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Effects of Indoor Air Pollutants on Childhood Asthma: African American Parents' Perspective

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Walden University

College of Health Sciences and Public Policy

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Marcia Lewis

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Walden University
2022

Abstract

Effects of Indoor Air Pollutants on Childhood Asthma:

African American Parents' Perspective

by

Marcia Lewis

MA, Walden University, 2012

BS, Chamberlain College of Nursing, 2009

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Public Health

Walden University

August 2022

Abstract

Indoor air pollution has been implicated in many chronic health conditions, including childhood asthma, which is more prevalent among African American children. Children are more susceptible than adults to the effects of exposure to indoor air pollution; however, many parents may not be aware of the polluting impacts of products in their homes and are inadvertently placing their families at risk for adverse health outcomes. Understanding parents' perceptions and experiences is essential for planning and developing educational programs and interventions for improving indoor environment management as part of asthma management in children. This descriptive phenomenological study aimed to explore parents' perception of their children's exposure to indoor air pollution and describe parents' experiences with managing their indoor environment in relation to their children's asthma. Semistructured telephone interviews were conducted with nine African American parents who had children aged 3 to 6 years diagnosed with asthma. Thematic analyses revealed three themes that summarized the participants' perceptions and beliefs about asthma and indoor air pollution: perceived pollution/triggers, perceived effects of exposure, and parental management. Bandura's social cognitive theory provided the theoretical framework for the study. The unexpected finding was that parents consider cleaning as a strategy to manage their indoor environment and control their children's asthma. The significant finding from the study highlights the need for parental education on indoor pollutants and their influence on asthma. The findings can be used to plan and develop educational programs for parents on indoor pollutants and their impact on asthma.

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Dedication

I dedicate this dissertation first to my Lord and Savior Jesus Christ who brought me to and through this monumental journey. To my mother Linda, who was not educated but worked hard to ensure her children were. Also, to my family and friends who supported and encouraged me through this long journey. I could not have done this without the continuous love and support of my children David, Shane, Kristian, and especially my daughter Kyra, who kept me motivated and would not allow me to give up. To my daughters-in-law Leo, Cassandra, and Whitney, and my adorable grandchildren Joash, Ethan, Ayla, and Arya who continue to love me unconditionally and fill my life with joy and laughter. The love, support, and encouragement I received from everyone made this possible, thank you for believing in me.

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Chapter 1: Introduction to the Study

Air quality is recognized as a determinant of health, and indoor air pollution is a significant health threat and global public health challenge (World Health Organization [WHO], 2021). Many products and activities considered essential to the modern quality of life are sources of indoor air pollution, including building materials, gas stoves, incense and fragrances, cleaning products, air conditioning, and insect repellants (Apte & Salvi, 2016; U.S. Environmental Protection Agency [U.S. EPA], 2022; WHO, 2021). There is increasing evidence that the air inside homes is more polluted than the air outside, even in industrialized countries (U.S. Consumer Product Safety Commission [USCPSC], n.d.; U.S. EPA, 2022). Research has also indicated that children are more vulnerable to indoor air pollution because of their size and their developing organs and immune system; additionally, most people, especially children, spend approximately 85% to 90% of their time indoors, increasing their exposure and their risk for developing adverse health conditions, including asthma (Rosario Filho et al., 2021; U.S. EPA, 2021a).

Asthma is one of the most common chronic childhood diseases (Centers for Disease Control and Protection, [CDC], 2022). In the United States, asthma results in frequent emergency room visits, hospitalizations, school absences, missed days from work and lost productivity, and significant healthcare costs (CDC, 2022). African American children are disproportionately affected by asthma. According to the CDC (2022), 13.5% of African American children are affected by asthma, compared to 6.4% of White children. African American children also visit the emergency room with asthma

330% more than White children with asthma, are 5 times more likely to be hospitalized because of asthma, and are 8 times more likely to die from asthma (CDC, 2022).

Many everyday household products are allergens or triggers that can cause or exacerbate asthma, especially in small children (CDC, 2020). Children are reportedly more susceptible to indoor air pollutants (WHO, 2021); however, many parents inadvertently contribute to the pollution in their indoor environment and are unknowingly putting their children at risk. Parents and caregivers are responsible for managing all aspects of their children's asthma, including their environment (Searle et al., 2017). Healthcare personnel are expected to raise awareness of the need to assess and control the indoor environment as part of asthma management practices (Matsui et al., 2016). This descriptive phenomenological study aimed to (a) explore parents' perception of their child's exposure to indoor air pollution and (b) describe parents' experiences with managing their indoor environment in relation to their children's asthma. The information from this study will add to the knowledge of asthma and indoor air pollution among health educators, public health professionals, and school nurses in New Jersey.

In this chapter, I discuss the background of the study, including related research and gaps in knowledge. I also address the problem statement, the purpose of the study, research questions, the theoretical framework, and the nature of the study. Additionally, I define critical concepts in the study and discuss the assumptions, scope, delimitations, limitations, and significance of the study.

Background

Indoor air pollution has been recognized as a substantial health threat, especially in children (WHO, 2021). Experts have indicated that exposure to indoor air pollutants is linked to an increased risk of developing adverse health conditions, contributing to the global burden of disease (Rosario Filho et al., 2021; WHO, 2021). The evidence pointing to the damaging effects of indoor air pollution has grown over time, suggesting that the air inside buildings may be 2 to 5 times more polluted than outdoor air (Holm et al., 2018; Rosario Filho et al., 2021; U.S. EPA, 2022). People of all economic backgrounds are exposed to indoor pollutants because all activities are potential sources of pollution (U.S. EPA, 2021b). The risk from exposure is heightened by the presence of multiple sources of pollution from everyday activities (Holst et al., 2020; U.S. EPA, 2021a). The cumulative effects of various sources of pollution and the long periods that people spend indoors have resulted in increased exposure and risk, especially to the most vulnerable, including children.

Exposure to indoor air pollution results in significant health and economic cost to the population. According to the WHO (2021), 3.8 million people die from exposure to indoor air pollution each year. This includes children who are more susceptible because of their small body size, immature and developing organs and systems, increased contact with indoor surfaces, and the length of time that they spend indoors; and the poor who may be disproportionately affected by indoor air pollution due to poor living conditions and the presence of multiple sources of pollution in their environment (Friedrich, 2018; Rosario Filho et al., 2021; Schachter et al., 2020). People of low socioeconomic status

may be living with mold, pests, dust and dust mites, rodents, fungus, lead, and poor housing. In contrast, people of higher socioeconomic status may be exposed to pollutants from use of many high-technology products in the home, as well as chemicals from furniture, carpets, and home care, and products that are common to people of both low and high socioeconomic status such as air fresheners, pesticides, and personal care products (Canbaz et al., 2016; Holm et al., 2018; Oluwole et al., 2017; Rosario Filho et al., 2021). The impact of indoor air pollution can be assessed from the many adverse health effects of chronic diseases, especially asthma, millions of premature deaths, and the very high health and economic cost incurred because of exposure to indoor air pollution.

Many researchers have investigated and debated the association between asthma and indoor air pollution. As the prevalence of childhood asthma increases, the focus of air pollution research has shifted to indoor air as researchers strive to identify the sources of pollution that could be regarded as allergens or triggers responsible for the development or exacerbation of asthma, reporting varying conclusions for specific pollutants (Keet et al., 2017; Liu et al., 2018; Schachter et al., 2020). This resulted in numerous studies on various pollutants, their sources in the indoor environment, and their effect on health.

As the discussion of indoor air pollution and asthma continues, so does speculation about the role of everyday household products in the development and exacerbation of childhood asthma; however, the number of studies examining the role of everyday household products in the development or worsening of asthma has been minimal. The ongoing theme in many studies of parents' knowledge and perspectives is

that parents need to be knowledgeable to manage their children's asthma. Understanding parents' perception of asthma and indoor air pollution will provide knowledge to assist in planning and implementing programs to educate parents and families on managing environmental pollutants to reduce indoor triggers of asthma, improve air quality, and improve asthma outcomes for themselves and their children.

Problem Statement

Exposure to indoor air pollution has been recognized as a health threat (U.S. EPA, 2021a; WHO, 2021). Indoor air pollution is especially harmful to small children because of their immature organs and immune systems, small size, proximity to indoor surfaces, and the amount of time that they spend indoors (Friedrich, 2018; Rosario Filho et al., 2021; Schachter et al., 2020). Indoor air quality is affected by many products considered essential to the modern quality of life (CDC, 2020; U.S. EPA, 2021a), indicating that most activities conducted indoors have the potential to produce pollutants (Jabre et al., 2020; U.S. EPA, 2021a; WHO, 2021). Most people spend 90% of their time indoors (U.S. EPA, 2021a), increasing their exposure to the pollutants and their risk for developing chronic diseases, including asthma.

Asthma is more prevalent among children of African American descent, who are recognized for having more emergency room visits, more hospitalizations, and worse disease outcomes from asthma than children who are White (Johnson et al., 2021). Many everyday household products are considered allergens or triggers that can cause or exacerbate asthma, especially in small children, who are reported to be more susceptible to air pollution. However, many African American parents are unaware of the polluting

effects of these products and are inadvertently contributing to the pollution in their indoor environment and to the development and or exacerbation of asthma in their children. Despite this issue, the number of studies examining the role of everyday household products in the development or worsening of asthma has been very minimal. There have been even fewer studies that have used a qualitative approach.

Purpose of the Study

Through this descriptive phenomenological study, I aimed to explore parents' perception of their children's exposure to indoor air pollution and describe parents' experiences with managing their indoor environment in relation to their children's asthma. Understanding how parents of children with asthma perceived indoor air pollution might assist healthcare professionals in planning and developing programs intended to improve parents' knowledge and asthma management skills.

Research Questions

The research questions were the following:

1. How do parents perceive indoor air pollutants?
2. What are parents' beliefs about their children's exposure to indoor air pollutants in their homes?
3. What are parents' beliefs regarding the effects of indoor air pollutants on their children's asthma?

Theoretical Framework

Theoretical support was provided by Albert Bandura's (1986) social cognitive theory (SCT). SCT suggests that human behavior results from the interaction of personal,

behavioral, and environmental factors; it emphasizes the active and continuous interaction between people, their behavior, and their environment (Bandura, 1986; Conner, 2015). The concepts of SCT were used to explain the relationship between asthma, indoor air pollution, and parents' behavior in this study and to guide the interpretation of the findings. The central concept, reciprocal determinism, is used to explain the complex interaction among the environment, person, and behavior, or the ability of environmental factors to influence people, and the ability of people to influence their environment and control their behavior (Bandura, 1986; Conner, 2015). A more detailed description of the concepts is presented in Chapter 2. SCT guided the development of the study design and served as a framework for analyzing and interpreting the study data.

The Nature of the Study

The study utilized a descriptive phenomenological approach. Phenomenological design was appropriate for understanding the meaning of indoor air pollution to parents of children with asthma and capturing the description of the parents' asthma experiences. Participants were recruited from the community through flyers. Informed consent was obtained before the interviews were conducted. Data were collected using telephone interviews with parents of children with asthma, transcribed, and analyzed using thematic analysis.

Definitions

The following definitions are intended to provide clarification and promote understanding of terms or phrases used in the study:

Adverse health effects: In this study, adverse health effects refer to the development, exacerbation, or relapse of an illness or condition because of exposure to contaminants in the indoor environment (Steinemann, 2017; U.S. EPA, 2021a; WHO, 2021; Wolkoff & Nielsen, 2017).

Household products: Household products refer to substances used in the home for everyday uses, including cleaning, maintenance, deodorizing, laundry, and personal care (Steinemann, 2017; Wolkoff & Nielsen, 2017).

Indoor air pollutants: For this study, indoor air pollutants refer to substances that can produce gases or chemicals that could negatively affect the health of people exposed to them (U.S. EPA, 2021a).

Triggers: Triggers are substances capable of causing or precipitating an illness or condition (CDC, 2022; U.S. EPA, 2021a).

Assumptions

For this study, it was assumed that parents answered questions honestly and with enough detail to understand their perceptions and experiences of their children's asthma and indoor air pollution. It was also assumed that providing information to parents about the study, explaining their rights to withdraw at any time, and assuring anonymity and confidentiality encouraged parents to participate. Additionally, it was assumed that parents were motivated to participate because they believed that the information gathered would assist them, their children, and other families of children with asthma in the future.

Scope

This study focused on describing parents' perceptions about asthma and indoor air pollution. Data were collected from African American parents in an urban community. The study approach was determined because while there had been many studies on indoor air pollution, very few had sought to explore parents' perceptions, and even fewer studies had focused on describing perceptions of indoor air pollution and asthma.

Delimitations

This study involved only African American parents of children with asthma 3 to 6 years old living in an urban community. Only parents fitting the set criteria were eligible for inclusion in the study. Additionally, children included in the study had been diagnosed with asthma, were taking medication for asthma control, had experienced an asthma attack, had visited the emergency room, or had been hospitalized within the year leading up to the study.

Limitations

The study's design, the specific population studied, and the specific research questions influenced and limited the applicability of the study findings. The study results may not be generalizable to other populations because the results reflect the participants' responses and may only describe their unique perceptions and experiences related to asthma and indoor air pollution. Additionally, the participants were recruited from one urban town and one ethnicity, presenting a lack of diversity that further impacted the generalizability of the findings. Another limitation may be the study's dependence on parents' self-reported information due to the qualitative nature of the study.

Significance of the Study

The study explored the parents' knowledge, opinions, and feelings regarding indoor air pollution and their children's asthma. The data from this study will help increase understanding of how parents perceive indoor air pollution and its impact on their children's asthma among healthcare professionals, public health educators, and program developers. The result of the study can be used to assist in the planning and development of programs to increase awareness of indoor pollution among parents and all stakeholders. This study could be a basis for a more extensive study involving a more diverse population.

Social Change Implications

Indoor air pollution is a growing concern, and childhood asthma is a public health challenge that needs to be addressed. Parents need to be knowledgeable to manage their children's asthma effectively. Results from the study could assist in planning and developing education and intervention programs for parents and caregivers to learn to manipulate their indoor environment as part of asthma management, thus reducing the prevalence and incidence of asthma development and exacerbation among small children. Reducing children's exposure to indoor air pollution could potentially improve asthma outcomes with decreased incidence of childhood asthma.

Summary

Indoor air pollution has been implicated in many chronic health conditions, including childhood asthma. Many products and activities considered essential to the modern quality of life are sources of indoor air pollution; therefore, with modern

conveniences, research has demonstrated that the air quality inside is more polluted than the air outside buildings. Children are more susceptible to the effects of exposure to indoor air pollution; however, parents may not be aware of the polluting impact of these products and are inadvertently placing their families at risk for adverse health outcomes. Parents of children with asthma must be made aware of the potential for adverse health outcomes associated with exposure to indoor air pollution. Understanding parents' perceptions and experiences is essential to planning and developing educational programs and interventions to improve indoor environment management as part of asthma management in children. In this chapter, I gave an overview that included a brief discussion of key sections of the study, including the problem, purpose, research questions, nature of the study, assumptions, scope, delimitations, limitations, definitions of key words and phrases, and significance of the study. A detailed literature review is presented in Chapter 2.

Chapter 2: Literature Review

Indoor air pollution is a persistent public health challenge. All over the world, in developing and underdeveloped countries, the problem of pollution in the indoor environment has posed an ongoing health threat, leading to increased risk of death, disability, and chronic medical conditions (U.S. EPA, 2021a; WHO, 2021). Mounting evidence indicates that the air within homes is more polluted than the air outside, even in industrialized countries (USCPSC, n.d). As a result, approximately 3.8 million people die yearly from exposure to indoor air pollution. Most of the deaths are children, who are more vulnerable, and the poor, who are disproportionately affected (Johnson et al., 2021; WHO, 2021). Children are more vulnerable to indoor air pollution because their organs and immune system are still developing, and they spend approximately 85% to 90% of their time indoors (Rosario Filho et al., 2021; USCPSC, n.d.). The cumulative effects of exposure to indoor air pollution can be seen in the increased incidence of chronic noncommunicable diseases among children, including congenital disabilities, neurodevelopmental disorders, cancers, obesity, and chronic respiratory conditions, including asthma (Cincinelli & Martellini, 2017; Friedrich, 2018; U.S. EPA, 2021b).

Asthma is one of the most common chronic medical conditions among children (CDC, 2022). In the United States, asthma is responsible for frequent emergency room visits, hospitalizations, school absences, missed days from work, lost productivity, and significant healthcare costs (CDC, 2022). To date, many researchers have investigated the association between asthma and well-known asthma triggers, including secondhand cigarette smoke (CDC, 2022; U.S. EPA, 2021a); mold and fungi (Jara et al., 2017;

Oluwole et al., 2017; U.S. EPA, 2021a); dust mites (Rozwadowski et al., 2019; U.S. EPA, 2021a); and biologic irritants, including rodents, pets, and pests (U.S. EPA, 2021a). However, few studies have investigated the association between asthma and everyday household products, including cleaners, air fresheners, candles, and perfumes (Lucattini et al., 2018; USCPSC, n.d.). Even fewer studies have attempted to explore parents' perspectives concerning pollution from everyday household products and children's asthma. Pollutants in everyday household products are a significant concern because many people are inadvertently contributing to the pollution in their indoor environment, thereby putting the health of themselves and their families at risk. Through this study, I attempted to explore parents' perception of children 3 to 6 years old with asthma regarding indoor air pollution. This study aimed to (a) explore the parents' perception of their child's exposure to indoor air pollution and (b) understand parents' experiences with managing their indoor environment in relation to their children's asthma.

In this chapter, I discuss historical and current evidence on indoor air pollution and asthma. I focus on the sources of pollution in the home, as well as the short-term and long-term effects of exposure to indoor air pollutants. I review the evidence of the association between asthma and indoor air pollutants, including household practices of parents that contribute to indoor air pollution. I outline the search strategy that I used to locate articles for the literature review, including keywords and searched databases. I also discuss the theoretical foundation used for the study.

Literature Search Strategy

I conducted the research for this study using Walden University's online library, including CINAHL and Medline simultaneous search, Academic Search Complete, ProQuest Central/Dissertations, and Thoreau Multi-databases. I also searched PubMed Central, Directory of Open Access Journals (DOAJ), Google Scholar, and government websites, including the CDC, the EPA, and the National Institutes of Health (NIH)/Medline Plus. I also searched peer-reviewed online journals, including *Environmental Perspectives*, *American Journal of Public Health*, and *Pediatrics*. I arranged to be alerted when new research articles on my topic were published in relevant journals. For the literature review, I selected articles pertinent to indoor air pollution and asthma, children's exposure to pollutants, and the effects of indoor air pollutants. I focused on peer-reviewed articles, research studies, and systematic reviews relevant to childhood asthma and indoor air pollution. I did not include studies on indoor air pollution from biomass fuels prevalent in low- and middle-income countries.

Search terms that I used to find relevant articles included the following: *asthma* [and] *indoor air pollution*, *pediatric asthma and indoor air pollution*, *effects of indoor air pollution*, *pediatric asthma*, *parents' perception of pediatric asthma* [and] *indoor air pollution*, *indoor air pollution*, *childhood asthma*, *indoor air quality*, *indoor air pollutants*, *air pollution*, and *pediatric asthma triggers*. I repeated search terms on databases in the Walden University Library, on Google Scholar, PubMed, and the DOAJ every week, searching for new articles. I set limits for peer-reviewed, from 2017, English

language, and full text with abstract. I also searched for qualitative research articles; however, there were few qualitative studies.

Theoretical Framework

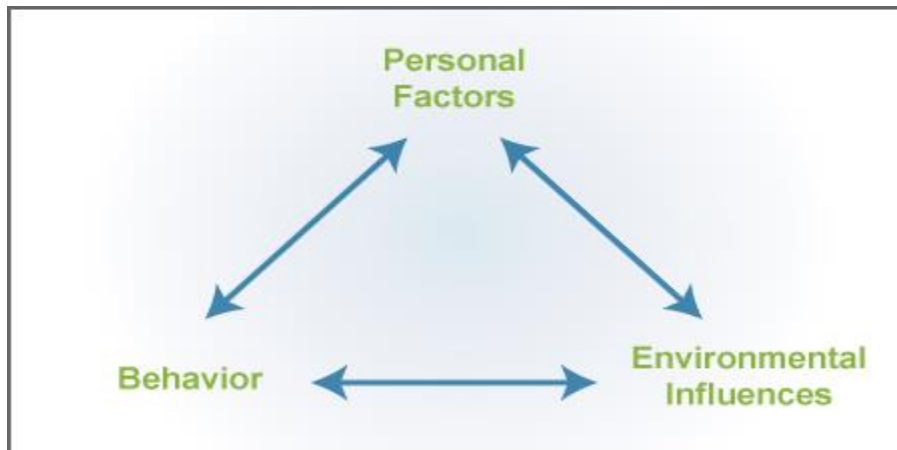
The theoretical framework for this study was Bandura's (1986) SCT. SCT was initially known as social learning theory (SLT); it was founded on principles of learning and later developed and named SCT in 1986 (McAlister et al., 2008). SCT incorporates concepts from psychology, sociology, and political science; its concepts highlight the reciprocal interaction between people and their environment—referred to as “reciprocal determinism” (McAlister et al., 2008). The concepts of SCT include reciprocal determinism, outcome expectations, self-efficacy, observational learning, and self-regulation (McAlister et al., 2008). The concepts of SCT can be applied to public health education, intervention, and research.

The concepts of SCT were used to explain the relationship between asthma, indoor air pollution, and parents of children with asthma in this study. The central concept, reciprocal determinism, was used to explain the complex interaction among the environment, person, and behavior, or the ability of environmental factors to influence people, and the ability of people to influence their environments and control their behavior (McAlister et al., 2008). Other concepts include outcome expectations, which are beliefs about the potential consequences of behavior; self-efficacy, which refers to people's opinion about their ability to perform a desired behavior successfully; and observational learning, which involves people learning to perform new behavior by observing the behavior performed by others, either personally or through the media

(McAlister et al., 2008). Self-regulation refers to the measures taken by a person to engage in self-help, including seeking support from family, friends, and community (McAlister et al., 2008). The core concept of reciprocal determinism and the other concepts together explain the factors that influence interaction as people regulate their behavior and shape their environments.

SCT has been used extensively to explain the effect of environmental and socioenvironmental factors on health and various educational research studies and interventions. Many health promotion interventions have been developed on the concepts of SCT, including the CDC's asthma education program for children, "The Roaring Adventures of Puff (RAP): A Childhood Asthma Education Program" (CDC, 2009). SCT has also been applied to guide behavior change in health promotion for various populations and settings, including physical activity intervention in people with prediabetes and diabetes (Shamizadeh et al., 2019; Smith et al., 2020). Multiple researchers have utilized SCT as the foundation for their research in a variety of disciplines, including in public health for analysis and evaluation of public health intervention programs for asthma education (Dailah, 2021) and asthma medication adherence (Rhee et al., 2018) and in education and psychology (Dubovi & Sheu, 2021). Bandura (2004) discussed several examples of health promotion activities to which SCT was applied. He suggested that SCT should be applied on a community level using technology to produce comprehensive improvement in health (Bandura, 2004). SCT has been frequently used to guide research and interventions to encourage behavior change in multiple settings.

SCT provided the framework for the study. The central concept—reciprocal determinism—and the supporting concepts self-efficacy, self-regulation, and outcome expectation—explained the changing interaction between personal, behavioral, and environmental influences related to indoor air pollution and asthma. I explored the perceptions and experiences of parents regarding behaviors and indoor air pollution using concepts from SCT. The concepts of SCT include outcome expectations (in this case, parents' feelings about their actions, their environment, and their child's asthma); self-efficacy, which related to parents' beliefs about their capacity to behave in ways that improve the environment for their child's asthma; and self-regulation, which involved the perceived self-help strategies that parents performed concerning their indoor environment and their child's asthma. I used SCT as a guide to develop the study's design and as the framework for analyzing and interpreting the study data. The relationship between the constructs of SCT is depicted in Figure 1.

Figure 1*Social Cognitive Theory*

Note. Depiction of the reciprocal relationship of behavior, environmental influences, and personal factors. Adapted from *Social Foundations of Thought and Action: A Social Cognitive Theory* (1st ed., p. 24), by A. Bandura, 1986, Prentice Hall. Copyright 1986 by Pearson Education. Reprinted with permission.

Review of Literature

Indoor air pollution has been recognized as a significant health threat, especially in children. In seminal literature, exposure to indoor air pollutants has been linked to increased risk for adverse health outcomes, contributing to the global burden of disease (Friedrich, 2018; WHO, 2021). The body of evidence reporting the adverse health effects of indoor air pollution has grown over time, identifying higher concentrations of pollutants indoors than outside (Rosario Filho et al., 2021; U.S. EPA, 2021b). The U.S. EPA (2021a) suggested that the air inside buildings may be 2 to 5 times more polluted than the outdoor air. This indicates that people, especially the most vulnerable, are at increased risk of adverse health effects from exposure to indoor air.

Exposure to indoor air pollution results in significant health and economic cost to the population. The WHO (2021) estimated that exposure to indoor air pollution is responsible for the death of 3.8 million people each year. This includes children who are particularly susceptible to the effects of indoor pollutants because of their small body size, increased respiratory rate, immature respiratory and immune systems, and increased contact with indoor surfaces, as well as the length of time that they spend indoors (Mankikar et al., 2016; Schachter et al., 2019). Socioeconomically disadvantaged people are also reported to be disproportionately affected by indoor air pollution due to their living conditions, such as poor or overcrowded housing, inadequate ventilation, and the presence of multiple sources of pollution and asthma triggers in their environment (Keet et al., 2017; Schachter et al., 2019; WHO, 2021). Many authors have studied the socioeconomic cost of indoor air pollution, including mortality, morbidity, and lost productivity from the health impact attributable to the effects of exposure to indoor air pollution (Boulanger et al., 2017; Ferguson et al., 2020; Friedrich, 2018). The impact of indoor air pollution can be assessed from the many adverse health effects of chronic diseases, millions of premature deaths, and the astronomical health and economic cost incurred because of exposure to indoor air pollution.

Sources of Indoor Air Pollution

All human activities have the potential to affect the environment. To understand the impact of indoor air pollution, it is helpful to know the sources of pollution in the home. Well-known sources of indoor air pollution include smoke from cooking or heating fuels, particulate matter, lead, radon, asbestos, pesticides, biological pollutants,

and secondhand tobacco smoke (U.S. EPA, 2021a; WHO, 2021). Less well-known sources of indoor air pollution include cleaning supplies; paints; incense, candles, and other fragrances; computers; television; furniture; and carpets (Holm et al., 2018; Holst et al., 2020; Lucattini et al., 2018; USCPSC, n.d.). Many activities performed in the home can potentially produce pollution, including cooking, use of gas stoves (Holm et al., 2018), cleaning, and candle or incense burning (Rosario Filho et al., 2020). Indoor pollutants are of great concern because many people are inadvertently contributing to the pollution in their indoor environment, thereby putting the health of themselves and their families at risk.

Many household products emit chemicals that are considered harmful to the environment. These pollutants include particulate matter (PM) and volatile organic compounds (VOC), nitrogen dioxide (NO₂), polychlorinated biphenyls, bisphenol A, and phthalates Carreiro-Martins et al., 2016; Park et al., 2017). There has been conflicting evidence concerning the role of PM and VOC in the development of respiratory disease in children, including the Institute of Medicine (IOM) published report examining the effects of indoor pollutants on asthma, which concluded that there was insufficient evidence of a relationship between asthma and specific pollutants, including VOC, PM, and everyday household products (Kanchongkittiphon et al., 2015). However, some studies point to a direct association, even a causative effect, between indoor air pollution and chronic conditions, including asthma (Liu et al., 2018). Despite the conflicting evidence produced by some researchers, the overwhelming evidence points to an

association of indoor air pollution with adverse health effects, especially chronic respiratory effects, including asthma.

Effects of Indoor Air Pollution

The adverse health outcomes associated with indoor air pollution have been well documented. The U.S. Congress, recognizing that children are more susceptible to the harmful effects of pollutants, enacted federal protections for children as early as 1995 (Firestone et al., 2016). Despite the federal protections, many children are exposed daily to harmful pollutants in their indoor environment, resulting in the manifestation of adverse health effects, because there are no standards for safe levels of certain harmful contaminants that can be found in products in the home (Cincinelli & Martellini, 2017; Friedrich, 2018; Lucattini et al., 2018; Schachter et al., 2020). Health conditions attributed to indoor air pollution may manifest immediately after exposure or years later.

The short-term effects of exposure to pollutants may include headaches, dizziness, irritation of mucous membranes, and fatigue, while long-term effects may be seen after prolonged or repeated exposures and include chronic conditions such as heart disease, cancer, respiratory diseases including asthma, and obesity (Carreiro-Martins et al., 2016; U.S. EPA, 2021b). Indoor air pollution has also been associated with diabetes as well as neurodevelopmental disorders such as attention-deficit disorders, autism, and learning disabilities (Firestone et al., 2016; Manisalidis et al., 2020). The many sources of pollution in the indoor environment, the length of time that children spend indoors, and their susceptibility to the effects of indoor pollutants have contributed to the risk of harmful health conditions.

Asthma and Indoor Air Pollution

Asthma is one of the most common chronic childhood diseases. It often manifests as chronic airway inflammation, with recurrent coughing, wheezing, shortness of breath, and chest tightness (CDC, 2022; U.S. EPA, 2021b). Asthma has been recognized as a significant public health problem, affecting people of all ages, races/ethnicity, and geographic regions; however, its prevalence varies among populations, with higher incidence observed among children of lower socio-economic groups and children of Black or African American descent (CDC, 2022). Compared to White children, Black/African American children have three times more emergency room visits, three times more hospitalizations for asthma, and are at increased risk for asthma-related mortality (Schachter et al., 2020; U.S. EPA, 2021b). According to the CDC (2022), asthma affects approximately 6 million children or 8.3% nationwide. Asthma imposes a significant health and economic cost on children, their families, and their communities through the repeated visits to emergency rooms, hospitalizations, school absences, lost days from work, lost productivity, and decreased quality of life (Banjari et al., 2018; CDC, 2022; Hossny et al., 2017). According to the American Lung Association (2018), the cost associated with asthma is approximately 56 billion dollars yearly in the United States. The exact cause of asthma is unknown; however, genetics, race or ethnicity, and environmental factors, including indoor air pollution, have been implicated.

Asthma has been linked to socioeconomic status and ethnicity. Many researchers reported a higher prevalence of asthma in children from poor, urban neighborhoods (DePriest et al., 2018; Milligan et al., 2016; Schachter et al., 2020). These factors are

associated with poor housing quality and increased likelihood of conditions conducive to the presence of allergens and triggers, including dust, pests, rodents, mold, dampness, overcrowding, and environmental smoke (Poowuttikul et al., 2019). While many researchers support this association, some studies have reported evidence that disproved this fact, stating that there is no evidence that inner-city or urban areas have a higher prevalence of asthma in children (Keet et al., 2015, 2017). In studies of children of African American race and lower household incomes, these variables were recognized as risk factors for asthma, similar findings to other studies; however, Keet et al. (2017) reported that living in inner-city areas was associated with more asthma-related emergency room visits and hospitalizations but is not associated with increased prevalence of asthma.

The effect of air pollution on asthma has been widely investigated, with varying conclusions drawn for specific air pollutants, contexts, and populations. The evidence that air pollution contributed to the exacerbation of asthma and the development of new-onset asthma has been growing for decades; however, the association of asthma with some pollutants are still being investigated. For years the focus was on outdoor or ambient air pollution and the effect on childhood asthma (Kravitz-Wirtz et al., 2018). With the rising prevalence of asthma, the focus has shifted to indoor air pollution as researchers strive to identify the risk factors or triggers in the indoor environment.

This can be observed in the numerous studies on the various indoor pollutants and their effect on health. For example, Schachter et al. (2020) found that indoor pollutants were associated with asthma exacerbation and increased use of rescue medications in

their study of children in inner-city areas in New York; while Patelarou et al. (2015) found contradictions in the evidence associating indoor pollutants to childhood asthma in a meta-analysis performed over ten years. Canbaz et al. (2016) investigated the effect of flame retardants in dust from 220 mattresses and the development of childhood asthma in a birth cohort of 110 children; they reported that they found no association between flame retardants and the development of asthma; however, they attributed the development of asthma to other substances found in the home. Similarly, studies of the effects of PM and NO₂ reported inconsistent results. Molter et al. (2014) noted no evidence of an association between long-term exposures to PM₁₀ (coarse PM) and NO₂ and asthma or wheeze; while Liu et al. (2018) reviewed the evidence and concluded that there is good evidence that PM (both fine and coarse particles) are associated with adverse respiratory effects in children. Bălă and associates (2021) later examined the effects of specific air pollutants on the body, concluding that air pollutants were significant risk factors for major respiratory diseases, including asthma and other conditions such as heart diseases. Many asthma triggers have been identified as linked to exacerbation or development of new-onset asthma, including secondhand smoke, pet dander, exposure to pests and rodents, mold, and perfumes (Matsui et al., 2016; U.S. EPA, 2021a, 2021b). However, the strength of the evidence varies among researchers.

The discussion of the possible release of harmful chemical pollutants from the use of everyday household products has given rise to speculation observed in the news reports, reputable journals, and in popular media about their role in the development and exacerbation of childhood asthma; however, the number of studies examining the role of

everyday household products in the development or worsening of asthma has been minimal. The few studies that explored how the indoor environment is affected by everyday household products include Lucattini and colleagues (2018), who examined the evidence for the presence of semi-volatile organic compounds (SVOCs) from computers, televisions, furniture, carpets, and other household consumer products in the dust and air inside homes, offices, and schools; they found only reports of the chemicals present inside the buildings, with no data on the chemicals in the products.

Early research studies also investigated the home environment in relation to asthma, including Krieger et al. (2000), who looked at the home environment and the presence of conditions and substances that could be viewed as potential triggers for asthma, such as the presence of molds, carpets, stuffed animals, secondhand smoke, perfumed candles, and air fresheners, and chemicals from household cleaning products. The search continues as more recent studies examine the role of chemicals from everyday household products in the prevalence of childhood asthma. Such as an article by Slezakova (2012) discussing the historical aspects and health impact of indoor air pollutants, including emission sources of household pollutants. Larramendy et al. (2017) also investigated the practices of parents that were associated with indoor pollution and asthma in children, including use of home fragrances, smoking, use of cleaning products, and home ventilation practices. More recently, Abrams (2020) discussed cleaning products and asthma, while Tjalvin et al. (2022) conducted a study and found that exposure of mothers to cleaning products and disinfectants preconception and throughout pregnancy was associated with childhood asthma in their children. The discussion of the

sources and impact of indoor air pollution on children with asthma continues as researchers attempt to increase awareness of the issue.

The Institute of Medicine (IOM) joined the debate in Kanchongkittiphon et al. (2015) and released a review providing updated information from the available scientific evidence on specific indoor pollutants and their effect on asthma; with the conclusion that substances with proof of causation in indoor air included dust mite, cat allergen, environmental tobacco smoke, and cockroach allergens. Substances with evidence of an association with asthma exacerbation in children were listed as dog allergen, fungi, dampness, and NO₂ (Kanchongkittiphon et al., 2015). Some triggers once associated with causation or exacerbation of asthma were reported as having limited evidence, such as perfumes, and substances with insufficient evidence for an association included pesticides, plasticizers, and VOCs (Kanchongkittiphon et al., 2015). Despite the report by the IOM, several studies have reported an association with indoor air pollution, while other evidence suggests a dose or level effect at which some pollutants are associated with an adverse health outcome, specifically asthma.

The evidence implicating indoor air pollutants in the development and exacerbation of asthma has been accumulating for decades, including information on its impact on childhood asthma. Many researchers have acknowledged the importance of family involvement in reducing the pollutants in the indoor environment and its effect on asthma in children. Few studies have explored parents' and caregivers' knowledge and perspective about asthma and indoor air pollution. Studies that sought to examine parents' perception of indoor air pollution and asthma include a hospital-based cross-

sectional study by Gajanan et al. (2016) that sought to assess parents' knowledge and attitudes of children with asthma, concluding that parents had inadequate knowledge of asthma. A study by Searle et al. (2017) explored the views of children, parents, and health professionals on asthma management, including the management of the children's environment; the result was consistent with the other studies, indicating that parents lacked the knowledge necessary for the management of their children's asthma, including knowledge of asthma triggers. Bhagavatheeswaran et al. (2016) conducted a similar hospital-based study to assess parents' knowledge, attitudes, and practices related to their children's asthma; and concluded there was a need for parental education on the prevention of asthma exacerbation. Additionally, Al-Anazi and colleagues (2015) also conducted a study in Saudi Arabia to investigate the knowledge and perceptions of parents of children with asthma; however, they reported inconclusive results. Likewise, Kuti and Omole (2016) also had comparable results; however, they also found that parents who experienced previous asthma-related hospitalization, family history of asthma, and high educational level demonstrated more asthma knowledge. Qian et al. (2016) assessed parents' perceptions of air quality and concluded that parents' perceptions of pollution in their environment were associated with asthma and allergic diseases in children. Divecha and colleagues (2020) studied parents' knowledge regarding asthma and concluded that parents' asthma education was essential to improve their knowledge and attitudes. The ongoing theme in many studies of parents' knowledge and perspectives is that parents need to be knowledgeable to help their children's asthma. This can be

achieved by educating the parents about managing the environment to reduce pollutants and triggers.

Summary

In this review I discussed the current literature relevant to indoor air pollution and childhood asthma. I provided information on the sources of indoor air pollution in the home, the health effects and impact of indoor air pollution, and the impact and cost of asthma on children and their families. I reviewed available literature on parents' perspectives of children with asthma regarding indoor air pollution and their children's asthma. The literature revealed that most activities performed in the home have the potential to produce pollutants that can contribute to the development or exacerbation of childhood asthma. Many substances in the indoor environment could be regarded as asthma triggers, including chemicals and gases produced by the many sources of indoor air pollution, including household activities in the home. Many authors pointed out that children spend up to 90% of their time indoors, and because they are more vulnerable because of their size, their developing bodies, and immune system, they are at increased risk for adverse health conditions, including asthma.

Many research studies have discussed the association between indoor pollution and asthma; however, most studies used quantitative methodology. Understanding parents' perception of asthma and indoor air pollution will provide knowledge to assist in planning and implementing programs to educate parents and families on managing environmental pollutants to reduce indoor triggers of asthma, improve air quality, and improve asthma outcomes for themselves and their children.

The next chapter provide information on the research methods and design, including recruitment strategies, data collection, management, and analysis. I will also discuss the relevance of the chosen research methodology to the research topic and research questions, the rationale for the selected population, and issues related to the study.

Chapter 3: Research Methodology

Through this descriptive phenomenological study, I sought to explore the perceptions and experiences of parents of children 3 to 6 years old regarding indoor air pollution and their feelings about their actions, the environment, and their children's asthma. In this study, I aimed to (a) explore the parents' perception of their child's exposure to indoor air pollution and (b) understand parents' experiences with managing their indoor environment in relation to their child's asthma. Asthma is one of the most common chronic medical conditions affecting children. In the United States, it is responsible for frequent emergency room visits, hospitalizations, school absences and missed days from work, lost productivity, and significant healthcare costs (CDC, 2022; Zahran et al., 2018).

In this chapter, I describe the reasoning for this descriptive phenomenological study approach and why it was appropriate for exploring and understanding the parents' perceptions of asthma and indoor air pollution. I discuss key aspects of conducting this qualitative study and provide insight on my role as the researcher in relation to bias awareness, ethical issues, and issues of trustworthiness. I also discuss recruitment strategies, data collection, data management, and data analysis.

Research Design and Rationale

The research questions were intended to obtain in-depth descriptions of the parents' perceptions and experiences surrounding indoor air pollutants and their children's asthma. The research questions were the following:

1. How do parents perceive indoor air pollutants?

2. What are parents' beliefs about their children's exposure to indoor air pollutants in their homes?
3. What are parents' beliefs regarding the effects of indoor air pollutants on their children's asthma?

Central Concepts/Phenomena

The central phenomena explored in this study were indoor air pollutants and children's asthma. The outcomes of exposure to indoor air pollution have been well documented and include adverse health conditions and high economic costs (Boulanger et al., 2017; Friedrich, 2018; Keet et al., 2017; WHO, 2021). Based on current evidence, it has been suggested that the indoor environment could be 2 to 5 times more polluted than the outdoor air (U.S. EPA, 2021a). In this study, indoor air pollutants refer to any objects or conditions that can produce contaminants in the indoor air. Sources of indoor air pollution include everyday activities such as cooking, cleaning, home maintenance products, and personal care products (U.S. EPA, 2021a; WHO, 2021). This indicates that many activities performed in the home have the potential to produce pollutants and affect those susceptible to pollution in the indoor air, particularly small children.

Childhood asthma has been recognized as one of the most common chronic medical conditions of childhood. Asthma is a chronic respiratory condition. It is characterized by chronic airway inflammation, recurrent coughing, wheezing, shortness of breath, and chest tightness (CDC, 2022; U.S. EPA, 2021b). While the cause of asthma is unknown, certain factors, including socioeconomic status, ethnicity, and environmental

factors including indoor air pollution, have been associated with higher incidence and prevalence of asthma.

Research Tradition and Rationale

The research topic and questions lent themselves to a qualitative design.

Qualitative research methods are used to understand the meanings that individuals and groups give to their experiences by using various techniques to collect data in the natural setting with the researcher as the instrument (Creswell, 2013). Qualitative research methods allow the researcher to interact closely with the participants, gaining in-depth knowledge of the phenomena under study and allowing for the collection of detailed descriptions through flexible data collection methods, including in-depth interviews, observations, focus groups, artifacts, and reading diary or journal entries (Creswell, 2013; Patton, 2015).

Qualitative research approaches are similar in some respects, but each is unique and appropriate for specific studies. Qualitative methods include narrative research, which is based on spoken or written stories of one or two individuals, chronologically ordered; grounded theory, which is aimed at generating theory; ethnography, which involves studying an entire cultural group; case study, which may involve the study of one or multiple cases in real-life situations; and phenomenology, which is intended to describe the ordinary meaning of the lived experiences of a phenomenon or concept to individuals or a group of individuals (Creswell, 2013).

A descriptive phenomenological approach was used for this study. The purpose of phenomenology research is to increase understanding of the essence or meaning of a

phenomenon by describing the participants' lived experiences (Patton, 2015).

Phenomenology has a philosophical origin with differing points of view and perspectives by various experts in the field. It is used in many disciplines to explore phenomena using one of the approaches, which include heuristic phenomenology, which brings out the personal experiences of the researcher; hermeneutic phenomenology, which focuses on describing and interpreting the affairs of the participants; and transcendental or descriptive phenomenology, which focuses on describing the essence of the individuals' experiences (Creswell, 2013; Patton, 2015).

Descriptive phenomenology was appropriate as a research method for exploring and describing the lived experiences of parents regarding their children's asthma and indoor air pollution. In descriptive phenomenology, researchers are expected to examine the phenomena under study without personal bias, setting aside their experiences with the phenomena (bracketing) to understand the participants' experience (Creswell, 2013; Patton, 2015). Using the process of descriptive phenomenology assisted in producing the detailed descriptions of the phenomena needed to help increase understanding of the parents' perception of asthma and indoor air pollutants.

Role of the Researcher

My role as the researcher was to collect information that expressed how participants thought, felt, and gave meaning to their experiences. In the role of observer-participant, I, as the researcher, became the instrument and collected the data through in-depth telephone interviews, transcribed and organized the data, analyzed the data, and reported the findings of the data analysis (Creswell, 2013; Patton, 2015; Sundler et al.,

2018). Additionally, I ensured that the methods were documented in detail for reliability and validity, utilizing reflectivity and bracketing to minimize bias (Tufford & Newman, 2010). I also ensured that the rights of the participants were protected, provided a detailed description of the process, answered questions, reminded participants of the voluntary nature of their participation, described strategies to ensure confidentiality, and obtained the participant's consent before each interview (Patton, 2015). I conducted a small informal pilot with my family and friends to assess the interview questions and protocol (Aung et al., 2021). To ensure that the study was conducted with integrity, honesty, trustworthiness, and rigor, I had the oversight of my doctoral committee and the university Institutional Review Board (IRB), whose members provided guidance and ensured that my research followed approved procedures and ethical standards.

Methodology

Population and Sampling

The population chosen for this study was African American parents who had children 3 to 6 years old diagnosed with asthma. The population was chosen based on the reported prevalence of asthma among African American children. Purposive sampling was used to select individuals who responded to the recruitment flyers and met the study criteria described below. Parents were given a brief description of the study and the interview process. Participants were chosen to share their stories of asthma and describe their experiences in detail (Creswell, 2013).

Selection Criterion

Participants were selected from families living in an urban community in New Jersey with children who had been diagnosed with asthma for at least 1 year. Children were on maintenance medication for asthma and/or had an asthma attack within the last 6 months requiring rescue medications, emergency room visits, or hospitalization. Parents were screened at recruiting to determine their appropriateness for the study. Participants were selected if they met the study criteria and consented to participate.

Sample Size

The population for this study was African American parents who had children 3 to 6 years old diagnosed with asthma. The research questions were focused on a specific population, allowing for the utilization of purposive sampling (Etikan et al., 2016). There is some flexibility regarding the sample size appropriate for specific research approaches in qualitative research. There are diverse views on the number of participants required to collect data-rich information. Moser and Korstjens (2018) pointed out that the sample size is different for each study, but most qualitative studies utilize a small sample size and an emergent design. Patton (2015) suggested that six to 10 participants may be adequate for a phenomenological study. Creswell (2013) agreed that the number of participants could vary among research approaches and even in the same approach. Based on current literature, I estimated a participant size of eight to 12 parents, to collect rich data.

The sample size was selected as recommended by Patton (2015), who suggested selecting a minimum number of participants as a starting point, with the expectation to gather information-rich data, and interview participants until no new information is

collected, otherwise known as saturation. The goal of saturation is indicative of an emergent, flexible qualitative design and may require more or fewer participants as a study progresses.

Recruitment

Participants for the study were recruited from an urban community in New Jersey with a diverse population. Flyers were posted at strategic points throughout the town, including the post office, the community center, the community health center, and bulletin boards outside places of worship with permission. The flyers briefly stated the reason for the study, a description of the eligibility criteria, the gift card offered to participants, my contact information as the researcher, and information for a contact at Walden University for any questions. Participants were screened via telephone to ensure that they met all the study requirements. Participants who volunteered were given a brief description, including the purpose of the study and study procedures, and an appointment was made for the interview. Participants were given my contact number for any questions.

Data Collection and Management

Data were collected using open-ended questions with semistructured interviews. Creswell (2013) and Patton (2015) suggested that open-ended questions allow participants to share more of their experiences and enable the researcher to ask follow-up questions, providing more data. An interview protocol was used to guide the interviews, ensure in-depth responses from the participants, and reduce deviation from the topic, allowing me to stay focused on the purpose of the interview (Patton, 2015). Informed

consent was obtained before each interview, after the study was described in detail, including any potential risks to the participants, recording and storage of the interviews, approximate length of each interview, and how anonymity and confidentiality of information would be assured. Participants were assured that their participation was voluntary, and they could withdraw from the study at any time without repercussions. I also obtained permission to make follow-up calls to the participant to validate or clarify the information from the interview and for member checking following transcription of the interviews.

Interviews were recorded electronically and handwritten with the permission of the participants. The preference was to conduct face-to-face interviews; however, I conducted telephone interviews because of the COVID-19 pandemic. Each interview was transcribed verbatim after it was completed. After each interview, I noted my thoughts about the interview, the information obtained, and the transcribed data in the reflective journal. Participants were contacted for follow-up interviews to clarify any information and for the participants to validate the transcribed data.

Data Analysis

Following transcription, thematic content analysis was used to analyze the data. Transcribed interviews were read and reread, then classified into codes, and then classified into themes to guide the description of the parents' perceptions. Data were stored in designated files on my computer, password protected. According to Creswell (2013), phenomenological data analysis begins with bracketing the researcher's personal experiences of the phenomenon under study. My reflexive journal with the field notes

was used to bracket my experiences related to the problem, allowing for data analysis without personal bias.

Issues of Trustworthiness

The trustworthiness of qualitative research is established by the credibility, transferability, dependability, and confirmability of the study procedures and findings (Patton, 2015). For the phenomenological research approach, trustworthiness involves evaluating the accuracy of the research procedure and findings as described by the researcher and the participants (Creswell, 2013).

Credibility

Credibility establishes that the participants recognized the study's findings as accurate representations of their perceptions (Creswell, 2013; Korstjens & Moser, 2018). To demonstrate credibility, I used member checking of the data and findings to allow the participants to assess how accurately the data represented their experiences and perceptions. I also practiced bracketing throughout the study by utilizing the reflexive journal entries to explore my thoughts, personal feelings, and experiences that could have influenced the study. The reflective process uncovered potential biases and presuppositions, allowing an open mind concerning asthma and indoor air pollution.

Transferability

Transferability refers to the ability of information from research to be transferred to other settings or situations as determined by readers (Creswell, 2013; Korstjens & Moser, 2018). To establish transferability, I provided detailed descriptions of the participants, the setting, and the research procedures, including the data collection and

analysis. I transcribed the interviews verbatim and used thick descriptions to document the experiences and behavior of the participants.

Dependability

To establish dependability, a researcher must demonstrate that a study's findings could be consistently replicated (Creswell, 2013; Korstjens & Moser, 2018). To show dependability, I documented the steps taken in the study to collect, analyze, code, and report the data in an audit trail. An audit trail is used to document the steps taken from beginning a research project to reporting the findings; it also confirms that the methodology is in line with the phenomenological research approach (Korstjens & Moser, 2018).

Confirmability

Confirmability is established through verifying that the research findings are derived from the data through examining the research procedure, including data collection and transcript, analysis process, and conclusions (Korstjens & Moser, 2018; Patton, 2015). The reflective journal and audit trail confirmed the study's findings. The journal contained the documentation of my personal feelings, assumptions, and experiences related to the study, participants, and the research process, while the audit trail contained detailed documentation of the steps taken in the research process.

Ethical Procedures

Ethical issues are a consideration at every stage of research. According to Patton (2015), ethical issues may occur in designing a study, collecting, and analyzing data, and reporting findings. Creswell (2013) maintained that a researcher should consider the

ethical issues that may arise at each phase of a study and have a plan in place to address them. Ethical considerations for this study included informed consent, the participant's right to confidentiality, privacy, and explanation of risks and benefits (Patton, 2015).

Treatment of Human Participants

Participants were informed of the purpose of the study, and the research procedures, including the interview process, recording and storage of the interview information, the participants' rights to refuse consent to participate, or withdraw from the study at any time, how anonymity would be maintained, how data collected would be kept confidential, who the information and results would be shared with, and any potential risks as a result of participating in the study. Participants volunteered to participate in the study without pressure or coercion. Informed consent was obtained before the interviews. Information was collected without identifying information, and each participant was assigned a unique identifier known only to the researcher. Additionally, the ethical procedures of the study were reviewed by Walden University's IRB and validated and approved before data collection began.

Ethical Issues in Recruitment of Participants

Participants were recruited from the community using flyers with the research information, allowing the participants to volunteer for the study. Full disclosure of study information was provided before the participants consented to the study. I followed the ethical principles by protecting the rights of the participants, respecting their autonomy by allowing them to make their decisions to participate or not through informed consent, and informing participants of their right to withdraw from the study at any time.

Ethical Concerns Related to Data Collection

Data was collected through individual interviews. Creswell (2013) mentioned that the interview process could create power imbalance between the researcher and the participants. I maintained transparency, honesty, and integrity in data collection by explaining the research's purpose, all research procedures, and obtaining consent. It was made clear to participants that they could withdraw from the study at any time. Information was collected anonymously to protect the identity of the participants. Each participants' information was identified with a unique identifier known only to the researcher.

Data Management

Data were collected anonymously and stored using a unique identifier. Transcribed data was stored on my password-protected computer with access only by me. Taped interviews will be destroyed after the dissertation is completed. Participants were informed of the need to share information with my dissertation committee and reviewers at Walden University before they consent to participate, and member checks of the transcribed data were done by participants to ensure data was accurate and reflected their perceptions.

Summary

In this chapter, I discussed the design and methodology for this descriptive phenomenological study of the perceptions of parents of children with asthma regarding asthma and indoor air pollution. I detailed the design including the population of focus, the recruitment procedures, data collection, storage, and analysis. I also discussed my role

as researcher, issues of trustworthiness, and ethical procedures. The outlined procedures described the process used for conducting the study. Data analysis and findings will be discussed in Chapter 4.

Chapter 4: Results

Through this descriptive phenomenological study, I aimed to explore the parents' perception of their children's exposure to indoor air pollution and describe parents' experiences with managing their indoor environment in relation to their children's asthma. The goal of this study was to understand how parents perceive indoor air pollution, with the aim to assist healthcare professionals with planning and developing programs intended to improve parents' knowledge and asthma management skills. The following research questions guided this research:

1. How do parents perceive indoor air pollution?
2. What are parents' beliefs about their children's exposure to indoor air pollutants in their homes?
3. What are parents' beliefs regarding the effects of indoor air pollutants on their children's asthma?

Chapter 4 includes an introduction with a brief overview of the purpose of the study and the research questions, a description of the informal pilot study, and a detailed description of the setting, demographics, and data collection. I also describe the thematic analysis and coding process and provide direct quotes as examples. Evidence of trustworthiness is presented with a description of steps taken to ensure credibility, transferability, dependability, and confirmability. I also present the results of the descriptive qualitative study.

Pilot Study

I conducted a small informal pilot study with five family members and friends to assess the interview questions. I also requested feedback on my interviewing skills. Based on the feedback that I received, I rearranged some of the interview questions to be more open ended, merged some questions, and deleted redundant questions. I later assessed the updated interview protocol with family members and submitted it for review by my dissertation committee chair before using it for my interviews.

Setting of the Study

I began recruiting participants after receiving Walden University IRB approval (IRB # 12-28-20-0202070). The participants were African American parents of 3 to 6 year-old children diagnosed with asthma in an urban community in New Jersey. Face-to-face interviews were not conducted due to the COVID-19 pandemic. Given the options of video interviews or telephone interviews, all participants preferred telephone interviews. Interviews were conducted at a time chosen by the participants and recorded with the participants' consent.

Demographics

I conducted interviews with 12 participants who volunteered for the study. All participants resided in the township, and children were students at various schools in the community. Three children did not meet the inclusion criteria: During the interviews, it was revealed that one child was past the stated age of inclusion, one child was not diagnosed with asthma, and one child had not had an asthma attack in more than 4 years.

Nine participants, parents of three girls and six boys, met all inclusion criteria, and their interviews were included in the study.

Data Collection

I started the recruiting process by posting flyers all over the urban community in public places and privately owned businesses with permission. I placed flyers in supermarkets with permission, on public bulletin boards, on light posts near public places, in post offices, in laundromats, and near houses of worship. Because of the restrictions in place due to the COVID-19 pandemic, it was more difficult to recruit participants; I started recruitment in January 2021 and continued through September 2021.

I confirmed the inclusion criteria with parents when they volunteered for the study. The consent forms were sent as scans via text messages and emails, and participants responded with “I consent,” indicating consent. Four volunteers did not respond after receiving the consent forms, three more participants consented but did not respond at the agreed-on time of the interview, and two others kept requesting that the interviews be rescheduled; therefore, the recruitment and data collection took longer than anticipated.

In preparation for the interviews, I practiced in the mirror and recorded myself to note any intonations or emphasis on the questions and check for clarity. As a novice researcher, I was very nervous about conducting the interviews, and practicing helped me overcome my nervousness. I started a reflexive journal to document my personal experiences, presumptions, feelings, and observations during the research process,

referred to as bracketing (Tufford & Newman, 2010). I wrote my impressions and observations after each interview as a means of bracketing. Each telephone interview was conducted in a private and quiet place in my home, and the participants were asked to choose a private location. Each interview was recorded using a portable recorder with the participant's consent. Questions were semistructured and open ended, allowing participants to answer with as many details as possible. Each interview lasted a duration of 20 to 35 minutes.

After each interview, I thanked each participant and reminded them that I would be sending a transcript of the interview for their review and acceptance. All participants agreed. I also followed up with a thank you via text message and a thank you \$25 gift card. Data were transcribed and stored on my password-protected computer. Because participants were concerned about the confidentiality and anonymity of their information, the transcribed data were sent to them for approval and as reassurance that no identifiable information was included in the transcripts. During the data collection process, I realized after the sixth interview that I had reached the point at which I was not getting new information, referred to as data saturation (Saunders et al., 2018).

Data Analysis

To begin the data analysis, I attempted to immerse myself in the data by reading and rereading the transcribed data; transcripts were then manually coded and categorized using thematic analysis (Braun & Clarke, 2006; Lester et al., 2020; Sundler et al., 2018). I read the participants' responses multiple times and highlighted keywords and phrases in an iterative process; I began with memos as first impressions, then assigned codes to

sections, and then grouped the codes into categories or themes. I applied an inductive analytical process to the data as I read through the transcripts, waiting for the codes and themes to emerge (Lester et al., 2020; Sundler et al., 2018); the initial list of codes was cataloged and then summarized in emergent themes as outlined in Table 1. I read line by line, reviewing and refining emerging themes, repeating the process until three themes emerged that were common across all participants' responses. The themes were (a) perceived pollution/triggers, (b) perceived effects of exposure, and (c) parental management.

Table 1

Initial Emergent Codes/Themes

Themes	Number of transcripts	Number of references
Triggers, biological	1	1
Hereditary/Genetic	6	9
Chemicals/Irritants	9	19
Triggers/General	8	21
Environmental triggers	9	22
Indoor triggers	8	28
Treatment/Management	9	30
Prevention	9	32

Evidence of Trustworthiness

Credibility

Credibility establishes that the participants recognized the study's findings as an accurate representation of their perceptions (Korstjens & Moser, 2018). To demonstrate credibility, I sent the transcribed interviews to the participants for member checking, requesting feedback regarding the accuracy of the verbatim transcript, any changes that the participants wanted me to make, and any information that they wanted me to add. I had verbal confirmation of member checking with six out of nine participants; three cited busy schedules and no time to read the transcript but gave verbal consent to continue the study. I also practiced bracketing throughout the study by documenting my thoughts, feelings, perceptions, and observations that could influence the study in the reflexive journal (Sundler et al., 2018). Credibility was also accomplished by gathering data at different times of day and over a protracted period (from March to September) utilizing the same interview questions and methods for each participant and consistent coding and data analysis methods across the study (Korstjens & Moser, 2018).

Transferability

The transferability of this study was demonstrated through the thick descriptions of the participants, the setting, the research procedures, and the uniformity of the data collection and data analysis procedures (Korstjens & Moser, 2018). The recorded interviews were transcribed verbatim to capture the experiences as described by the participants. Health and education professionals may use the results of this study to plan and develop educational programs on pediatric asthma.

Dependability

Dependability was established by documenting all stages of the study, beginning with the recruitment of participants, collection of data, data analysis, and reporting of the findings (Korstjens & Moser, 2018). This study demonstrated the consistency of the research methods, including a thorough review of transcribed data and reflexive notes to reduce bias. I ensured authenticity and accuracy of the transcribed data through member checking. I also checked data analysis methods against expert literature on qualitative methodology and relied on my dissertation committee chair for guidance.

Confirmability

Confirmability was established by consistently utilizing uniformed recruitment methods, data collection, data transcription, data analysis and reporting, and exhibiting transparency in documenting research procedures (Korstjens & Moser, 2018). Reflexivity and bracketing were employed to minimize researcher bias. To enable other researchers to confirm the research, I applied an inductive data analysis strategy. I started the data analysis with immersion in the data and ended with the findings derived from the study of the participants' descriptions and experiences.

Results of the Study

The study consisted of eight interview questions designed to answer the research questions:

1. How do parents perceive indoor air pollutants?
2. What are parents' beliefs about their children's exposure to indoor air pollutants in their homes?

3. What are parents' beliefs regarding the effects of indoor air pollutants on their children's asthma?

Nine participants were included in the study. All participants were asked the same interview questions; interviews were conducted from March to September 2021. The data were analyzed using thematic analysis, and three themes emerged from the analysis that summarized the data. The themes are (a) perceived pollution/triggers, (b) perceived effects of exposure, and (c) parental management.

Theme 1: Perceived Pollution/Triggers

In responding to the interview questions, parents described what they perceived as pollutants or triggers for their children's asthma. This theme categorized all the codes from the transcribed data that identified sources or substances that parents perceived as asthma triggers. This theme included environmental triggers, household conditions, and any chemical substances, including household cleaners, that parents believed could affect their children's asthma.

Participant 7 stated the following about her children:

Well, I know some of the things that could trigger it is carpet. We have carpet, I know drapery, so I wash often. Pretty much every week, I'm washing. Dust mites, food, pollen, paint. I didn't know all of these things until they got it.

Participant 5 commented about her son,

Usually, if I know I'm doing spring cleaning, or something, or a really big cleaning, and I'm going to use certain products, then I'll send him to my mother's

house, or something like that. If I put ammonia down, he will immediately start coughing. He can't be home if I know I'm going to use ammonia.

Participant 3 described her experiences with her daughter:

Yeah. It's better in a sense of different triggers. Because when it's too cold, it'll trigger her. If it's too hot, humid, it'll trigger her. Or if it's a high-smelling perfume like that smell of fresh grass, those kind of things, dust, anything of high smelling in that sense that'll trigger her. And then she has seasonal allergies, so she'll get congested because every now and then, the allergies kick in. And then it'll trigger the breathing, and it'll trigger the asthma and all that together. So yeah.

Theme 2: Perceived Effects of Exposure

Parents discussed how their children responded to various triggers, often describing the signs and symptoms that they observed. This theme described the perceived effects of identified pollutants or triggers on children's asthma or the children's responses as reported by parents. For example, Participant 3 explained, "She'll get congested overnight and then it'll trigger the asthma. It'll start the breathing because it's too hot or whatever." Participant 2 commented about her son, "He wheeze from time to time when he plays. And he has his allergies; I know when he plays in like grass or around animals, he'll start sneezing and stuff." Participant 4 also described how her sons responded when exposed to triggers or conditions that exacerbated their asthma, stating, "They do get where their chest is really tight, so they're coughing a lot. So, then I have to use their pump or the machine." Participant 5 stated,

But if I hear a cough, he'll start wheezing, anything, I'm automatically putting him on the machine and giving him a cough medicine. Cause if he gets sick, he ends up in the hospital again, and when he is sick, I can't work.

Theme 3: Parental Management

Throughout the interviews, parents discussed what they did to prevent their children from having asthma attacks, how they managed their children when they had asthma attacks, and how they managed their environment to help control their children's asthma. Theme 3 categorized the various strategies that parents employed to manage their children's asthma symptoms and how they manipulated their environment to manage or control their children's asthma. Management described also included prescribed medications and homemade remedies. Participant 5 stated, "But if I hear a cough, he'll start wheezing, anything, I'm automatically putting him on the machine and giving him a cough medicine." Participant 8 stated, "I use my own remedy sometimes, and I give them the honey, the garlic, and the ginger." Participant 7 explained,

Immediately we come from outside; they go straight in the tub. Of course, I wash my sheets and blankets and stuff often. Keep my carpet clean. I invested in a carpet cleaner, so once a week, I deep clean the carpet. I vacuum at least twice a week, and I dust; I sweep up every day with the windows open. When I'm sweeping and vacuuming and everything that's dealing with the dust that's just in the house. I keep the windows open to keep the dust from settling in. It can kind of blow itself out of the window.

The study results answered the research questions and highlighted parents' perceptions of their children's asthma and indoor air pollution. Below I have included some of the verbatim data related to the research questions (Braun & Clarke, 2006; Sundler et al., 2018).

Research Question 1: How Do Parents Perceive Indoor Air Pollutants?

Parents equated indoor air pollutants with general uncleanliness, household dust, and anything in the house that could be cleaned. All nine participants mentioned cleaning more, dusting more, vacuuming to keep the home clean to reduce triggers and pollutants.

Participant 4 stated.

If the filters are not changed properly, and you have to have good air recycling throughout the house. If not, it causes the flare-ups, the tightness in the chest, the coughing. Yeah. If your air filters are not changed, or if you're not wiping down your house and dusting properly, or you're not washing your sheets, the pillowcase and their clothes and things that they have close to their face can trigger it and make it worse.

Participant 7 explained,

Immediately we come from outside; they go straight in the tub. Of course, I wash my sheets and blankets and stuff often. Keep my carpet clean. I invested in a carpet cleaner, so once a week, I deep clean the carpet. I vacuum at least twice a week, and I dust; I sweep up every day with the windows open. When I'm sweeping and vacuuming and everything that's dealing with the dust that's just in

the house. I keep the windows open to keep the dust from settling in. It can kind of blow itself out of the window.

Participant 6 stated, "I can't even say that there's any pollution in the house because I have OCD. So, I'm constantly cleaning my house."

Research Question 2: What Are Parents' Beliefs About Their Children's Exposure to Indoor Air Pollutants in Their Homes?

The result from the data analysis revealed that parents believe that they can control their children's exposure to indoor air pollutants in their homes by cleaning more. Parents said they used disinfectants and household cleaners to clean their homes but believed children are not affected by them. Some parents stated they move the children out of the cleaning area. Participant 7 stated,

I use regular vinegar and water. Sometimes I may use Pine-Sol, in the bathroom because I use Pine-Sol disinfect or bleach, but most of the time it's bleach and water first, and then its vinegar and water. If I'm don't feel like doing it all, I'll put it in the container and just clean it like that. I try not to use too many harsh chemicals, but when I do clean, most of the time, they are not even around.

They're either upstairs out the way, or they're in my room with the window and stuff open. I try to circulate as much air as I can in the house.

Participant 8 mentioned,

If I have to clean, she'd be in the room. So, if I have to clean bathroom, she know not to go there, 'cause I'm going to tell her, "Mommy's going to clean the bathroom now." So, you know? They know. So, I make sure she can't smell it.

Participant 4 remarked,

The pandemic made me clean more. Try to keep it disinfected a lot more than I used to. So, I guess maybe we're using a little bit more product like Lysol and the bleach products to try to keep it cleaner, but I don't think it triggers their asthma.

Research Question 3: What Are Parents' Beliefs Regarding the Effects of Indoor Air Pollutants on Their Children's Asthma?

During the interviews, parents listed triggers they believed could influence their children's asthma. Some parents acknowledged the presence of pollutants in the home and listed smells from everyday household products, the effect of heat, dust, germs, mold, and mildew; most parents indicated they did not believe there were pollutants present in their home if they cleaned thoroughly.

Participant 2 stated, "I don't think there is anything in the home that could trigger his asthma so. I am careful. No. Nothing in the house I can think of." Participant 7 stated about pollutants in the home,

Pollution in the home, it seems to be mold or mildew, that affects a child. Maybe, bed linen. If they're not properly washed, bed linens, pillows. Maybe, the feathers from the pillows can possibly be another reason that can cause a trigger.

Participant 3 observed,

In the house, it don't bother her mostly in the house because I'm always sanitizing. So, I do a lot of sanitizing around her, around where she sleeps and stuff like that, around the house. So in the house, I'll have to put the AC and the fan on together to keep her cool

While one parent expressed concern about the effect on her son's asthma from the dry air of the home heating system in the winter and the air quality in her home, commenting that it is not much she can do to change things because they were renting their apartment.

Participant 4 explained,

The outside maybe trigger it, but when he's inside, it's more, I guess, because it's drier in the house. And there's not a lot of air circulation. Yeah, I think because if we had the heat on at night, it gets really hot or dry in the house, it's harder for him to breathe. You know...

Participant 4 continued,

If the filters are not changed properly, and you have to have good air recycling throughout the house. If not, it causes the flare-ups, the tightness in the chest, the coughing. Yeah. If your air filters are not changed, or if you're not wiping down your house and dusting properly, or you're not washing your sheets, the pillowcase and their clothes and things that they have close to their face can trigger it and make it worse.

Summary

This descriptive phenomenological study aimed to explore parents' perception of their children's exposure to indoor air pollution and described parents' experiences with managing their indoor environment in relation to their children's asthma. In this chapter, I discussed the setting, the recruitment, data collection, data management, and analysis procedures. Data were collected by telephone interviews, semi-structured open-ended questions, and recorded. Recorded data were transcribed, and using an inductive

approach, thematic analysis was done, starting with immersion in the data, an extensive recursive search for codes and patterns of meaning until three themes emerged that summarized and gave meaning to the descriptions provided by the participants.

The themes summarized the participants' perceptions and beliefs toward asthma and indoor air pollution: Perceived sources of pollution/triggers, effects of exposure, and parental management. The research questions were answered with direct quotes taken from participants' responses. The data revealed that most participants perceive indoor air pollutants as dirt, dust, germs, and anything that can be cleaned. Therefore, they believed that if they were constantly cleaning, dusting, and vacuuming, their children would not be exposed to triggers or pollutants in the home. The data also revealed that parents utilized various measures to manage and control their children's asthma, including using home remedies and manipulating their environments.

In the next chapter, I interpreted the findings and described the limitations of the descriptive phenomenological study. I described recommendations for future research, implications for positive social change including methodological, theoretical, or empirical implications, and finally, significance of the study and recommendations for practice.

Chapter 5: Discussion, Conclusions, and Recommendations

Through this descriptive phenomenological study, I aimed to explore the parents' perception of their children's exposure to indoor air pollution and describe parents' experiences managing their indoor environment in relation to their children's asthma. I sought to understand the meaning of indoor air pollution to parents of children with asthma and capture parents' descriptions of their experiences related to managing their indoor environment in relation to their children's asthma. The data revealed the perceptions and beliefs of parents toward asthma and indoor air pollution and highlighted three themes that best described the findings: perceived sources of pollution/triggers, effects of exposure, and parental management.

In this chapter, I discuss the interpretation of the findings and how they correlated with the literature review. Additionally, I discuss the findings in the context of the theoretical framework. I also describe the study's limitations, recommendations, and social change implications, and finally, provide a conclusion of the study.

Interpretation of the Findings

Findings Compared to the Literature Review

The data analysis revealed three overarching themes that capture the participants' experiences described in the data. The themes were (a) perceived sources of pollution/triggers, (b) effects of exposure, and (c) parental management. A review of the literature concerning the findings of the study revealed similarities and differences and supported findings by other researchers. The findings are described below.

Perceived Sources of Pollution/Triggers

The findings from the study revealed that most parents perceived sources of pollution and triggers as dust, dirt, germs, mold, mildew, or anything that can be cleaned, wiped, vacuumed, or washed. Some parents believed that environmental factors such as pollen, seasonal changes, and weather changes were strongly associated with their children's asthma. Other parents mentioned odors or fumes that could evoke specific symptoms in their children. As stated by Participant 3,

So, if I'm smelling it, then I automatically think, "Okay, it's going to bother her."

But I'll clear it out of her presence. If I'm smelling it, I'm like, "Oh, your perfume is too loud." Or "Maybe your underarm, there's too much going on." So, I have to be like, "Could you just go somewhere? Go over there." It's like an automatic trigger. My nose is very high in ... It can sense cigarette smoke or those kind of things. I can smell it if I'm in the store and somebody just smoked and then come in and they standing next to me, it's like, "Ugh." I get this feeling. So, if she's with me, then it's I automatically think that "Okay, it's irritating her." She'll make this sniffing kind of sound, and I'm like, "Uh-huh (affirmative), this smell is too strong." And I'm moving away from her before it triggers her in any way.

Participant 5 also stated, "I think it may be like, if someone's smoking and then they come around him, that can trigger it. Because when you smoke, it gets in your clothes."

Participant 7 remarked,

The main thing is the carpet. Because a person is always walking on carpet. We take the soil from outside; they bring that dirt in, they get in the carpet, they roll

around on the carpet. They play, they flip on the carpet. Those are the only things that I know for sure that can probably be the triggers of it, if there was, any set or offsets of asthma.

This was in keeping with current literature that pointed to the many common sources of indoor air pollution that could contribute to the development or exacerbation of asthma in children (Holst et al., 2020; Jabre et al., 2020; Oluwole et al., 2017; U.S. EPA, 2022; WHO, 2021), while many parents were not aware of less well-known sources of indoor air pollution such as cleaning supplies, furniture, fragrances, and carpets (Krasner et al., 2021; Lucattini et al., 2018). As Participant 6 discussed,

I use Lysol, Pine-Sol, bleach, bleach, and more bleach. No, it doesn't; it doesn't affect me because when I use all that stuff, I make sure I open up the windows. I don't have it just sitting in the house. I have the air coming in, going out, coming in, and going out.

Genetics or family history have also been implicated in the literature as a contributing factor to childhood asthma (Di Palmo et al., 2021; Holst et al., 2020; Trivedi & Denton, 2019); similar findings emerged in the study, where five parents were also diagnosed with asthma, and seven parents had multiple children currently diagnosed with asthma. All parents revealed a personal or family history of asthma. It was observed that parents who were also diagnosed with asthma themselves stated that they believed that their children's asthma was inherited; they were also more likely to deny the presence of external triggers and indoor pollution. This could be attributed to a lack of knowledge or education (Searle et al., 2017). For instance, Participant 8 stated, "the other two, they say

it's my genes. 'Cause I have it.” Additionally, Participant 6 said, “I'm also an asthmatic, and I keep that. Sometimes you get hot, have that water.” Participant 5, discussing triggers for her son’s asthma, mentioned “running, crying too hard, or smoking, and it's also hereditary. My sister has asthma, and he was also premature, that plays a role as well.” Participant 7 noted,

I know they said with asthma, you can grow out of it. I had it. I grew out of it. My other children had it; all my children have it; I have a son, he's 24 now, his first was when he was about 9 months.

Effects of Exposure

The data contained participants’ descriptions of their children’s responses to exposure triggers, allergens, or irritants. The data often included asthma symptoms and parents’ responses, which included keeping children home from school, visits to emergency rooms or doctors’ offices, or hospitalizations. As described by Participant 8,

Well, all the other kids have it, and then she was just constantly coughing. I had given her cough medicine; it was not working. So, I decided to call the doctor and make an appointment to bring her in, and then they say it. 'Cause I realized she had the wheezing like the other kids. You give her the treatment, it's not working. Now she go by a specialist. The asthma specialist because she used to end up in the hospital.

Participant 5 also said,

But if I hear a cough, he'll start wheezing, anything, I'm automatically putting him on the machine and giving him a cough medicine. Cause if he gets sick, he ends up in the hospital again, and when he is sick, I can't work.

This was also supported by what had been reported in the literature indicating that asthma is responsible for many missed days of school and missed days of work for parents (Banjari et al., 2018; CDC, 2022; Holm et al., 2018; Hossny et al., 2017). In the study, parents who denied the presence of indoor air pollutants in their homes also described their children as having asthma symptoms, and their cleaning practices with household cleaners regarded as allergens and irritants and linked to indoor air pollution in the literature (Cincinelli & Martellini, 2017; Larramendy et al., 2017; Lucattini et al., 2018; Park et al., 2017). In describing their children's responses to exposure or triggers, parents also described the actions that they took to care for their children and manipulate their environment to control their children's asthma.

Parental Management

The study data included descriptions of strategies that parents used to manage their children's asthma and their environment. Strategies that the parents discussed included prescribed medications, home remedies, and dietary changes; all are supported in the literature (Castro-Mendes et al., 2019; Searle et al., 2017; Teoh & Chang, 2021). Management of the environment, including cleaning, dusting, washing, and vacuuming, was a consistent thread through all interviews. Parents expressed their belief on multiple occasions in each interview that the more they cleaned (including mopping the house,

washing the bed linens, vacuuming the carpet), the less pollutants and triggers would be in their homes. As described by Participant 6,

Like I said, cleaning and sanitizing doesn't affect us. This is a normal to me. I have OCD. I make sure everything is clean. There will be less triggers, but that goes with anybody, not just the person that's asthmatic. Cleanliness plays an important part in the day-to-day.

Additionally, Participant 5 stated, "I make sure I mop more, mop my house, clean my house with Lysol and bleach, and I give elderberry vitamin." Participant 7 explained,

I do a lot of cleaning. I clean every day. Every day I'm cleaning, I'm wiping down, especially when I notice ... Well, Saturdays I deep clean. The whole house, deep cleaning on Saturdays. I do a lot of cleaning, wiping down, constantly keeping them, washing their hands. When they come from outside, I immediately put them in the tub. I wash their hair. So, this way, if it there is any pollen, or dust, or anything on them, they don't take it to bed.

Participant 7 continued,

Immediately we come from outside; they go straight in the tub. Of course, I wash my sheets and blankets and stuff often. Keep my carpet clean. I invested in a carpet cleaner, so once a week, I deep clean the carpet. I vacuum at least twice a week, and I dust; I sweep up every day with the windows open. When I'm sweeping and vacuuming and everything that's dealing with the dust that's just in the house. I keep the windows open to keep the dust from settling in. It can kind of blow itself out of the window.

Participant 7 further explained,

I use regular vinegar and water. Sometimes I may use Pine-Sol, in the bathroom because I use Pine-Sol disinfect or bleach, but most of the time it's bleach and water first, and then its vinegar and water. If I'm don't feel like doing it all, I'll put it in the container and just clean it like that. I try not to use too many harsh chemicals, but when I do clean, most of the time, they are not even around.

They're either upstairs out the way, or they're in my room with the window and stuff open. I try to circulate as much air as I can in the house. I make it my routine to make sure that I keep them off because out of six of my children, and five of them have asthma. I pretty much try my very best to keep my house at a bare minimum where I'm not having to run to the emergency room.

This was one of the unexpected findings of the study; however, it is supported by current literature (Rozwadowski et al., 2019). Parents identified household cleaning as one of the most important strategies that they used to control their children's asthma along with prescribed medications. Parents also discussed how they were cleaning more and using more household products because of the coronavirus pandemic. Parents verbalized that they believed that they were protecting their children by keeping them and their surroundings clean. Parents also expressed that they felt limited in what they could change in their homes where they were renting (Jabre et al., 2020; Schachter et al., 2020). As stated by Participant 7, "We've been in this apartment for 10 years now. Definitely, with the carpet, I'm trying to keep it as clean as possible, wiping dust and all of those things." Participant 4 also noted: "I'm not buying, I'm renting, so we don't have access to

change the filters ourselves. So, I try to keep things wiped down and dust-free as possible.”

Diet was also listed as a strategy used by participants to manage their children’s asthma, a finding that is also supported by research (Castro-Mendes et al., 2019; Guillemineault et al., 2017); this was emphasized by parents who had multiple children with asthma, and children with food allergies and other allergic conditions. As stated by Participant 7,

I guess due to the fact that, it could just be ... I believe in prayer, but maybe it could just be the fact that I've tried to change all of our diets. There are certain foods we don't eat. I know a lot of stuff is foods that we eat. Like I said, again, they run. I don't know. I know they said with asthma, you can grow out of it. I had it. I grew out of it.

Interpretation of Findings in Context of Theoretical Framework

SCT (Bandura, 1986) provided the theoretical lens for the study’s findings. The central concept of reciprocal determinism can be applied to the circular relationship between the participants, their actions and beliefs toward the environment, and the effect on their children’s asthma (McAlister et al., 2008). The data yielded insight on parents’ perceptions of indoor air pollution in their environment and parents’ actions that influenced their environment and the effects of their actions on children’s asthma. The parents’ beliefs about the impact of their cleaning activity on their children’s asthma can be discussed through the concepts of outcome expectations, denoting beliefs about the potential consequences of their behavior (McAlister et al., 2008). The participants’

consistent efforts to manage their children's asthma and their actions to regulate and control their environment can be explained by the concepts of self-efficacy and self-regulation; self-efficacy can be seen in the participants' confidence in their ability to care for their children, and self-regulation describes the action that participants took to manage their children's asthma and their environment (McAlister et al., 2008). The concepts of the SCT together explained the factors that influenced the interaction of the participants with their children's asthma and their environment.

Limitations of the Study

The study explored the perceptions of parents regarding indoor air pollution and asthma. The findings revealed how the participants perceived indoor air pollution, their beliefs about their children's exposure to indoor air pollution in their homes, and their beliefs regarding the effects of indoor air pollution on their children's asthma. The findings from the study may be limited because of the small sample size and the lack of diversity in the sample; moreover, because the participants were recruited from one urban community, their perceptions and experiences may not be representative of the broader population. Another limitation is the subjectivity of self-reported information from the participants. The study was conducted during a major pandemic, which could have influenced the participants' responses to interview questions. Lastly, researcher bias may have affected the findings despite my attempt at reflexivity.

Recommendations

The findings from this study need to be substantiated with future research and deeper exploration of the topic on a larger scale and with an expanded scope. This study

could form the basis for a more extensive study exploring indoor air pollution and its effect on asthma that could apply to the broader population. The topic of indoor air pollution needs further exploration and broader dissemination of information; therefore, I would recommend that plans for dissemination of information be included with the findings from further study.

Implications

Positive Social Change

This study provides insight into parents' perceptions, knowledge, beliefs, and opinions of indoor air pollution and their children's asthma. Indoor pollution remains a significant concern, and asthma is still a public health threat. Parents should be knowledgeable about managing their children's asthma effectively. The findings from the study revealed that parental education on sources of indoor air pollution is needed because parents may be inadvertently contributing to the indoor pollution in their homes by their everyday actions (Holm et al., 2018; Krasner et al., 2021; Searle et al., 2017). Results from this study could aid in the planning and development of educational and intervention programs addressing indoor air pollution and asthma in affected communities. Reducing children's exposure to indoor air pollution could improve asthma incidence and outcomes.

Conclusion

This qualitative study provided insight into the perceptions, beliefs, and behaviors of parents of children with asthma toward indoor air pollution. Although the public's awareness of indoor air pollution is increasing, more needs to be done to reach the

parents most affected by this issue. This study highlighted the need for parental education for individual parents and programs at the community level. The scope of this study limits the applicability of the findings to the general population; however, this study may provide a basis for broader studies.

The unexpected finding from the study is that all parents spend a significant amount of time cleaning and managing their indoor environment to manage and control their children's asthma. This was seen as parents detailed their cleaning practices, often using products documented in the literature to be irritants or pollutants, but which represented to the parents a source of protection for their children, especially in a pandemic. This finding highlighted the dire need for parental education about indoor pollutants and their influence on asthma.

SCT provided the theoretical lens for the inductive findings from the study. This theory explained the relationship between parents' behavior or actions, their environment, and their children's asthma through the concept of reciprocal determinism (McAlister et al., 2008). This concept could also be applied to educational programs for parents and their community. This research is an addition to the field of public health and addresses a gap in the literature on parental perception of indoor air pollution and childhood asthma.

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Appendix A: Pearson Publishing Permission for Use of Figure 1



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Marcia Lewis
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- Page 24 Depiction of the reciprocal relationship of behavior, environmental influences and personal factors

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Appendix B: Interview Protocol

Research Interview Protocol

Marcia Lewis

Effects of Indoor Air Pollutants on Childhood Asthma: African American Parents'
Perspectives

A. Greetings and Introduction

B. Explanation of the interview process and purpose of the study

a. Ask permission to record interviews: Audiotaped and some note taking.

Interview may take 45 minutes to an hour; I may ask you to clarify answers.

Information will be kept confidential; I will ask your permission to call you to verify that the written interview and my interpretation of what you said is correct.

b. Participant's rights:

Participation is completely voluntary

You may stop the interview at any time, or chose not to answer any questions that make you feel uncomfortable

c. Informed consent

Discuss research purpose, procedure, and process; obtain consent to record the interviews and participate. Reiterate voluntary nature of participation, and will contact for verification after transcription in {approximate time}

Ascertain participants' understanding of information about study and consent

Ask if they have any questions about the study or the interview.

C. Interview Questions

1. Can you tell me about your child?
 - a. What he/she likes to do? Favorite things to do?
 - b. How did you find out he/she has asthma? what happened?
 - c. How is he/his asthma now? (Medications, doctors' visits, limitations)
2. What has the doctor told you about what might be triggering your child's asthma?
(How do you feel about that)
3. What do you think is contributing to his/her having asthma attacks? (Can you give me an example? Tell me more about that?)
4. Thinking about your child's asthma, how do you believe he/she is exposed to substances that trigger an asthma attack or make it worst?
5. Can we talk about places where he/she is exposed to the most substances that could be affecting his/her asthma?
 - a. How about at home? Could you describe anything in the home that could be affecting his/her asthma?
6. What are your thoughts about triggers inside the home?
 - a. How do you think pollution inside the home can affect a child with asthma?
 - b. Can you describe where some sources of pollution could be in the home?
7. With everything going on now with the pandemic,
 - a. How has it affected what you do at home? (What you use to clean? keep safe?) (tell me more about that)

- b. How has it affected your child's asthma (Can you tell me more about that)
- 8. Thinking about your child's asthma, is there anything else you want to talk about?

Thank participants for their participation

Ask permission to contact to clarify any information and to set appointment for member checking

Appendix C: Recruitment Flyer

Seeking African American Parents of Children aged 3 to 6 years old diagnosed with Asthma to participate in an **Asthma interview Research study to understand what parents think about how the indoor air affect their child's asthma**

Children must have active asthma at time of interview

Information About the Study

- One 30 – 60 minutes interview that will be audio-recorded
- You would receive a \$25 “thank you” gift card
- To protect your privacy no personal information will be recorded or shared

For more information or to volunteer please contact:

Marcia Lewis: XXX XXX-XXXX
PhD Student, Walden University