately challenged in managing their asthma symptoms (Kim et al., 2020). Hence, the primary objective of this study was to evaluate the correlation between medication adherence and asthma in the U.S. Latino population.

A strategic approach to reduce asthma-related morbidity and mortality significantly entails identifying patients at a higher risk and proactively applying targeted interventions. However, this strategy necessitates more comprehensive longitudinal studies that explore the factors contributing to asthma exacerbations (George et al., 2023). The outcomes of this examination serve as a foundational reference for the present study.

Background of the Study

In the United States, asthma is the most common chronic respiratory condition (Mes et al., 2018). Most asthma patients can control their symptoms (American Lung Association [ALA], 2020a). However, 5%–10% of patients cannot control their asthma, which leads to persistent symptoms and frequent complications (McQuaid, 2018). Asthma significantly impacts the daily lives of adults and is the leading cause of activity limitations, costing the United States $81 billion annually (ALA, 2020b). Patients with uncontrolled asthma experience higher disease and healthcare costs and have a greater risk of death or near-fatal exacerbations (Mes et al., 2018).

Adherence to medication regimens is crucial to achieving optimal health outcomes, and non-adherence can lead to adverse consequences for patients and the healthcare system. According to Sabaté (2023), patients who do not follow their medication instructions have a higher risk of worsening their conditions, experiencing higher mortality rates, and incurring more healthcare costs. Adherence is influenced by various factors, including patient-related, medication-related, and healthcare system-related factors (Vrijens et al., 2019). Non-adherence may lead to treatment failure, which may result in unnecessary additional treatments or intensification of therapy (Vrijens et al., 2019). It is important to note that increasing the dose of medication without addressing adherence issues is unlikely to improve symptoms (Nieuwlaat et al., 2020). Therefore, it is crucial to identify and address adherence issues to ensure optimal health outcomes.

Medication adherence is a crucial factor in the treatment of asthma, as it is impacted by various factors such as the patient's personality, family and culture, interactions with healthcare professionals, and the healthcare system (Chongmelaxme et al., 2020). The World Health Organization (WHO) defines *medication adherence* as the extent to which the person's attitude is associated with the approved prescription from a healthcare provider (Amin et al., 2020). To control asthma, taking medication and avoiding triggers that can cause an attack is recommended, as stated by the Centers for Disease Control and Prevention (CDC, 2022). Between 2014 and 2018, Latinos experienced asthma attacks at a frequency of 45.6%, despite the effectiveness of the prevention technique (ALA, 2020a). The importance of medication adherence in treating asthma cannot be overstated, and healthcare professionals must address the various factors that may affect it.

In this study, I investigated the correlation between adherence to prescribed medication and the occurrence of asthma episodes within the Latino community. As the second-largest ethnic population in the United States, Latinos bear the heaviest burden of asthma prevalence (Pike et al., 2018). Predominantly comprised of migrants, this community grapples with unique challenges regarding assimilation within the United States.

Historically, Latinos in the United States have suffered from inadequate access to healthcare services and have underutilized preventive care services relative to other ethnic groups. Prior to the implementation of the Affordable Care Act in 2014, an alarming 30% of Latinos reported being without health insurance, a rate significantly

higher than the 11% reported among non-Latino Whites (Velasco-Mondragon et al., 2016). Additionally, they encounter distinct issues stemming from cultural and linguistic differences from the mainstream population in the United States. This study aims to shed light on these issues and their potential impact on asthma management among Latinos.

The present circumstances reveal that numerous factors contribute to the increased prevalence of asthma among specific populations. These factors include differences in cultural practices, language barriers, nature of work, level of education, background, and interests (Keisler-Starkey & Bunch, 2021). Furthermore, people living in polluted areas with limited healthcare services are more susceptible to asthma (Agency for Healthcare Research and Quality., 2021). This is compounded by the fact that many individuals affected by asthma are associated with small companies that do not offer health insurance or medical facilities and, therefore, have limited access to treatment options (Heintzman et al., 2022). The lack of education and awareness in these populations further exacerbates the problem. In light of these challenges, medication adherence varies from patient to patient or from one population to another (Gray et al., 2018; Jia et al., 2020). It is imperative to address these underlying issues to mitigate the severity of asthma and improve the overall health outcomes of these vulnerable populations.

Several factors contribute to the complexity of asthma and limited medication adherence (Arcoleo et al., 2019). Previous studies have critically evaluated various medications to assess their level of adherence (Amin et al., 2020). However, researchers have identified a gap in the literature, as there is less focus on medication adherence and

health insurance use, particularly among Latinos in the United States. As a result, effective treatment options and strategies specifically designed for this region are currently unavailable. It is crucial to address this gap to ensure that all individuals, regardless of their background, have access to appropriate care.

Asthma is a prevalent condition in the United States. Latinos are the most affected group, with 2.3 million Latinos reporting asthma in the United States (Minorityhealth.hhs.gov, 2022). Research has found that medication adherence in asthma cases is impacted by factors such as age, gender, medication cost, and education level (Chongmelaxme et al., 2020). As individuals age, the severity of their asthma can increase, and many Latinos may be hesitant to seek treatment in hospitals due to cultural beliefs about home remedies and high medication costs (Gaffney, 2022). Additionally, low education levels and awareness among Latinos can contribute to a lack of understanding about the importance of receiving medical treatment (Arcoleo et al.,2019). These findings demonstrate the need for targeted interventions to increase medication adherence and improve asthma management among the Latino population.

The issue of health insurance coverage presents a challenge for many Latinos in the United States, particularly those employed in small and irregular jobs. This can make it difficult for them to access health insurance benefits and receive free-of-cost treatments that could improve their health outcomes (Arcoleo et al., 2019). Geography also plays a role in limiting access to health facilities and insurance for this group. Health facilities are scarce in many areas where Latinos reside, further exacerbating the problem (Rhee et al., 2018).

Latinos comprise 19% of the U.S. population, making them the second-largest population group; they also represent the poorest population in the country, with 1 in every 4 Latinos living at the poverty level (Rhee et al., 2018). One reason for this is that they face significant hurdles in obtaining employment, and even when they do, they tend to earn lower wages than other groups.

Common barriers to employment include limited proficiency in English and lower levels of education, especially among new migrants (Gray et al., 2018). Working in sectors such as factories, construction, and agriculture exposes Latino workers to indoor and outdoor air pollution, making them more susceptible to developing asthma (Rhee et al., 2018). Unfortunately, controlling asthma can be a challenging task due to the presence of toxic chemicals like formaldehyde in insulation, wood products, and glue used in the construction sector, as well as carpets, foam cushions, cleaning products, and paints (Jia et al., 2020).

Research has shown that approximately 10% of the Latino population, particularly children under 18, suffer from chronic respiratory disease (Foot et al., 2019; Heintzman et al., 2022). This group experiences more severe asthma symptoms, with increased risks of asthma attacks, emergency room visits, and even death due to asthma (Rhee et al., 2018). A report by Agency for Healthcare Research and Quality (AHRQ) in 2021 found that the hospital admission rates per thousand adult asthma patients aged 18 to 39 were higher for Latinos compared to non-Latinos (AHRQ., 2021). The reasons behind this disparity are complex and multifaceted, including genetics, exposure to air

allergens, environmental tobacco contact, obesity, and access to healthcare (Garcia et al., 2019).

Environmental pollution has been linked to asthma, both from atmospheric and indoor/outdoor air pollution (Arcoleo et al., 2019). Smoking is also a common habit among the Latino population, with a significant percentage of men and women addicted to heavy smoking (Olorunfemi & Ojewole, 2019). Poverty is another factor that affects the Latino population, with a higher incidence of asthma, morbidity, and mortality (Kim et al., 2020). Poverty can also lead to environmental factors that increase the risk of asthma, such as parental smoking, exposure to cockroach allergens, and inadequate access to healthcare (Heintzman et al., 2022).

One of the significant challenges for Latinos with asthma is accessing proper treatment due to poor access to hospitals, inadequate use of anti-inflammatory treatment, and a lack of reference value for tools like spirometers for measuring lung function (Mes et al., 2018; Kim et al., 2020). It is crucial to address these factors to improve the quality of life for Latinos with asthma and reduce healthcare disparities.

Problem Statement

According to the CDC (2019), the prevalence of asthma is higher among Latinos in the United States compared to non-Hispanic Whites. Low income, limited access to medical care, and residing in polluted regions are significant predictors of asthma among Latino children, as found by Padilla and colleagues (Padilla et al., 2019). Lack of knowledge and education, language difficulties, exposure to allergies, air quality, poor lifestyle, and high-stress levels due to prejudice are other contributing factors to asthma

among Latinos (Caverly et al., 2019; Jerant et al., 2018). Researchers have studied variables that affect non-adherence in adults with asthma, with most of them focusing on individual and household stages, such as child development and family allocation of treatment responsibilities (Gray et al., 2018). However, Latinos, as a group, have worse health outcomes and less access to high-quality medical treatment. This lack of access to healthcare coverage is the most significant reason for their failure to comply with asthma treatment, which further harms their health (Shiro & Reeves, 2020). Additionally, medication adherence to specific medication use for asthma can differ among Latinos due to differences in age, gender, medication cost, and education level (Kaplan & Price, 2020). Therefore, it is essential to evaluate the differences in medication adherence among Latinos and non-Latinos by examining these factors.

Latinos face several barriers when it comes to taking medications correctly. Limited access to healthcare due to a lack of insurance, language barriers, or immigration status can make it difficult for them to receive regular care and follow up with providers, resulting in non-adherence to medication regimens (Ginzberg, 2019). Cultural factors may also affect how Latinos view medication and healthcare. Healthcare providers who do not speak their language or have access to interpreters may struggle to effectively communicate medication regimens and provider suggestions (Magaña, 2020). Additionally, the cost of medication can be a significant barrier for many Latinos, especially those without insurance or limited financial resources. Lack of access to education about health conditions and medication regimens can make it difficult for

Latinos to understand the importance of taking medication correctly and following provider suggestions (Baghikar et al., 2019).

Purpose of the Study

The purpose of this quantitative cross-sectional study was to identify the association between medication adherence and Asthma among Latinos in the United States, as Latinos are the second largest population in the United States and are more prone to asthma. I also evaluated the association between health insurance and geographic location (urban/rural areas) when controlling for age, gender, medication cost, and education level. This research has taken the initiative to support the Latinos living in the United States to live healthy lives and prevent themselves from suffering from asthma.

Research Question and Hypotheses

Research Question 1: What is the association between medication adherence and asthma episodes among Latinos in the United States when controlling for age, gender, medication cost, and education level?

H_o1: There is no association between medication adherence and asthma episodes among Latinos in the United States when controlling for age, gender, medication cost, and education level.

H_a1: There is an association between medication adherence and asthma episodes among Latinos in the United States when controlling for age, gender, medication cost, and education level.

Research Question 2: What is the association between health insurance and asthma episodes among Latinos in the United States when controlling for age, gender, medication cost, and education level?

H_o2: There is no association between health insurance and asthma episodes among Latinos in the United States when controlling for age, gender, medication cost, and education level.

H_a2: There is an association between health insurance and asthma episodes among Latinos in the United States when controlling for age, gender, medication cost, and education level.

Research Question 3: What is the association between Latinos living in urban/rural areas and asthma episodes in the United States when controlling for age, gender, medication cost, and education level?

H_o3: There is no association between Latinos living in urban/rural areas and asthma episodes in the United States when controlling for age, gender, medication cost, and education level.

H_a3: There is an association between Latinos living in urban/rural areas and asthma episodes in the United States when controlling for age, gender, medication cost, and education level.

Theorical Framework Overview

The research employs Andersen's behavioral model of health services as its theoretical framework. This model was introduced by Ronald Andersen in 1968 amid a societal push for healthcare equity and access, further contextualizing the importance of

this model for our current research (Andersen, 1995). The model proposes that three main factors determine healthcare utilization: predisposing, enabling, and need, providing a comprehensive approach to understanding healthcare behavior (Andersen, 1995). One inherent assumption of this model is that these three factors primarily shape healthcare utilization. Recent studies applying Andersen's model have made significant strides in exploring racial and ethnic disparities in medication adherence in the United States, including among Latinos, thereby providing key insights applicable to this study.

Dong et al. (2021), Wang et al. (2019), and Xie et al. (2019) have utilized Andersen's model to delve into the medication adherence patterns among various patient groups, with a specific focus on racial and ethnic disparities. Dong et al.'s study of Medicare recipients revealed the significance of Andersen's predisposing, enabling, and need factors in medication adherence across racial and ethnic groups. This study highlighted racial and ethnic disparities in medication adherence among Latinos, necessitating a tailored healthcare approach. Similarly, Xie et al. found that these factors, particularly education level, socioeconomic status, and insurance coverage, significantly influenced medication adherence among privately insured patients in the United States, emphasizing the potential impact of health insurance, a primary enabling factor in Andersen's model, on healthcare utilization among Latinos in the United States. Wang et al. applied the model to study antihypertensive triple-combination therapy adherence among Medicare Advantage patients, underscoring the role of income, health insurance, age, and education in influencing adherence rates.

Stockbridge et al. (2021) further corroborated the practical applicability of Andersen's model in their analysis of antipsychotic medication adherence and preventive diabetes screening among Medicaid enrollees with serious mental illness. Their findings illustrated the profound impact of access to healthcare, social support, and health status on medication adherence, mirroring findings; with these studies collectively reinforcing the relevance and utility of Andersen's model, it establishes the model as a viable framework for this present study (Dong et al., 2021; Wang et al., 2019; Xie et al., 2019) These comprehensive analyses contribute to a broader understanding of the myriad factors influencing medication adherence and elucidate the significance of tailored healthcare provision, particularly in the context of racial and ethnic disparities.

These studies collectively demonstrate the relevance and applicability of Andersen's model in investigating medication adherence among different racial and ethnic groups, including Latinos. They provide substantial evidence supporting the use of Andersen's model to explore the association between medication adherence and asthma among Latinos in the United States, as proposed in this study. The choice of Andersen's behavioral model of health services for this study is based on its multidimensional approach to understanding healthcare utilization. This model allowed me to examine how predisposing, enabling holistically, and need factors interact and influence medication adherence among Latinos with asthma.

The model's constructs align well with my research questions. *Predisposing factors* encompass demographic, social, and psychological characteristics, such as age, gender, education level, and income, which potentially influence an individual's health

behavior before the onset of illness. *Enabling factors* refers to resources that can facilitate or hinder the use of health services, such as health insurance and the availability of healthcare providers. The *need factors* represent an individual's perceived and evaluated health status, including the severity of illness. The research questions in this study specifically examine the interplay between medication adherence (a need factor) and other enabling factors, such as health insurance and geographic location, as well as predisposing factors, such as demographic and social factors among Latinos with asthma in the United States.

Therefore, Andersen's behavioral model of health services provides an essential and robust theoretical framework for our investigation into the complex factors influencing healthcare utilization among Latinos with asthma. By applying this model, I aimed to challenge and build upon the current understanding of healthcare utilization, ultimately contributing to a more comprehensive understanding of asthma care among Latinos.

Nature of the Study

The methodological framework of this quantitative cross-sectional study draws from a combination of guidelines stipulated by Jensen (2020) and Gilad (2021), who underscore the significance of quantitative methodologies to attain a comprehensive understanding of a given issue. This study is designed to examine the connections between conditions related to medical treatment for asthma adherence and Latinos in the United States. Asthma, a chronic respiratory disease, serves as the dependent variable. Asthma represents a significant public health issue globally and disproportionately affects

the Latino population in the United States (Keisler-Starkey & Bunch, 2021). Thus, this study is geared towards uncovering the relationship between medication adherence, health insurance, and geographic location (urban and rural) on asthma among Latinos in the United States, as guided by the principles of quantitative research methodologies (Jamieson et al., 2022).

The independent variables in the study include medication adherence, health insurance, and geographic location, whose effects are crucial in shaping health outcomes based on previous studies (Abu-Bader, 2021; Stockemer, 2019). Medication adherence refers to whether patients take their prescribed medication and adhere to prescriptions as directed. At the same time, health insurance can influence access to healthcare services, such as asthma management and medication (Heintzman et al., 2022).

In order to explore these relationships, this study used secondary data from the National Health Interview System (NHIS) collected in 2020. The NHIS was chosen due to the range of topics and the necessary information it provides to represent Latinos in the United States (Argyrous & Argyrous, 1997; Jamieson et al., 2022), and the data are publicly available with easy access to statistical programs for analysis.

The study's target population consists of Latinos from the NHIS data obtained in 2020. The NHIS uses a sampling technique in the interview process, and the data were collected through face-to-face interviews with individuals residing in households and non-institutional group quarters such as homeless shelters, rooming houses, and group homes. The exclusion criteria are persons with no household address, active-duty military personnel and civilians living on military bases, people in long-term care institutions, and

people in correctional facilities. I analyzed the data using the IBM Statistical Package for the Social Sciences (SPSS, 2020), following recommended protocols for quantitative social science research (Abu-Bader, 2021; Stockemer, 2019). This research could provide insights into the factors that impact asthma management and prevention among the Latino population in the United States, which could help inform future public health strategies for this vulnerable group.

Literature Search Strategy

This study employs a comprehensive literature search strategy, encompassing various databases and search engines, including PubMed, Medline, Redalyc, Thoreau, ProQuest Health & Medical Collection, Google Scholar, Google Scholar alerts, and Science Direct. These databases and search engines were selected due to their extensive medical and health-related research coverage, which is particularly crucial for investigating the nuanced aspects of asthma and healthcare access among the Latino population. The search terms used were *access to care, asthma episodes, medication adherence, wellness visit, admission for asthma, gender, health coverage, asthma triggers, inhaler cost, low income, visit ED with asthma symptoms, and Latino barriers*. These search terms were selected to ensure a comprehensive understanding of the complex interplay between asthma, healthcare access, and socioeconomic factors affecting the Latino community. Additional search term combinations and precise search terms will be provided in an appendix for further transparency.

The literature review spanned 5 years, from 2017 to 2021, covering both seminal and current peer-reviewed literature. This timeframe was chosen to provide the most

current understanding of the situation while incorporating foundational research from seminal literature. In cases where recent research was scarce or doctoral studies, dissertations, and conference proceedings were few, this challenge was managed by considering seminal literature and studies from other minority groups with similar socioeconomic conditions. Additionally, the interdisciplinary nature of the selected databases facilitated the retrieval of literature from diverse fields of study to provide a more comprehensive understanding of the research topic.

Interplay of Variables and Their Relevance to the Study

So far, the comprehensive overview provided in this study underscores the multifaceted relationship between predisposing, enabling, and need factors in the healthcare utilization of Latinos with asthma (Apter et al., 2013; Oraka et al., 2013). It draws attention to the disparities in asthma management and outcomes among this population, highlighting the need for more culturally-tailored and equity-focused approaches. By analyzing the interplay between variables such as gender, age, education level, and health insurance, this study can uncover the underlying mechanisms that drive disparities in medication adherence and healthcare utilization, thereby contributing to the advancement of public health interventions (Grineski et al., 2010; Ban et al., 2016).

The relevance of this study's variables and their interplay reflects the complexity of healthcare utilization among Latinos with asthma (Boudreaux et al., 2003). It is well understood that health behaviors and outcomes are not driven by singular, independent factors but rather by a confluence of interrelated elements. Recognizing this, the study employed a multifaceted approach to exploring healthcare utilization. For instance,

understanding how predisposing factors like gender and age intersect with enabling factors like health insurance could offer valuable insights into targeted interventions for specific subgroups within the Latino population (Wu et al., 2013).

Additionally, focusing on the need factor of asthma episodes sheds light on the urgency and importance of medication adherence (Apter et al., 2013; Ortega et al., 2007). Asthma episodes are indicators of disease severity and outcomes that affect individuals' health behaviors, such as medication adherence. By examining the association between medication adherence and asthma episodes among Latinos, the study can provide critical insights to healthcare providers and policymakers about asthma management (Bouazza et al., 2018).

The current study acknowledges the potential influence of geographical location on asthma prevalence and management, recognizing that asthma outcomes can be impacted by factors beyond individual characteristics and health behaviors (Gonzalez-Guarda et al., 2021; Oland et al., 2017). Considering how environmental and societal factors may interact with individual variables can lead to a more nuanced understanding of health disparities among Latinos with asthma. It also underscores the need for interventions beyond individual-level factors and considering broader societal and environmental contexts.

In conclusion, by examining the intersection of predisposing, enabling, and need factors, this study offers a comprehensive understanding of healthcare utilization among Latinos with asthma (Apter et al., 2013; Oraka et al., 2013). The insights gained from this investigation can inform culturally competent, targeted strategies for improving asthma

management and outcomes in this population. This research also highlights the importance of taking a holistic approach to health research, considering the multiple, interconnected factors that shape health behaviors and outcomes (Ban et al., 2016; Boudreaux et al., 2003; Grineski et al., 2010; Wu et al., 2013).

Definitions

Asthma: Asthma is a chronic respiratory condition characterized by inflammation and obstruction of the airways, often triggered by exposure to certain allergens or irritants, such as cigarette smoke (National Heart, Lung, and Blood Institute, 2020).

Medication adherence: Medication adherence refers to the extent to which patients correctly follow their prescribed medication and treatment regime. Factors influencing adherence can include personal beliefs, cultural background, quality of communication with healthcare providers, and the structure of the healthcare system itself (Osterberg & Blaschke, 2005).

Asthma among Latinos: This term refers to the occurrence and management of asthma in the Latino population in the United States, noted for its higher rates of asthma prevalence and mortality compared to non-Latino groups (Foot et al., 2019).

Health insurance: Health insurance is a contract that covers part or the entire cost of an individual's medical expenses due to health-related issues, including chronic conditions like asthma (Palmer et al., 2015).

Geographic location: In this study, geographic location refers to the specific regions within the United States where the Latino population resides, acknowledging that

the prevalence and management of asthma can vary across different geographical contexts (Mes et al., 2018).

Covariables

Age: The age at which the participant was diagnosed with asthma (Arcoleo et al., 2019).

Gender: In this study, gender refers to the biological sex of the participant, which has been found to influence asthma outcomes (Arcoleo et al., 2019).

Medication cost: Medication cost is defined as the financial burden associated with asthma medication, which can affect adherence to the treatment regime (Matthay & Glymour, 2020).

Education level: Education level refers to the highest level of education the patient achieves, which can impact the understanding and management of asthma (Heintzman et al., 2022).

Medication adherence: Medication adherence refers explicitly to whether patients take their asthma medication as prescribed, which includes both persistence (i.e., continuing to take the medication over time) and dose compliance (i.e., taking the medication as frequently as directed; Tabyshoba et al., 2022).

Assumptions

In the context of research, an assumption is out of the researcher's control. It is conditions assumed to be present for the study to be conducted. If the assumptions are incorrect, the study's findings may be invalid (Simon & Goes., 2013). This study is based on several assumptions related to asthma among the Latino population in the United

States. Firstly, Latinos are more prone to asthma than other ethnic groups. Secondly, poverty and high medication costs make it difficult for them to afford hospital treatment, leading to inadequate care. Thirdly, a lack of awareness and education contributes to higher severity levels of asthma among the Latino population. Fourthly, medication adherence levels vary between different populations, which may be influenced by age, gender, medication cost, and education level. Fifthly, living in poor areas makes it difficult for Latinos to obtain health insurance, limiting their access to healthcare services. Finally, it is assumed that geographical location can impact access to health insurance and medication adherence for asthma management. These assumptions are necessary to investigate specific variables that could improve healthcare outcomes for Latinos with asthma (Patton & Galven, 2019; Simon & Goes, 2013).

Scope and Delimitations

In the research context, *scope* refers to the extent of the study area or subject matter that a research project covers (Terrell, 2022). It is the depth of the investigation into the research topic. *Delimitations* are the boundaries set by the researcher to define the limits of a study. They describe the boundaries set for the study (Simon & Goes, 2013). They are the constraints or boundaries that the researcher sets to control the scope of the study.

This study's scope encompasses examining the association between medical treatment adherence and asthma episodes among Latinos in the United States. This secondary data analytic study, which employs data from the NHIS, aims to minimize potential data unreliability and evaluate the factors that act as barriers to medication

adherence for asthma among Latino patients. The study's findings are intended to shed light on the difficulties Latinos face in obtaining effective asthma treatment and to aid in the analysis and implementation of preventive measures for controlling identified obstacles, thereby improving the quality of life for Latinos in the United States.

Regarding the study's delimitations, the focus is on Latinos in the United States diagnosed with asthma. Excluded from the study are non-Latinos and individuals with other respiratory diseases. The study also does not examine the impact of cultural beliefs, social support, and healthcare access on medication adherence and asthma episodes among Latinos. However, these areas could provide valuable insights into asthma treatment adherence factors. Furthermore, the investigation does not consider the effect of comorbidities, such as anxiety and depression, on medication adherence and asthma episodes.

The potential generalizability of this study is primarily limited to the U.S. Latino population diagnosed with asthma. As different cultural influences might affect medication adherence, the generalizability of the study's findings could be limited to other ethnic or racial groups. Various minority groups may have unique perspectives on health and medical interventions, which could influence their adherence behaviors. Thus, caution should be exercised when interpreting and applying the study's findings to other groups. Potential differences in healthcare systems, medication availability, and cultural factors in other countries or regions may also constrain the generalizability of the study's results. Lastly, as different chronic diseases have distinct characteristics impacting

medication adherence, the findings should not be extrapolated to other chronic conditions without further research.

Limitations

This study follows a quantitative research design; hence, it has different types of limitations associated with the chosen research design. As mentioned by Foot et al. (2019) in their study, quantitative research designs include a large sample size, creating difficulty for the researchers to analyze. Another limitation of the study is that it is limited to only one region. Therefore, this study is not applicable and provides any solution to Latinos living outside the United States. However, this affects the reliability and credibility of the data because other countries and regions may have different strategies and tactics that bring forward different results. Quantitative studies are also limited because they are based on the opinions of participants and hence biased. The study is also confined to a particular country and nationality, ignoring the effect of culture on either variable.

Significance

The efficacy of any medical treatment for an asthma patient largely hinges on three factors: (a) the patient's knowledge related to the illness, which empowers them to take appropriate measures to control asthmatic symptoms; (b) the patient's attitude towards the disease, including their willingness to collaborate with medical professionals to manage the symptoms; and (c) the patient's confidence in their ability to contribute to disease management (Garcia et al., 2019). Several factors contribute to patients' reluctance to adhere to medical regimens for asthma. These include inconvenience with

inhaler devices, the frequency of dosage, complex regimens, high cost of medications, side effects, lack or misunderstanding of instructions, dissatisfaction with healthcare professionals, and conflicting schedules.

Non-adherence to treatment for severe asthma poses significant challenges, with non-compliant patients often exhibiting poorer lung function, higher airway eosinophils, and worse asthma control (Foronda et al., 2020). This research holds significance as it may influence U.S. policymakers to revise medication treatment guidelines and provide training for healthcare professionals working with asthmatic Latino patients. It could also raise awareness about the importance of treatment adherence among Latinos with asthma. Other researchers adopting a quantitative research design may also find this study beneficial.

Social Change Implications

Ensuring adequate access to healthcare and fostering social improvements can significantly reduce asthma incidence among Latinos (Mes et al., 2018). Educating the Latino community about the importance of adhering to asthma medication is essential for disease control. Factors such as low income, substandard housing, outdoor air pollution, unhygienic living conditions, exposure to allergens, secondhand smoke, and high-stress levels due to racism should be addressed more broadly. It is crucial to mitigate these social determinants to an extent where Latinos can access adequate healthcare and receive treatment for asthma. To improve medication adherence, physicians can employ strategies like simplifying inhaler administration, education, and electronic reminders.

Discussing potential side effects is also crucial, as patients may be reluctant to take medication due to fear of adverse effects (Arcoleo et al., 2019). Improving the economic conditions of Latinos is also crucial to grant them better access to healthcare. The implications of societal change will benefit not only the Latino population but also non-Latino Whites by raising awareness about the importance of medication adherence (Heintzman et al., 2022).

Research Summary

This chapter presents the study's background, purpose, and problem statement. The research is centered on understanding the association between medication adherence and asthma among Latinos in the United States. This population, being the second largest and prone to asthma, often faces issues such as racism, limited healthcare access, and financial constraints. The research also explores the impact of various societal determinants like geographic location, education level, age, and sex on medication adherence.

The study aims to investigate the significant association between asthma episodes and medication adherence among U.S. Latinos, recurrent asthma episodes among Latinos, and variables such as health insurance, geographic location, gender, age, education level, and unfulfilled prescription medication needs due to cost. This chapter also highlights the research scope, delimitations, significance, and societal implications. As this is a secondary quantitative study, the results will be based on logical reasoning, with data gathered from published articles. The scope of this study is limited to the Latino

population residing in the United States and suffering from asthma. The chapter concludes with an analysis of the social change implications of the study.

Section 2: Research Design and Data Collection

This quantitative cross-sectional study aims to explore the association between medication adherence and asthma among Latinos in the United States, a population that, being the second largest in the nation, has a higher predisposition to asthma. Additionally, this research will evaluate the impact of health insurance and geographic location (urban vs. rural areas) on this relationship while controlling for age, gender, medication cost, and education level. This study serves as an initiative to support U.S. Latinos in their quest for healthier lives, specifically in the context of asthma management.

In Section 2, I outline the research methods adopted for this study, describing the steps taken and the rationale behind each decision. Potential challenges encountered during the study will be detailed, along with the ethical measures to ensure smooth execution. Furthermore, the criteria ensuring the validity and reliability of this study will be highlighted, reinforcing the accuracy and relevance of the research's direction in meeting its purpose and answering the research questions.

Research Design and Rationale

This quantitative cross-sectional study focuses on the associations between variables related to medication adherence for asthma and Latinos. A quantitative cross-sectional design has been chosen for its ability to enable data collection at a single point, making it less time-consuming and cost-effective (Patten & Galvan, 2019). This method facilitates gathering data from a large sample (Wangberg & Woessner, 2021), with

sources chosen for their credibility, thus saving time and aligning with the research's objectives (Karvala et al., 2019).

In this study, the independent variables include gender, age, education level, and health insurance, whereas the dependent variable is the frequency of asthma episodes. The selected quantitative cross-sectional design is fitting for examining the relationship between these independent variables and the dependent variable at one specific point in time (Abu-Bader, 2021). Given the research question's focus on the association between medication adherence and asthma episodes among Latinos with asthma, this design is apt. This design choice is more efficient in terms of time and cost than longitudinal studies, which would require long-term tracking of participants (Singh et al., 2019).

Cross-sectional studies enable gathering data from a larger group, which is crucial when assessing health-related issues within a specific demographic. The choice of a cross-sectional design aligns with the research designs necessary for advancing knowledge in the field (Patten & Galvan, 2019). Such studies are prevalent in health services research, exploring the prevalence of health conditions and factors associated with health outcomes (Singh et al., 2019). This research design can inform health policies and clinical practice by identifying populations at risk for certain conditions and shedding light on factors affecting health outcomes (Abu-Bader, 2021).

Methodology

Population

The target population used in the study is Latinos in the United States who are part of the NHIS data obtained in 2020. The individuals interviewed were civilian

noninstitutionalized populations residing within the 50 states and the District of Columbia at the time of the interviews. The NHIS universe includes residents of households and non-institutional group quarters such as homeless shelters, rooming houses, and group homes. Data from 31,568 sample adults are collected for analysis. Among them, 20,000 are Latinos, and others are non-Latinos. I conducted a Power analysis before analyze the data.

Sampling and Sampling Procedures Used to Collect Data

The study uses secondary data from the NHIS, a significant U.S. data collection program of the National Center for Health Statistics (NCHS; CDC, 2022). The data were collected from January to December 2020 using a face-to-face interview format. The NHIS (2020) uses a geographically clustered sampling technique in the interview process due to its manageability, cost-effectiveness, and timely operations (Stockemer, 2019). The exclusion criteria include persons with no household address (e.g., homeless and transient persons not residing in shelters), active-duty military personnel and civilians living on military bases, people in long-term care institutions (e.g., nursing homes for the elderly, hospitals for the chronically ill or physically or intellectually disabled, and wards for abused or neglected children), and people in correctional facilities.

The NHIS is the central data collection program of the NCHS, which is part of the CDC (CDC, 2020). The data are public, readily available online, and do not require permission for access; they are available for analysis using statistical programs like SPSS and Stata, allowing for comparisons among variables. The information from the survey can be found in various sources, including NCHS Data Briefs, National Health Statistics

Reports, MMWR Quickstats, and publications and articles in scientific and technical journals (CDC, 2020).

The NHIS database was chosen due to the variety of topics and necessary information it provides to represent Latinos in the United States. Compared to other databases, the NHIS provides comprehensive information on the individuals who live in the United States, which is crucial to monitor the nation's health (CDC, 2022). I conducted a power analysis using G*Power software to determine the appropriate sample size for this study. The effect size was estimated based on previous studies examining the relationship between medication adherence and asthma outcomes among Latino populations. A medium effect size of 0.5 was chosen, a conservative estimate. The alpha level was set at 0.05, indicating a 5% chance of making a Type I error. The power level was set at 0.80, indicating an 80% chance of detecting a statistically significant effect if it exists.

A sample size of 203 was determined sufficient for achieving the desired power level and effect size. However, a larger sample of 31,568 adults was chosen to improve the precision and generalizability of the findings. This sample size was determined based on practical considerations and the availability of data rather than the power analysis. A larger sample size increases the power of the study and reduces the risk of Type II errors (Sürücü & Maslakçi, 2020).

Operationalization

The dependent and independent variables selected from the NHIS (2020), are asthma episodes and medical treatment adherence. The dependent variable is asthma

episodes, which represents the last time an individual presented symptoms or had an asthma episode. The independent variable is medication adherence, which focuses on determining whether adults take their medication when having an asthma attack and how often they have it. Age, medication cost, gender, and education level are selected as the covariate. I included covariables to determine whether they influence the relationship between asthma attacks and medication adherence among Latinos in the United States (Hyatt et al., 2020; Kwah & Peter, 2019; Tabyshoba et al., 2022). Other than this, health insurance and urban areas are also considered independent variables.

Asthma was a dependent variable because it provided information on adults' asthma episodes for the last 12 months, and based on this, an evaluation was made. Medication adherence is considered an independent variable because it provided information on how frequently an adult takes preventive asthma medication. The measure of the variable is ordinal, providing the adult with the option of selecting between every day, most days, some days, or never. Different coverage options classify health insurance; the independent variable provided information on an adult's insurance type.

The geographical location of an adult may be critical and affect health outcomes. This study adds the variable of urban areas as an independent variable to analyze how strong the association is for better asthma control. The lower the exacerbation rate, the lower healthcare spending on these diseases (Tabyshoba et al., 2022).

Medication cost was used as a covariable to evaluate why an adult needing a medication prescription did not get it due to cost. The level of measurement of Latinos/Latinos is nominal, which will contribute to understanding the strong association

between asthma and medication adherence compared with other ethnicities. Age as a covariable supported the demographic data to understand in what age range asthma episodes are frequent concerning medication adherence. The education level is measured ordinally and established whether there is a relationship between asthma episodes due to medication adherence and how education level may impact that behavior.

Table 1

Operationalization of Variables

Name of variable	Type of variable	Level of measurement	Location of the item in the survey
Asthma episodes	Dependent variable	Nominal	76
Medication adherence	Independent variable	Ordinal	82
Health insurance	Independent variable	Ordinal	240
Urban areas	Independent variable	Ordinal	23
Medication cost	Covariate	Nominal	405
Gender	Covariable	Nominal	42
Age	Covariable	Ordinal	40-41
Education level	Covariable	Ordinal	40-45

Data Analysis Plan

For the data analysis, the literature review was conducted first to provide the foundation of the study. For the literature review, the search engines included PubMed, Medline, Redalyc, Thoreau, ProQuest Health & amp, Medical Collection, Google Scholar, Google Scholar Alerts, and Science Direct. Search terms used were *access to care, asthma episodes, medication adherence, wellness visit, admission for asthma, gender, health coverage, asthma triggers, inhaler cost, low income, visit ED with asthma symptoms, Latinos,* and *health insurance.*

In this study, missing data will be addressed using *multiple imputations*, a statistical technique used to impute missing data by generating several plausible sets of values for the missing data based on the observed data. The imputations are performed using a statistical model that estimates the missing data's most possible values based on the observed data's patterns (Little & Rubin, 2014). Multiple imputations are preferable to other missing data handling techniques because they preserve the sample size, maintain the variability in the data, and reduce the bias that may be introduced when data is removed, or data analysis is conducted only on complete cases. Also, the imputed datasets allow a researcher to assess the sensitivity of the results to the missing data. After the imputed datasets are generated, they are analyzed, and the results are combined using a method called "Rubin's rules" to obtain the final estimates and statistical inference.

Research Question and Hypotheses

Research Question 1: What is the association between medication adherence and asthma episodes among Latinos in the United States when controlling for age, gender, medication cost, and education level?

H_o1: There is no association between medication adherence and asthma episodes among Latinos in the United States when controlling for age, gender, medication cost, and education level.

H_a1: There is an association between medication adherence and asthma episodes among Latinos in the United States when controlling for age, gender, medication cost, and education level.

Research Question 2: What is the association between health insurance and asthma episodes among Latinos in the United States when controlling for age, gender, medication cost, and education level?

H_o2: There is no association between health insurance and asthma episodes among Latinos in the United States when controlling for age, gender, medication cost, and education level.

H_a2: There is an association between health insurance and asthma episodes among Latinos in the United States when controlling for age, gender, medication cost, and education level.

Research Question 3: What is the association between Latinos living in urban/rural areas and asthma episodes in the United States when controlling for age, gender, medication cost, and education level?

H_o3: There is no association between Latinos living in urban/rural areas and asthma episodes in the United States when controlling for age, gender, medication cost, and education level.

H_a3: There is an association between Latinos living in urban/rural areas and asthma episodes in the United States when controlling for age, gender, medication cost, and education level.

Following a comprehensive literature review, I examined the relationship between asthma episodes (disease occurrence) and various key variables by leveraging data gathered from the NHIS specific to the Latino population in the United States. The analysis relied on a detailed understanding of independent and dependent variables

alongside a range of covariates, including medication cost, gender, age, and education level, to enhance the robustness of the statistical testing. I employed quantitative analysis to test the hypotheses put forth in this study.

Descriptive statistics, comprising mean, median, mode, standard deviation, and skewness, will offer a detailed (micro) and overarching (macro) view of the data—in essence, providing a thorough depiction of the study sample's characteristics. For predictive analysis, inferential statistics were employed. Hypotheses relating to the dependent variable (asthma episodes) and each independent variable (medication adherence, health insurance, and geographical location) were tested using Pearson chi-square (X^2) tests. In the context of these chi-square tests, the value of the phi-coefficient indicated the effect size. Lastly, logistic regression was conducted to assess the covariates' influence, including medication cost, gender, age, and education level. This technique enhanced my understanding of how these covariates might interact with the primary variables of interest, thereby providing a comprehensive picture of factors influencing asthma episodes among Latinos.

The data were extracted from the NHIS (2020). The data were analyzed using a free download of the IBM SPSS (V.28) rom Walden University. Data are commonly used across the Department of Health and Human Services to track progress in achieving national health objectives and to monitor trends in illness and disability (CDC, 2022a). The data contain the survey questions collected from adult interviews, files in IBM SPSS (V.28), and Statistical Analysis Software (SAS). The software contains the variables that were used to perform the study.

For this study, SPSS (V.28) was used to analyze the data. The data contain all variables to perform the study and test the hypothesis. The dataset excludes all direct identifiers and any characteristics that could lead to identification to preserve surveyors' identity and privacy (CDC, 2022b). The National Health Survey is a complete and detailed survey that collects the population's current health status, income status, education level, preferences, and opinions. In 2019, telephone interviews accounted for 34.3% of the Sample Adult interviews (CDC, 2020b). The survey is available online for data users or researchers, making it possible to do cross-sectional studies or test variables to establish associations.

Threats to Validity

Maintaining the integrity and accuracy of research requires careful consideration of potential threats to validity, which can impact internal, external, construct, and statistical validity (Matthay & Glymour, 2020). Internal validity pertains to the accuracy of the study's results and the study's ability to accurately address the hypothesis (Patino & Carvalho, 2018). Factors such as measurement errors or participant selection could threaten this study's internal validity. However, since this research utilizes secondary data from a credible source, the risk of these threats is low (Andrade, 2018). Rigorous statistical analysis was performed, providing logical justification for the results, and further strengthening internal validity (Findley et al., 2021). Nonetheless, continuous monitoring for potential bias and systematic errors remains crucial to ensure robust internal validity.

External validity involves generalizing the study's results to other populations or scenarios (Andrade, 2018). The findings from this research are primarily applicable to the Latino population in the United States and may not be directly transferrable to other demographics. However, these findings serve as a valuable basis for future studies exploring other populations. Construct validity addresses whether the study accurately measures what it intends to measure. This study has been ensured by closely aligning the research design, data collection, and analysis methods with the study's objectives and research questions.

Statistical validity is essential to ensure that the statistical analyses used to test the hypothesis are appropriate (Simms & Watson, 2007). Rigorous and relevant statistical tests were applied in this study, enhancing the reliability of the findings, and reducing potential threats to statistical validity. As suggested by Grigsby and McLawhorn (2019), the applied statistical techniques were reviewed by peers to ensure their appropriateness to the study's specific objectives. Despite the careful measures taken to address potential threats to validity, it remains imperative to reassess these threats throughout the research process continuously. This iterative approach helps maintain the robustness of the study's findings and conclusions.

Ethical Procedures

This study employs secondary data from the NHIS (2020). Ethical considerations are essential in any research, and the secondary data's quality and ethical treatment are significant concerns. The NHIS, a public access dataset collected since 1957, is a reputable source of data (CDC, 2021). Identifiers within the dataset were removed at the

source, ensuring the anonymity of the participants. For this research, the confidential data obtained will be stored securely on password-protected drives accessible only to the researcher. The data will be disseminated only in aggregate form, without any identifying information, in line with the data protection policies of the NHIS. The data will be destroyed upon completion of the study as per ethical guidelines. No conflicts of interest are associated with this study (Tripathy, 2013).

Summary

Section 2 of this study presented a comprehensive outline of the research design and methodology, detailing using a quantitative cross-sectional approach and secondary data from the NHIS. A detailed description of the study's variables, their types, and measurement levels was provided, along with the rationale for the chosen population. Detailed plans were also laid out for conducting statistical analyses using SPSS (V.28), and potential threats to validity were addressed with corresponding mitigation strategies.

The following section, Section 3, will build on this foundation and delve deeper into the statistical analyses performed to test the hypothesis. The focus will be on presenting logical reasoning for the content and providing a relationship between the selected variables.

Section 3: Presentation of the Results and Findings

This quantitative cross-sectional study aimed to explore the association between medication adherence and asthma among Latinos in the United States. Additionally, this research evaluated the impact of health insurance and geographic location (urban vs. rural areas) on this relationship while controlling for age, gender, medication cost, and education level. The following research question guided this study:

- **Research Question 1:** What is the association between medication adherence and asthma episodes among Latinos in the United States when controlling for age, gender, medication cost, and education level?

  H_o1: There is no association between medication adherence and asthma episodes among Latinos in the United States when controlling for age, gender, medication cost, and education level.

  H_a1: There is an association between medication adherence and asthma episodes among Latinos in the United States when controlling for age, gender, medication cost, and education level.

- **Research Question 2**: What is the association between health insurance and asthma episodes among Latinos in the United States when controlling for age, gender, medication cost, and education level?

  H_o2: There is no association between health insurance and asthma episodes among Latinos in the United States when controlling for age, gender, medication cost, and education level.

H_a2: There is an association between health insurance and asthma episodes among Latinos in the United States when controlling for age, gender, medication cost, and education level.

- **Research Question 3**: What is the association between Latinos living in urban/rural areas and asthma episodes in the United States when controlling for age, gender, medication cost, and education level?

  H_o3: There is no association between Latinos living in urban/rural areas and asthma episodes in the United States when controlling for age, gender, medication cost, and education level.

  H_a3: There is an association between Latinos living in urban/rural areas and asthma episodes in the United States when controlling for age, gender, medication cost, and education level.

Results

Descriptive Analysis

Table 2 displays the frequency counts for selected variables. Most respondents were adults between 18 and 64 years old (68.0%). Male respondents comprised 46.0% of the sample analyzed, whereas female respondents comprised 54.0%. For the education level variable, 23.0% attended high school, 54.9% had a bachelor's degree, 15.8% had a master's degree, and 6.0% had a doctoral degree. Five percent of individuals reported needing a prescription medication but did not get it due to cost. Nearly 25% of respondents reported an asthma episode. Individuals with an asthma episode during the last 12 months were (25.2%). Most people reported not taking medication every day

(43.6%). Seven percent reported not having health insurance coverage. Individuals living in a large central metro area comprised 29.6% of the sample, large fringe metro residents were 23.6%, medium and small metro residents were 31.8%, and non-metropolitan residents were 15.1%.

Table 2

Frequency Counts for Selected Variables

Variables	*n*	%
Age		
Adults	21473	68.0
Senior adults	10025	31.8
Gender		
Female	17045	54.0
Male	14521	46.0
Education level		
High school	7276	23.0
Bachelor's	17326	54.9
Master's	4994	15.8
Doctorate	1901	6.0
Medication cost		
No	21458	94.2
Yes	917	5.1
Asthma episodes		
No	3242	74.6
Yes	1097	25.2
Medication adherence		
Never	1154	43.6
Every day	835	31.5
Most days	176	6.6
Some days	476	18.0
Health insurance		
Not covered	2417	7.7
Covered	29085	92.1
Urban/rural areas		
Large central metro	9336	29.6
Large fringe metro	7440	23.6
Medium small metro	10041	31.8
Nonmetropolitan	4751	15.1

Note. N = 31,568. Don't know/refused cases have been deleted from the analysis.

Bivariate Findings

Bivariate analysis was undertaken to examine the association between independent and dependent variables. Table 3 indicates that chi-square has no association between asthma episodes and medication adherence ($X^2 = 6.00$, $p = .11$). Table 4 demonstrates that chi-square has no association between asthma episodes and health insurance ($X^2 = 0.78$, $p = .37$). Table 5 demonstrates that chi-Square has no association between asthma episodes and living in rural/urban areas ($X^2 = 4.92$, $p = .17$).

Table 3

Bivariate Analysis: Asthma Episodes and Medication Adherence

	Never			Every day			Most days			Some days				
Asthma episodes	*n*	%	Adjusted residual	*n*	%	Adjusted residual	*n*	%	Adjusted residual	*n*	%	Adjusted residual	X^2	Likelihood ratio
0	865	75.0	-.2	649	77.7	2.1	126	71.6	-1.1	345	72.5	-1.5	6.00	0.11
1	289	25.0	.2	186	22.3	-2.1	50	28.4	1.1	131	27.5	1.5		

Table 4

Bivariate Analysis: Asthma Episodes and Health Insurance

	Not covered			Covered				
Asthma episodes	*n*	%	Adjusted residual	*n*	%	Adjusted residual	X^2	Likelihood ratio
0	251	76.8	.9	2991	74.6	-.9	0.78	0.37
1	76	23.2	-.9	1021	25.4	.9		

Table 5

Bivariate Analysis: Asthma Episodes and Urban/Rural Areas

	Large central metro			Large fringe metro			Medium and small metro			Nonmetropolitan				
Asthma episodes	*n*	%	Adjusted residual	*n*	%	Adjusted residual	*n*	%	Adjusted residual	*n*	%	Adjusted residual	X^2	Likelihood ratio
0	1919	59.2	.3	316	9.7	-1.6	730	22.5	-.3	277	8.5	1.7	4.92	0.17
1	644	58.7	-.3	125	11.4	1.6	252	23.0	.3	76	6.9	-1.7		

Logistic Regression Analysis

First Model

Research Question 1: What is the association between medication adherence and asthma episodes among Latinos in the United States when controlling for age, gender, medication cost, and education level?

H_o1: There is no association between medication adherence and asthma episodes among Latinos in the United States when controlling for age, gender, medication cost, and education level.

H_a1: There is an association between medication adherence and asthma episodes among Latinos in the United States when controlling for age, gender, medication cost, and education level.

Tables 6, 7, and 8 display the first logistic regression model used to test whether medication adherence, age, ethnicity, medication cost, and education level significantly predicted asthma episodes. Table 6, the model summary, shows the Pseudo R -Square (.006). In this case, it is possible to conclude that a 6% change in the criterion variable can be accounted for as the predictor variable in the model. Table 7 shows a classification table. Overall, the accuracy rate was good at 75.2%. The model exhibits reasonable specificity (100%) among those not reporting asthma episodes in the last 12 months.

Table 8 presents the parameter estimates as an individual analysis of predictors. The variable of medication adherence was entered as a categorical in the logistic regression. When examining the effect of medication adherence on asthma episodes, logistic regression found no significant effects. When compared to the referent,

medication adherence some days (p = .102), medication adherence never (β = .854, p = .144), medication adherence every day (β = 1.179, p = .363), and medication adherence most days (β = 1.144, p = .27). When examining the effect of education level on asthma episodes, logistic regression found no significant effects. When compared to the referent, doctoral degree, master's degree (β = 1.143, p = .248), bachelor's degree (β = 1.276, p = .110), and high school (β = .908, p = .645). Gender (β = 1.101, p = .286) and age (β = .995, p = .961) did not significantly predict asthma episodes. In conclusion, in Model 1, there is no significant predictor for asthma episodes.

The first logistic regression model was performed to ascertain the effects of medication adherence, medication cost, education level, sex, and age on participants' likelihood of having an asthma episode. The logistic regression model was not statistically significant, X^2= 11.246, p = .259. The model explained 6% (Nagelkerke R^2) of the variance in asthma episodes and correctly classified 75.2% of cases. Individuals who never take medication were .854 times more likely to exhibit asthma episodes than those who take their medication every day.

Table 6

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	2949.634[a]	.004	.006

Table 7

Classification Table

			Predicted		
			Asthma episodes		Percentage
	Observed		No	Yes	correct
Step 1	Asthma episodes	0	1985	0	100.0
		1	656	0	.0
	Overall percentage				75.2

Table 8

Regression Coefficients for Asthma Episodes and Medication Adherence Among Latinos in the United States

		B	*SE*	Wald	*df*	Sig.	Exp(B)
Step 1[a]	MA-some days			6.206	3	.102	
	MA -never	-.157	.108	2.136	1	.144	.854
	MA -every day	.164	.181	.828	1	.363	1.179
	MA -most days	.135	.123	1.195	1	.274	1.144
	Medication Cost	-.022	.232	.009	1	.925	.978
	EL- doctorate			3.958	3	.266	
	EL- masters	.133	.115	1.335	1	.248	1.143
	EL-bachelors	.244	.153	2.553	1	.110	1.276
	EL- high school	-.097	.210	.212	1	.645	.908
	Gender	.096	.090	1.139	1	.286	1.101
	Age	-.005	.098	.002	1	.961	.995
	Constant	-1.246	.124	100.931	1	<.001	.288

[a] Variables entered on Step 1: Medication Adherence (MA), Health Insurance, Urban/Rural Areas, Medication Cost, Education Level (EL), Gender, Age.

Second Model

Research Question 2: What is the association between health insurance and asthma episodes among Latinos in the United States when controlling for age, gender, medication cost, and education level?

H_o2: There is no association between health insurance and asthma episodes among Latinos in the United States when controlling for age, gender, medication cost, and education level.

H_a2: There is an association between health insurance and asthma episodes among Latinos in the United States when controlling for age, gender, medication cost, and education level.

Tables 9, 10, and 11 displays the second logistic regression model used to test if health insurance, age, ethnicity, medication cost, and education level significantly predicted asthma episodes. Table 9, the model summary, shows the Pseudo R -Square (.003). In this case, it is possible to conclude that a 3% change in the criterion variable can be accounted for as the predictor variable in the model. Table 10 shows a classification table. Overall, the accuracy rate was good at 74.7%. The model exhibits reasonable specificity (100%) among those not reporting asthma episodes in the last 12 months.

Table 11 presents the parameter estimates as an individual analysis of predictors. Table 11 displays that health insurance ($\beta = 1.124$, $p = .393$) and medication cost ($\beta = .888$, $p = .518$) did not significantly predict asthma episodes. When examining the effect of education level on asthma episodes, logistic regression found no significant effects. When compared to the referent, doctoral degree ($p = .093$), master's degree ($\beta = 1.137$, $p = .166$), bachelor's degree ($\beta = 1.210$, $p = .110$), and high school ($\beta = .843$, $p = .306$). Gender ($\beta = 1.043$, $p = .548$), and age ($\beta = .960$ $p = .592$) did not significantly predict

asthma episodes. In conclusion, in Model 2, there is no significant predictor for asthma episodes.

The second logistic regression model was performed to ascertain the effects of health insurance, medication cost, education level, sex, and age on participants' likelihood of having an asthma episode. The logistic regression model was not statistically significant, $X^2 = 8.441$, $p = .29$. The model explained 3% (Nagelkerke R2) of the variance in asthma episodes and correctly classified 74.7% of cases. Individuals with no health insurance were 1.124 times more likely to exhibit asthma episodes than those who have health insurance.

Table 9

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	4898.129[a]	.002	.003

Table 10

Classification Table

			Predicted		
			Asthma episodes		
	Observed		No	Yes	Percentage correct
Step 1	Asthma episodes	0	3242	0	100.0
		1	1097	0	.0
	Overall percentage				74.7

Table 11

Regression Coefficients for Asthma Episodes and Health Insurance Among Latinos in United States

Variable	B	*SE*	Wald	*df*	Sig.	Exp(B)
Health Insurance	.117	.136	.731	1	.393	1.124
Medication Cost	-.119	.185	.417	1	.518	.888
EL-doctorate			6.424	3	.093	
EL-masters	.128	.093	1.918	1	.166	1.137
EL- bachelors	.191	.119	2.556	1	.110	1.210
EL- high school	-.171	.167	1.047	1	.306	.843
Gender	.042	.070	.361	1	.548	1.043
Age	-.041	.076	.287	1	.592	.960
Constant	-1.289	.152	72.381	1	<.001	.275

Note. Variable(s) entered on Step 1: Health Insurance, Medication Cost, Education Level (EL), Gender, Age.

Third Model

Research Question 3: What is the association between Latinos living in urban/rural areas and asthma episodes in the United States when controlling for age, gender, medication cost, and education level?

H_o3: There is no association between Latinos living in urban/rural areas and asthma episodes in the United States when controlling for age, gender, medication cost, and education level.

H_a3: There is an association between Latinos living in urban/rural areas and asthma episodes in the United States when controlling for age, gender, medication cost, and education level.

Tables 12, 13, and 14 displays the third logistic regression model used to test whether living in urban/rural areas, age, ethnicity, medication cost, and education level

significantly predicted asthma episodes. Table 12, the model summary, shows the Pseudo R -Square (.004). In this case, it is possible to conclude that a 4% change in the criterion variable can be accounted for as the predictor variable in the model. Table 13 shows a classification table. Overall, the accuracy rate was good at 74.7%. The model exhibits reasonable specificity (100%) among those not reporting asthma episodes in the last 12 months.

Table 14 presents the parameter estimates as an individual analysis of predictors. The variable of living in urban and rural areas was entered as a categorical in the logistic regression. When examining the effect of urban/rural areas on asthma episodes, logistic regression found no significant effects. When compared to the referent, large fringe metro (p =.186), large central metro ($\beta = 1.185$, $p = .141$), medium small metro ($\beta = 1.035$, $p = .687$), and non-metropolitan ($\beta = .827$, $p = .169$). When examining the effect of education level on asthma episodes, logistic regression found no significant effects. When compared to the referent, doctoral degree ($p = .099$), master's degree ($\beta = 1.131$, $p = .184$), bachelor's degree ($\beta = 1.203$, $p = .122$), and high school ($\beta = .838$, $p = .290$). Gender ($\beta = 1.046$, $p = .518$), and age ($\beta = .960$ $p = .597$) did not significantly predict asthma episodes. In conclusion, in model 3, there is no significant predictor for asthma episodes.

The third logistic regression model was performed to ascertain the effects of living in urban/rural areas, medication cost, education level, sex, and age on participants' likelihood of having an asthma episode. The logistic regression model was not

statistically significant, (X^2= 12.547, p = 0.18). The model explained 4% (Nagelkerke R2) of the variance in asthma episodes and correctly classified 74.7% of cases.

Table 12

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	4894.129[a]	.003	.004

Table 13

Classification Table

			Predicted		
			Asthma Episodes		
	Observed		No	Yes	Percentage correct
Step 1	Asthma episodes	0	3242	0	100.0
		1	1097	0	.0
	Overall percentage				74.7

Table 14

Regression Coefficients for Asthma Episodes and Urban and Rural Areas Among Latinos in United States

Variable		B	*SE*	Wald	*df*	Sig.	Exp(B)
Step 1[a]	U/R Areas-large fringe metro			4.810	3	.186	
	U/R Areas- large central metro	.170	.155	2.172	1	.141	1.185
	U/R Areas-medium central metro	.035	.086	.362	1	.687	1.035
	U/A Areas-non-metropolitan	-.190	.138	1.889	1	.169	.827
	Medication Cost	-.124	.185	.451	1	.502	.883
	EL-doctorate			6.280	3	.099	
	EL-masters	.123	.093	1.769	1	.184	1.131
	EL-bachelors	.185	.120	2.387	1	.122	1.203
	EL- high school	-.177	.167	1.118	1	.290	.838
	Gender	.045	.070	.418	1	.518	1.046
	Age	-.040	.076	.280	1	.597	.960
	Constant	-1.190	.096	152.335	1	<.001	.304

a. Variable(s) entered on step 1:U/R: Urban/Rural Areas, Health Insurance, Medication Cost, EL: Education Level, Gender, Age.

Table 15 shows a dummy analysis after the logistic regression. Model 1 suggests that those who do not take medication (never, $\beta = -0.02$) and those who take it (every day, $\beta = -0.05$) as compared to medication adherence (some days) see fewer units on the dependent variable. Individuals who take their medication (most days, $\beta = -0.00$) as compared to medication adherence (some days) see an increase in the dependent variable. Medication adherence for the group of those who take medication every day as compared to those who never take medication shows a significant association.

Table 2

Dummy Variables Analysis

Model	Constant	B	Sig
1	Medication adherence=never	-0.25	0.29
	Medication adherence=every day	-0.52	0.03
	Medication adherence=most days	.00	0.81
2	Urban/rural areas=large central metro	-0.03	0.15
	Urban/rural areas=medium and small metro	-0.02	0.28
	Urban/rural areas=nonmetropolitan	-0.06	0.02
3	Education Level=master's	0.06	0.05
	Education level=bachelor's	0.05	0.06
	Education level=high school	0.02	0.02

Note. Dependent variable: Asthma episodes, 1. Medication adherence= some days. 2. Urban/rural areas= Large fringe metro. 3. Education Level=doctorate.

Summary

In summary, the secondary data cross-sectional study used data from the National Health Survey (2020), with a total of 31,568 respondents, to examine the relationship between medication adherence and asthma episodes among Latinos in the United States. Descriptive statistic was explained in detail (see Table 2), in which five percent of individuals reported needing a prescription medication but did not get it due to cost. Nearly twenty-five percent of respondents reported an asthma episode. The association between independent and dependent variables shows no association (See Tables 3, 4, and 5). Tables 6, 7, and 8 display the logistic regression models used to test if medication adherence, age, ethnicity, medication cost, and education level significantly predicted asthma episodes. Model 1 shows that there is no significant predictor for asthma episodes. The second logistic regression model was used to test if individuals living in urban and rural areas, age, ethnicity, medication cost, and education level significantly

predicted asthma episodes; Model 2 does not predict asthma episodes (see Tables 9, 10, and 11). Tables 12, 13, and 14 display the third logistic regression model used to test if health insurance, age, ethnicity, medication cost, and education level significantly predicted asthma episodes; Model 3 does not predict asthma episodes. In Section 4, the conclusion and implications will be developed.

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

In this quantitative cross-sectional study, I explored the association between medication adherence and asthma among Latinos in the United States. Additionally, this research evaluated the impact of health insurance and geographic location (urban vs. rural areas) on this relationship while controlling for age, gender, medication cost, and education level. The theoretical framework employed assessed the behavioral health characteristics of predisposing, enabling, and need factors that influenced access to healthcare services for Latinos with asthma episodes in the United States. Prior to this research, researchers had indicated that around 18.7 million adults in the United States are affected by asthma morbidity, and it is a prevailing cause among the population of Latinos (Lee et al., 2018). Many studies showed that Latinos are the least adherent to medical regimens to treat chronic asthma episodes (Kim et al., 2020). Hence, because of the combination of higher asthma rates and non-medication adherence, Latinos might be in danger of worse asthma well-being results (Ramsahai et al., 2019). In asthma patients, greater adherence is associated with improved health outcomes like better disease control, decreased severity, and fewer costly exacerbations. Studies have reported that adherence is defined as a multifaceted notion comprising unintentional and intentional causes that patients might not take medications provided by doctors as directed (Afuwape et al., 2022).

The primary hypotheses used to determine associations between asthma episodes and medication adherence are as follows:

- H_o1: There is no association between medication adherence and asthma episodes among Latinos in the United States when controlling for age, gender, medication cost, and education level.
- H_o2: There is no association between health insurance and asthma episodes among Latinos in the United States when controlling for age, gender, medication cost, and education level.
- H_o3: There is no association between Latinos living in urban/rural areas and asthma episodes in the United States when controlling for age, gender, medication cost, and education level.

The associated research questions were the following:

- RQ1**:** What is the association between medication adherence and asthma episodes among Latinos in the United States when controlling for age, gender, medication cost, and education level?
- RQ2: What is the association between health insurance and asthma episodes among Latinos in the United States when controlling for age, gender, medication cost, and education level?
- RQ3: What is the association between Latinos living in urban/rural areas and asthma episodes in the United States when controlling for age, gender, medication cost, and education level?

Key Findings of the Study

Research Question 1 examined the association between medication adherence and asthma episodes among Latinos in the United States when controlling for age, gender,

medication cost, and education level; after analysis, no significant predictors emerged. Similarly, with Research Question 2, the association between health insurance and asthma episodes among Latinos in the United States when controlling for age, gender, medication cost, and education level also did not identify any significant predictors. Research Question 3, which analyzes the association between health insurance and asthma episodes among Latinos in the United States when controlling for age, gender, medication cost, and education level, demonstrates no association and non-significant predictors. The Asthma Insights and Reality study revealed that many patients frequently accept a quality of life far lower than possible when prescribed management techniques and asthma medicines are used (Apps et al., 2019). It may be possible to attain better overall asthma control by raising patients' and physicians' expectations of what can be accomplished with asthma therapy.

Interpretation of the Findings

This study proved no association between medication adherence and asthma episodes among Latinos in the United States when controlling for age, gender, medication cost, and education level. Furthermore, it proved no association between asthma episodes and health insurance coverage; asthma episodes and living in urban/rural area when controlling for age, gender, medication cost, and education level.

Around 18.7 million adults in the United States are affected by asthma morbidity, and it is a prevailing cause among the population of Latinos (Lee et al., 2018). Latinos are distinguishably represented as the poor population in the United States; therefore, the application of sufficient access to health care and social improvements (e.g., enhancing

housing conditions of Latino populations) has a major effect on reducing asthma disease in Latino population, therefore, the higher asthma diseases and death rates in Latinos are higher as compared to Caucasians (Krings et al., 2019). From the survey conducted in 2009, the prevalence rate of this disease among Latinos in Napa County, California, was around 16.2% as compared to the general population which was 13.7% (Lee et al., 2018). Many studies have shown that Latinos are the least adherent to medical regimens to treat chronic asthma morbidity (Kim et al., 2020). Hence, because of the combination of higher asthma rates, drug non-adherence, and low pay/language obstructions, Latinos might be in danger of decreased asthma well-being results (Ramsahai Hansbro & Wark, 2019). According to the NHIS (2001-2010), the occurrence of current asthma was elevated in one of the subgroups of Latino; Puerto Ricans (16.1%) and was least in Mexican Americans (5.4%; Holguin et al., 2020). Latinos in the United States present stressors like poverty, disproportional social advantages, racism, and physical or sexual abuse (Holguin et al., 2020).

It is reported that medication adherence is necessary for minimizing the adverse outcomes of asthma. Non-adherence to medication comprises failing or delating in filling prescriptions, minimizing the frequency of administration, and cutting dosage (Gabr & Shams, 2015). It is anticipated that the non-adherence to medication results in the worsening of the patient's condition. Not only this, but it also leads to making the healthcare experience quite costly. Studies have reported that around 33%–69% of hospital admissions in the United States of severe asthma cases are the results of non-adherence to medications (Gabr and Shams, 2015). Moreover, it is estimated that around

125,000 deaths in the United States each year are due to medication non-adherence (Gabr and Shams, 2015).

Studies have highlighted that even though asthma is a symptomatic condition, medication adherence for asthma patients is suboptimal, around 30% to 50% (Bidwal et al., 2017). Similar to this study, another study showed that numerous factors can results in non-adherence to asthma medications in the Latino population (McQuaid et al., 2012). These factors comprised medication cost, low socioeconomic status, language barriers, low literacy, and access to care (Reeves et al., 2022). Other studies also reported elevated rates of medication adherence in Caucasians, older, higher socioeconomic status, and lower comorbidity population (Chawa et al, 2020). The Midwestern integrated health system conducted research that showed that the lowest adherence rates are reported in the cases of severe asthma and patients with chronic conditions (Rolnick et al., 2013). Results of that study showed that only 33% of the asthma patients with chronic conditions showed full adherence to the asthma medications, and most of the selected patients who showed low adherence to medication were found to be of Latino descent, with the age around 18–49 years.

Another study can be highlighted in which adherence rates of the controller asthma medications were evaluated in the community pharmacy setting at 15 different places throughout Utah (Feehan et al., 2015). The study showed that around 14%–15% of asthma patients reported full adherence to the asthma medication for over 6 months (Feehan et al., 2015). Other than this, it is reported that female, older patients, and patients treated with the mix of Inhaled Corticosteroid Combination (ICB) & Inhaled

Long-Acting Beta2-Agonist (LABA), in comparison to those given ICS alone, showed an increased rate of adherence (Averell et al., 2021). Another study showed that patients treated with a combination of ICS & LABA were found to have more chances of medication adherence (Ichinose et al., 2017).

Successful asthma treatment requires regular tracking of symptoms and measuring how well the lungs function. To treat asthma, patients must play an active role in managing better and long-term asthma morbidity, preventing asthma attacks, and preventing long-term issues (Hill et al., 2019). For treating asthma, patients must maintain a record as per the advice given by the physician in which the patient has to record various symptoms such as whistling sounds, the color of phlegm, disturbed sleep, and tightness of the chest (Papadopoulos et al., 2019). From the results obtained the treatment is planned. There are two types of medical regimens for asthma: the long-term control prescription in which inhaled corticosteroids are the vital medications used to calm the asthma attack (Zanobetti et al., 2022). This medicine treats the inflammation of the airways, which causes asthma. Second is quick-relief inhalers comprised of fast-acting medication such as albuterol, also known as rescue inhalers, which rapidly open the airways and make breathing easier. A long-term regimen keeps asthma under control and in the green zone (Lee et al., 2020).

There is broad consensus regarding the effects of age on asthma. Numerous studies have revealed that due to their smaller lungs, boys exhibit more asthma-related symptoms than girls do at an early age (Sbihi et al., 2019). To find evidence that puberty affects asthma, researchers considered over 30 years of authentic articles to review the

relationship between age and gender with asthma. According to the research conducted by Shrine et al. (2019), boys had higher asthma before the age of 10 or until their mid-teens, but puberty did not appear to impact asthma outcomes. According to Sohn et al. (2018), girls had more excellent lung function than boys during childhood (up to the age of 18), but the opposite was true for adults (from the age of 20 years and above).

Limitations of the Study

This quantitative cross-sectional study examined the association between medication adherence and asthma among Latinos in the United States. Additionally, this research evaluated the impact of health insurance and geographic location (urban vs. rural areas) on this relationship while controlling for age, gender, medication cost, and education level. A potential limitation of using secondary data is that they were collected by someone else for a different purpose; there may be missing information that could affect the desired analysis. A potential limitation of chi-square analysis is the assumption of independence between variables. If there are underlying dependencies or confounding factors that are not accounted for, it may affect the validity of the results. One potential limitation is the inability to establish causality. Since cross-sectional studies capture data at a single point in time, it can be challenging to determine the temporal sequence between variables. Additionally, cross-sectional studies may suffer from selection bias, as participants are not followed over time. This can limit the generalizability of the findings to the broader population.

Recommendations

Many people mistakenly believe that asthma is a condition that only affects children, yet longitudinal studies have revealed that maturity, not childhood, is when most middle-aged individuals with asthma first developed symptoms (Michalik et al., 2018). This secondary study established an association between asthma episodes and medication adherence. Future research should concentrate on analyzing the factors that may contribute to a person not taking the medications prescribed by providers. This is a main issue for a person with asthma due to the risk of having an asthma episode. The main goal should be identifying those barriers or factors and establishing a public health policy that addresses the factors that contribute to an individual on being compliance with their medication.

The second recommendation for future researchers is based on the creation of strong and routine educational programs for children and adults. The educational program can be concentrated on learning how to use medical equipment, and the difference between control and rescue inhalers. Rescue medications (Quick-Relief Medications) are taken for effective and fast response to relieve the patient from asthma attacks (Ramratnam et al., 2017) and operate by relaxing the airway muscles. These medications are found to show results within a few minutes and are effective for 4-6 hours (Zahran et al., 2015). However, it is not effective or recommended for daily use. Many individuals use this before playing games or exercising to prevent themselves from an asthma attack or breathing shortening (Ramratnam et al., 2017). These are effective for minor cases or patients who experience an infrequent asthma attack. Long-term asthma control

medications, taken daily, help control the symptoms and prevent asthma attacks (Peláez et al., 2015). During asthma attacks, such medications control the patient's condition and is also considered a lifesaver (Cazzola et al., 2021). Long-term asthma control medications include Leukotriene modifiers, inhaled corticosteroids, combination inhalers, long-acting muscarinic antagonists (LAMAs), and long-acting beta agonists (LABAs).

The third recommendation is to analyze other areas of behavior that may affect asthma, such as dietary habits. Numerous studies have been done on the connection between certain dietary variables and asthma or allergy illnesses (Zhang et al., 2021). There is significant evidence that dietary lipids may affect asthma and allergy, and eating fruits and vegetables can be helpful in allergies or pulmonary illnesses (Adikusuma et al., 2022). A high intake of fast food has been linked to a higher risk of developing asthma. Research on the relationship between dietary variables and environmental contamination is scarce. According to Alsaimary & Mezban (2021), people who smoke or live in places with high levels of ambient air pollution should include more antioxidants in their diets. The study by Barnthouse and Jones (2019) described that seasonal allergy sufferers experienced worse allergic symptoms throughout the pollen season if their zinc intake was lower. Furthermore, individuals who consumed the least vitamin C, manganese, and magnesium showed higher levels of bronchial hyperresponsiveness.

Implications for Professional Practice and Social Change

Professional Practice

Healthcare professionals, patients, and their family members face many challenges during treatment (King et al., 2018). Challenges related to asthma

management include treatment challenges, challenges related to follow-up, and general challenges (Usmani, 2019). These challenges are related to the unavailability of necessary asthma medicines and the high cost of treatment. The expensive nature of inhaled corticosteroids is a possible barrier to treating asthmatic patients, especially in underdeveloped countries (Agache et al., 2019). The absence of necessary instruments like spacer devices and nebulizers, which can be used as an effective medicine to administer, constitutes a significant challenge that affects the proper management and cure of asthma-related issues (Scavone et al., 2019). Even if the devices are found, the poor use techniques implemented in taking up the medicine and devices, particularly the inhaled drugs, contain a high risk of health deficiency and poor control of asthma.

The pressurized metered-dose inhaler (pMDI) is considered to be a widely used and inexpensive device that can be used with a combination of a spacer device (López-Campos et al., 2019). The medication is either suspended or dissolved under the pressure of propellant (López-Campos, Gallego & Hernández, 2019). Other instruments include breath-activated devices, which have a drug-triggering mechanism engaged during inhalation. Inhalers that use the dry powdery substance, including the Diskhaler, Turbohaler, Diskus, Rotahaler and Accuhaler are triggered by the patient's inspiration (Andrenacci et al., 2022). The stimulus breaks the powdered medication into small pieces (Lenney et al., 2018). To ensure that patients benefit from these devices, healthcare professionals must be prudent and persistent and repeatedly train the patients about them (Papadopoulos et al., 2019). If the patients frequently do not receive this education, it results in the poor utilization of oral medicines.

There is also a communication gap between healthcare professionals and patients and a shortage of patient self-monitoring devices and instructional resources (Kaplan & Price, 2020). Failure to follow up issues will result in poor asthma control, more frequent asthma exacerbations, and more frequent trips to the ER. According to a survey conducted by Amin et al. (2020), only 8.1% of asthmatic patients had their asthma under control, while 22.6% had only partially controlled asthma. Furthermore, the administrative personnel of public hospitals frequently lack the willingness to provide basic infrastructure, like asthma clinic registers, asthma clinics, recall systems and appointments in the clinics, and participation of nurses and doctors in asthma care training programs (Vijverberg et al., 2020). Additionally, not many skilled public health nurses typically play a significant role in assuring the quality of care in asthma programs by routinely recognizing staff needs and creating plans to deal with issues in asthma management (Kaplan et al., 2019). Poor medicine-buying regulations allow people to obtain drugs that are used to treat asthma incorrectly or even to start attacks (Katsaounou et al., 2018). The purchase of over-the-counter drugs like beta blockers and non-steroidal anti-inflammatory drugs (NSAIDs) is known to cause asthma episodes.

Other common issues include the inability to comprehend the cause of the rising prevalence of asthma despite all management efforts, the lack of a proper primary prevention plan, and the high expense of transportation to a medical facility (Wadhwa et al., 2019). We also require the effective enclosure of industrial activities and suitable ventilation to lessen the impact of general atmospheric pollution as a trigger for asthmatic attacks (Andrenacci et al., 2022). Poor communication is a key obstacle to better asthma

control, according to follow-up evaluations from doctors and patients concerning symptom and side-effect levels, awareness, and adherence to doctor-recommended treatment regimens (Golebski et al., 2020). These frequently result in discrepancies between the professional and patient aims.

Patients frequently compromise their respiratory health by making their own therapeutic decisions, which results in poor adherence to treatments (Gade et al., 2022). This is due to doctors' assumptions about how well their patients understand the symptoms and side effects of asthma, which frequently cause patients confusion about the tolerability and success of treatment (Esmaeilzadeh et al., 2020). The Asthma Insights and Reality study's findings revealed that many patients frequently accept a quality of life far lower than possible when prescribed management techniques and asthma medicines are used (Apps et al., 2019). It may be possible to attain better overall asthma control by raising patients' and physicians' expectations of what can be accomplished with asthma therapy.

Additionally, pharmaceutical firms could assist in overcoming these obstacles by working with the government to lower or subsidize the cost of asthma treatments (Agache et al., 2019). By doing this, asthma patients can maintain effective asthma control because they will not be unable to afford their medications (Scavone et al., 2019). Additionally, there is a need to start retraining and educating healthcare professionals about the current management of asthma through consistent CPD/CME activities (López-Campos et al., 2019). To guarantee that they focus on preventing asthma exacerbations rather than treating them, patients and their families must receive ongoing education,

participate in treatment support groups, and have access to after-hours clinic interactions and telephone evaluations.

This study probes the necessity to continue searching for an urgent strategy to decrease the disease burden across Latinos. Considering the role of health professionals, it is evaluated that proper training must be provided to patients to deal with different cases of asthma and to make them learn practical strategies to increase their level of communication and understanding with the patient, necessary to ensure that the patient takes medications on time and as the provided guidelines (Gillespie et al., 2018). Moreover, weekly or monthly follow-ups with patients are required to analyze the effectiveness of the medication and to make possible changes in the treatment plan as per the identified need for better improvement (Zheng et al., 2021).

Positive Social Change

Asthma prevalence has surged in recent decades, with an estimated 25 million Americans currently suffering from the condition, including more than 6 million children. Von Mutius and Smits (2020) suggested that the poor control of asthma brought on by co-morbidities, inaccurate diagnosis, and poor adherence is referred to as difficult-to-treat asthma. Fatal exacerbations and recurrent are more common in people with difficult-to-treat and severe asthma (Wilkinson et al., 2022). General practitioners (GPs) must implement a systematic approach to the care of patients with difficult-to-treat asthma to determine which patients' conditions may improve by addressing contributory variables (Zhang et al., 2021). Therefore, Hufnagl et al. (2020) suggested that patients' conditions

can be improved by training general practitioners (GPs) on systematically managing patients with difficult-to-treat asthma episodes.

Recent study results highlighted that a strategy for medication adherence that depicted improvement in medication adherence for asthma management comprises a patient-centred communication strategy, support from the side of the healthcare team, and medication counselling (Ammon et al., 2018). To illustrate, Community Health Clinic Ole has implemented the strategy of providing support to asthma patients by the healthcare team (George, 2018). This showed better management and prevention of asthma attacks. Like this study, another study evaluated the strategies to manage asthma conditions in patients. The study's results showed a positive relationship between patient-provider solid relations and medication adherence (Zeber et al., 2008). Another study was conducted in which counselling was provided to the patients face-to-face by a community pharmacist in the 1st two-week periods of statin therapy (Kaplan & Price, 2020). Results of the study showed that counseling is an effective strategy for increasing medication adherence in asthma patients. It is evaluated that at different levels, medication counselling is provided by pharmacists, nurse practitioners, physicians, and others healthcare staff involved in it (Powers et al., 2020). Every practitioner has a different background, understanding, and experience; if they collaborate and design a plan for a counselling patient, they can help in providing elevating quality delivery (Salgado et al., 2020). When GPs improve their practice and guidelines for asthmatic patients, it will be possible to see fewer asthma episode cases in the Latino community. If fewer cases are present, a healthy and robust community will rise.

Conclusion

This study's findings show no association between asthma episodes and medication adherence. The inclusion covariable of age, gender, medication cost, and education level does not indicate an association with asthma. To conclude, it can be shown that in the difficult-to-control asthma populace, suboptimal observance is widespread. It is associated with opposing clinical consequences and an increased risk of fatal to near-mortal asthma. Many people mistakenly believe that asthma is a condition that only affects children. Nevertheless, longitudinal studies have revealed that maturity, not childhood, is when most middle-aged individuals with asthma first develop symptoms. To have healthy adults, it is important to educate future generations with relevant information on how to prevent asthma. Educating children will become responsible adults who can identify early signs of asthma episodes and use the correct medication at the correct time to decrease asthma episodes.

Specific asthma triggers can cause an elevation in the asthma attack, which include coughing, difficulty in breathing, and wheezing, which are usually caused by various triggers such as exercise, air pollution, allergens, smoke, fragrances, etc. Every individual has different triggers; therefore, one needs to know their triggers and keep themselves away from them (Wu et al., 2021). Asthma and smoke are the worst combinations, even though second-hand smoke can activate asthma and constrict the airways. Therefore, asthma patients restrict their contact with all the origins of smoke, such as tobacco, candles, fires, fireworks, etc. If an individual smokes, he/she should avoid it as it will only make asthma bad (Côté et al., 2018). Individuals suffering from

asthma must take every possible way to avoid exposure to people who have a bad cold or the flue because getting into contact with a cold or flu will make asthma worse; along with this, patients must get their yearly shots of the flue to keep them secured from the flu virus (Arshad et al., 2020). If an individual has allergy-induced asthma, exposure to an allergen can momentarily increase inflammation (Lau & Tarlo, 2019). The rapid way to reduce the allergens is to get free of them altogether; the ways which can make the indoor allergy proofs are changing the bedsheets regularly, installing the air purifier to subside the number of dust mites, vacuuming the floor with a vacuum cleaner at least two times a week to eliminate the accumulation of dust (Sangrador & Blanco, 2018). Asthma prevention is in everyone's hands.

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