

Illness Trajectory, Risk Factors and Academic Performance of Primary School Children with Uncontrolled Bronchial Asthma in Riyadh, Saudi Arabia

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Abstract: Bronchial asthma (BA) in children has been well documented worldwide with varying prevalence rate. However, despite the known and documented epidemiology, little is known how asthma risk factors and prevalence, including their illness trajectory, affect the academic grades of school age children with uncontrolled bronchial asthma. This study protocol for a quantitative descriptive correlational design aims to collect more data on uncontrolled bronchial asthma that will be used to develop evidence-based asthma management control school program to improve the health and quality of life of primary school children with uncontrolled bronchial asthma in the school environment. Study samples that will be included in this study are the school children aged 5 to 12 years old in government schools diagnosed with uncontrolled bronchial asthma. Government schools in Riyadh, Saudi Arabia will only be included as the study site for this research. Because a primary criterion is set for inclusion, this study will use purposive sampling based on the pre-determined inclusion criteria. The researcher will use three validated tools (e.g., ISAAC Core, Child Health, and Pediatric Asthma Quality of Life questionnaires) to obtain data from parents of children diagnosed with uncontrolled BA. Samples' sociodemographic and economic characteristics, risk factors of uncontrolled BA will also be collected. The outcomes of this research include a description of the risk factors for uncontrolled bronchial asthma among primary school children, their general health status and quality of life being afflicted with this chronic disease. Another outcome is a description of the illness trajectory, which is common among primary school children. Through regression analysis, this study will also provide explorative description of how these risk factors, general health and quality of life, and illness trajectory affect their academic performance, limited to academic grades, absenteeism, and social isolation. The output of this research is an asthma management control school program, which adapts existing asthma management guidelines from scientific literature and modified to address local context using the quantitative results of the study. The asthma management control school program is a promotive and preventive school initiative aimed to minimize risk and control asthma, and consequentially improve academic performance, reduce absenteeism and improve social participation in school and classroom activities.

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I. Introduction

Al Ghobain, Algazlan, and Oreibi (2018) reported that the prevalence of asthma in children ranges from 8-25% based on the results of the Saudi Initiative for Asthma (SINA) in 2016, summarizing the results of researches conducted over the past 30 years. Corroborating this finding, a systematic review and meta-analysis of the prevalence of asthma revealed that in Riyadh, Saudi Arabia alone, there is an average prevalence rate of 16.8% from 1992-2012 among children (Hussain, Farhana, and Alnasser, 2018). Despite known and documented risk factors such as diet and obesity, infection, smoking in the household, air pollution, changes in weather, stress and lack of exercise (Alreshidi, 2017), little is known how these risk factors and prevalence of asthma, including their illness trajectory, affect their academic grades in school. Alqossayir (2017) studied academic performance of 1,058 intermediate school children with uncontrolled and controlled bronchial asthma and revealed that those with severe symptoms of the asthma has poorer academic performance and exam results. In a cross-sectional, population based study in 2003 and 2013, there has not been significant improvement of the prevalence of self-reported absenteeism from school among adolescents 10 years apart, with 15.2% in 2003 and 13.7% in 2013, and with social isolation during physical education still high at 14.1% in 2003 and 11.5% in 2013 (Stridsman, Dahlberg, Zandren, & Hedman, 2017). However, the findings cannot be corroborated among primary school children because there has not been a study in the Kingdom of Saudi Arabia regarding uncontrolled bronchial asthma and its impact on the health and quality of life of these populations, which can greatly affect their grades in the school. There exist some health programs of the school for asthma

management, but these are focused on biomedical treatment and management, and lacks psychosocial care dimensions to understand the illness from the perspective of the children and its effect in their school performance. Also, the constant accumulation of dust particles in the air especially during sandstorms has caused exacerbation of asthma and hospitalization among children, which increased cases of absenteeism, thereby affecting their academic performance. Therefore, there is a need to fill the literature gap on how to improve health and well being, or quality of life of primary school children with uncontrolled bronchial asthma so they can eventually improve their academic performance.

Significance of the problem: Despite the high prevalence rate of bronchial asthma among children (Al Ghobain, Algazlan, and Oreibi, 2018; Hussain, Farhana, and Alnasser, 2018), there is dearth in literature regarding interventions and its effectiveness in controlling bronchial asthma to improve health, well-being, and quality of life of primary school children. Most have focused on prevalence and risk factors that contribute to the increased prevalence of the disease, physical health of adolescents and adults and the relevant biomedical treatment (Alreshidi, 2017). In relation to academic performance as a consequence of good health and improved quality of life, no study has explored the association of uncontrolled bronchial asthma with academic performance among primary school children in Saudi Arabia. This study will describe the risk factors and illness trajectory of uncontrolled bronchial asthma among school children and the current quality of life they experience which will serve as bases for developing a nursing intervention such as an asthma management guideline to improve their health and academic performance.

Problem statement: This research aims to collect more data on uncontrolled bronchial asthma, which will be used to develop evidence-based asthma management control school program to improve the health and quality of life of primary school children with uncontrolled bronchial asthma in the school environment.

Research hypotheses:

1. What is the relationship of the risk factors, illness trajectory, health status and quality of life with academic performance among children diagnosed with uncontrolled bronchial asthma?
 - 1.1. Hypothesis: Socio-demographic and economic characteristics of the families of children diagnosed with uncontrolled bronchial asthma (BA) affects the child's health status and quality of life which in turn, affect their academic performance.
 - 1.2. Hypothesis: Lifestyle-related and environment factors associated with uncontrolled bronchial asthma affect the child's academic performance.
 - 1.3. Hypothesis: High illness trajectory of uncontrolled BA leads to poorer academic performance.
 - 1.4. Hypothesis: Poorer health status and quality of life because of uncontrolled BA leads to poorer academic performance.
2. What interventions can be designed to improve their health that can result to the improvement of academic performance measured through improvement in class attendance, improvement of grades, and reduction of social isolation in one academic semester?
 - 2.1. Hypothesis: Based on the Chronic Illness Trajectory Framework by Corbin and Strauss, an asthma management guideline based on chronic illness trajectory can be designed to improve academic performance among primary school children.

Literature review: The literature presented in this capstone proposal was searched using PubMed as database and ensured to be peer-reviewed using the DCU online library portal. Keywords such as asthma prevalence, uncontrolled bronchial asthma, risk factors of asthma, asthma quality of life, asthma management, asthma management guidelines. Literature were reviewed and selected based on the current publication with ten years, and those whose population included children and young adults in Saudi Arabia or Middle East. Because of the numerous literatures published in the database for asthma, a great number of researches appear using the keywords used but 22 research articles were specifically selected to reflect the current research publications on asthma in Saudi Arabia or Middle East. Excluded in the review are those literatures, which are published more than 10 years ago which were cited in current literature, and which encompass illness trajectories and disease prevalence in other countries whose topology and geographic conditions are different from that of Saudi Arabia. Of the 22 articles included in this literature review, 21 are quantitative, which are mainly cross-sectional surveys and a systematic review and meta-analysis, and 1 is a desk review qualitative research.

The literature review strengthens the proposition of the researcher that an advanced practice nursing initiative through a school-based asthma management program is necessary to control the progression of asthma as a chronic disease among children, and to minimize risks that contribute to exacerbation of asthma. Despite the availability of asthma management guidelines in the international medical arena, there is a need to contextualize

these guidelines based on local evidences and local needs, an evidence-based research whose results can be translated into local policies or programs.

Literature was reviewed in the past 5 years regarding the prevalence of asthma among children in Saudi Arabia. There is dearth of literature regarding this common pulmonary condition among this age group. Six articles were found relevant to this section and were synthesized to describe the trend of asthma prevalence over the years in Saudi Arabia. Compared to the global prevalence rate of asthma for both children and adults at 1 to 20%, asthma remains to be high in Saudi Arabia, and higher than other countries in Europe with a prevalence rate of 18.2%, based on a survey concluded on June 2016 among residents of the Kingdom of Saudi Arabia aged 20-44 years old. The prevalence rate almost remains the same for both males and females (Al Ghobain, Algazlan, & Oreibi, 2018), affecting more than 2 million people in Kingdom of Saudi Arabia(KSA) alone (Hussain, Farhana, and Alnasser, 2018). The result showed an increase in the prevalence rate of asthma at 4.05% to 14.3% based a national household survey conducted in KSA in 2013 based on the Saudi Health Interview Survey among 15 years and older, and systematic reviews conducted (Al Ghobain, Algazlan, & Oreibi, 2018; Moradih-Lakeh, 2015; (Hussain, Farhana, and Alnasser, 2018), reporting even a high prevalence rate of uncontrolled asthma among children at 59.3% (Moradih-Lakeh, 2015), with no significant decline over the past decade (Hussain, Farhana, and Alnasser, 2018). A systematic review of asthma prevalence using studies from 1992 to 2012 showed an increasing prevalence rate among school children (Al-Harathi, Al-Wagdani, Sabbagh, Al-Ghamdi, & Abu-Duruk, 2017; Hussain, Farhana, and Alnasser, 2018), the latest of which is in 2017 which reported an overall prevalence rate of 27.5% of physician-diagnosed (Al Qahtani, Asaad, Awadalla, & Mahfouz, 2017).

Literature review showed that there are few researches conducted to determine the prevalence of uncontrolled bronchial asthma among school children. Data collected were mostly from 1992 to 2001, and the latest data collected determining the prevalence rate of asthma, controlled or uncontrolled, was in 2012 (23.6%) (Nahhas, Bhopal, Anandan, & Sheikh, 2012) and 2017 (27.5%) (Al Qahtani, Asaad, Awadalla, & Mahfouz, 2017). Potter (2010) in his published article stated that there are no current global epidemiological studies of asthma or wheezy illnesses in children under 5 years of age due to difficulty in making conclusive diagnosis, the lack of objective criteria for asthma diagnosis among these age group, and the variability of symptoms of wheezing and other atopic symptoms among children less than 5 years of age. The lack of objective criteria and confident diagnosis, and the lack of scientific evidence thereof, may also be the reason of no specific management and treatment modalities for asthma and thus the high prevalence rate among this age group. The schoolchildren, including those younger than 3 years old, present to have the highest prevalence rate, despite the dearth of literature and epidemiology among this age group (Horaib, et al., 2018). This delimits the empirical basis for developing clinical and public health guidelines to help improve management of uncontrolled bronchial asthma.

1. Current Empirical Literature on Uncontrolled Bronchial Asthma

In this section, the nature and significance of understanding uncontrolled bronchial asthma and its relationship with academic performance are considerably discoursed to support and substantiate this dissertation proposal through relevant concepts and statistics from peer-reviewed articles.

1.1. Risk factors of uncontrolled bronchial asthma among children

Different articles were reviewed to determine risk factors that contribute to uncontrolled bronchial asthma among school children. Four recent articles whose authors are from Saudi Arabia revealed that environmental factors are the most common triggers for uncontrolled bronchial asthma. The high prevalence of asthma in Saudi Arabia can be attributed to or contributed by the occurrence of dust storms which are potential allergens, not common triggering factor or stimuli for asthma exacerbation (Al-Harathi, Al-Wagdani, Sabbagh, Al-Ghamdi, & Abu-Duruk, 2017; Al Ghobain, Algazlan, & Oreibi, 2018; Hussain, Farhana, and Alnasser, 2018), including changes in weather (Al-Harathi, Al-Wagdani, Sabbagh, Al-Ghamdi, & Abu-Duruk, 2017; Hussain, Farhana, and Alnasser, 2018). Also, those living in urban areas, possibly associated with industrial and vehicular pollution, dense traffic in the streets, increases the susceptibility of asthma among school among children (Al Qahtani, Asaad, Awadalla, & Mahfouz, 2017; Hussain, Farhana, and Alnasser, 2018).

Some of the risk factors include the following: being male (Al Qahtani, Asaad, Awadalla, & Mahfouz, 2017; Al-Harathi, Al-Wagdani, Sabbagh, Al-Ghamdi, & Abu-Duruk, 2017), though some studies indicate non-significant differences of asthma among males and females (Al Ghobain, Algazlan, & Oreibi, 2018, Moradih-Lakeh, 2015), having dogs and other indoor animals or pets in the house with allergic sensitization to dog hair (Al-Harathi, Al-Wagdani, Sabbagh, Al-Ghamdi, & Abu-Duruk, 2017; Al Qahtani, Asaad, Awadalla, & Mahfouz, 2017;

Hussain, Farhana, and Alnasser, 2018; Horaib, et al., 2018), smoking of a family member (Nahas, Bhopal, Anandan, & Sheikh, 2012; Al Zahrani, El-Morsy, Dorgham, 2014; Horaib, et al., 2018), being underweight (Horaib, et al., 2018), using wood as a cooking fuel, conducting vigorous exercise (Al Zahrani, El-Morsy, Dorgham, 2014; Al-Harathi, Al-Wagdani, Sabbagh, Al-Ghamdi, & Abu-Duruk, 2017; Al Qahtani, Asaad, Awadalla, & Mahfouz, 2017; Horaib, et al., 2018), consuming eggs, consuming vegetables and related dietary habits consuming potential food allergens (Al Qahtani, Asaad, Awadalla, & Mahfouz, 2017; Hussain, Farhana, and Alnasser, 2018), exposure to pigweed, and Bermuda grass (Al Qahtani, Asaad, Awadalla, & Mahfouz, 2017), and perfumes and household detergents (Al Zahrani, El-Morsy, Dorgham, 2014).

1.2. Uncontrolled bronchial asthma among children: illness trajectory and impact on health quality of life

Based on the survey using the European Community Respiratory Health Survey (ECRHS) questionnaire, those with asthma reported uncontrolled symptoms at a high rate including chest tightness (33%), shortness of breath (31%), and coughing (43%) (Al Ghobain, Algazlan, & Oreibi, 2018). These symptoms of asthma attack remained high as with the national household survey in 2013 at 76.7% (Moradih-Lakeh, 2015). These can lead to poor quality of life and psychosocial well being of the child.

The concepts associated with the quality of life represents the multifaceted perspective of asthma control because it validates the impact of the disease in the real-life circumstances and everyday living (Hossny, Caraballo, Casale, El-Gamal, & Rossenwasser, 2017). Tools such as quality of life questionnaire, pediatric asthma quality of life questionnaire, strengths and difficulties questionnaire, and asthma control test were used to determine quality of life based on an individual control asthma (Al Zahrani, El-Morsy, Dorgham, 2014; Hossny, Caraballo, Casale, El-Gamal, & Rossenwasser, 2017; Banjari, et al., 2018). Banjari, et al. (2018) found that children with uncontrolled bronchial asthma have significantly poorer quality of life. Assessed through the pediatric asthma quality of life questionnaire, all three domains, activity, symptoms and emotional function, have lower mean scores among those uncontrolled bronchial asthma; however, it was also found out that emotional problems, conduct problems, hyperactivity, peer problems and prosocial skills are not different among those with controlled and uncontrolled bronchial asthma. Similar literatures imply that an impaired control of asthma is detrimental and affects the quality of life of children, especially when compared with those with controlled bronchial asthma, the relationship of which is indirectly proportional, the more severe the symptoms, the poorer the quality of life (Al Zahrani, El-Morsy, Dorgham, 2014; Hossny, Caraballo, Casale, El-Gamal, & Rossenwasser, 2017; Banjari, et al., 2018).

The study of Miadich, Everhart, Borschuk, Winter, and Fiese (2015) found that age moderated the association of asthma severity and quality of life where the more severe the asthma is, the poorer the quality of life, such that older children have lower quality of life levels in the presence of severe asthma. Their social interactions as they grow older as adolescents are affected, as these children find their asthma treatments interfere with their interactions and relationships with peers. However, as they grow older, they begin to have wider comprehension of their asthma symptoms, but with more activities for their asthma care as part of their daily activities, the more burden they have and the poorer their quality of life is.

1.3. Asthma management guidelines in current literature

Since 1991, asthma guidelines were formulated to increase awareness among healthcare professionals about the asthma conditions, improve management of asthma, evaluate evidences in the treatment and management of asthma and encourage collaborations for asthma research, especially among younger age groups. The first international guidelines for asthma was formulated by the National Heart Lung and Blood Institute (NHLBI) in the United States of America, and was updated from results of meta-analysis in 2008 (Potter, 2010). Potter (2010) details the four major global asthma management guidelines in young children: the Expert Panel Report 3 of the National Asthma Education Programme (NAEPP) (National Institute of Health, 2007), the PRACTALL Consensus Report published by the European eAcademy of Asthma and Allergy (Bacharier, et al., 2008), an evidence-based guidelines compiled by the European Respiratory Society task force published in the European Respiratory Journal by Brand, et al. (2008) and the Global Initiative for Asthma (GINA) which contains new evidence-based guidelines for the diagnosis and management of asthma in children younger than 5 years published in 2009 (Potter, 2010).

The GINA published the Global Strategy for Asthma Management and Prevention as a 2018 update of the earlier evidence-based guidelines from the Global Initiative for Asthma, based on clinical trials and meta-analyses conducted over the years, providing a consistent pattern of findings among research subjects with asthma. The GINA report details the diagnostic criteria for asthma for adults, adolescents, and children 6-11 years, differential diagnosis among these age groups, assessment of asthma symptom control and future risk of

adverse outcomes, and severity of asthma, treatment of asthma to control symptoms and minimize risk, including long-term goals and control-based asthma management (Global Initiative for Asthma, 2018). While there are guidelines set in place through scientific protocols, fixed international guidelines may not work in some locations due to variations in risk factors, availability of resources and medical facilities, among others; hence, these guidelines must be adapted to fit local practices and context. This research endeavor thus attempts to determine local risk factors among primary school children, their general health status and quality of life affected by uncontrolled bronchial asthma that jeopardizes their academic performance in school, such that these guidelines may be adapted and modified based on the quantitative results of the study. Outcomes of the research thus tends to work with primary health care providers, school and public health officials to design, implement, and potentially evaluate asthma care programs adapted from the GINA report and based on scientifically sound evidence from this research. In the latter chapter of the GINA report, it presents an approach to implementation of the global strategy for asthma management and prevention. A local approach would first entail assessment of local needs, adapt local recommendations to local context, develop implementation framework and step-by-step plan, and assess uptake, effectiveness and sustainability. This quantitative study primarily assesses needs of primary school children afflicted with uncontrolled bronchial asthma through assessment of risk factors consequentially to minimize risks, identification of areas that needs to be addressed to improve health status and quality of life, and identification of common asthma symptoms based on illness trajectory. All these are rudimentary analyses to recommend asthma control guidelines from those available in the best practices literature of asthma, and develop an implementation framework contextualized on the needs of primary school children in Riyadh, Saudi Arabia.

In summary, the conclusion of the researcher is that there is dearth of literature for uncontrolled bronchial asthma among children 5 – 12 years old, age groups of primary school children, which makes asthma control and management for this age group difficult. With the help of the collated related literatures and studies, the researcher was able to augment her understanding regarding asthma control, how chronic illness affect general health status and quality of life of school children. A limited number to none were conducted to correlate these to academic performance. Overall, studies conducted are primarily focused on uncontrolled bronchial asthma among adolescents and adults.

Theoretical Framework: This research will determine if uncontrolled bronchial asthma has an effect on the academic performance of the primary school children at the end of the academic semester. It will use independent variables such as risk factors, illness trajectory or severity of the children's illness, and current health and quality of life of children to measure its effect on their academic performance. Outcome measures will be their academic performance delimited to attendance, general weighted average, and number of cases of social isolation at the end of the academic semester, which is approximately three months. A nursing intervention will be designed to improve their health and quality of life that will eventually lead to improvement in their academic performance.

The Chronic Illness Trajectory Framework by Corbin and Strauss (1991, 1992, 1998) will be used as the theoretical framework of this proposed research. With the shift of focus from acute care medical and nursing management to promotion of health and prevention of chronic illnesses, this model fits to address the chronicity associated with uncontrolled bronchial asthma through early interventions in the early phases of development of a child so he can cope up with the course of illness and its possible clinical sequelae, and enables the person to keep his illness stable. The trajectory, as defined by Corbin and Strauss in the update of the model (1998), is defined not only as the course of the chronic condition, but the actions of the participants, the individuals and providers of care among others, to control the course of the illness.

Determining the effect of uncontrolled bronchial asthma, a chronic condition, on the academic performance of children can use this model to develop a care management instrument to aid the advanced practice nurse to help children and parents adapt with the condition while maintaining good academic performance. The results of the study are preliminary investigations of the six steps of the trajectory model which are identifying the trajectory phase; identifying problems and establishing goals; establishing plans to meet goals; identifying factors that facilitate or hinder attainment of goals; implementing interventions; and evaluating the effectiveness of interventions. This framework will provide a conceptual basis for developing a nursing care model and will be a significant structure to potentially develop nursing care interventions for children with uncontrolled bronchial asthma, and encourage consideration of its implementation into the nursing management of this complex patient group based on the factors surrounding a child with the illness that can affect academic performance. Results of the study will fall in the first two steps of the model, and the output of the research will fall in the third to fifth step of the trajectory model. A subsequent research may be conducted to evaluate the effective of the interventions for the last step of the model.

The research questions and methodology are based on the operationalization of the chronic trajectory illness model. To implement this problem-solving model, data will be gathered from patients, family members,

and care providers if possible, to determine the physical, mental, emotional, functional and social, or economic data that support the existence of the problem. Based on the empirical data gathered and analyzed, a nursing intervention such as an asthma management guideline will be developed as a second step of the problem-solving model, which is prioritizing problems. This will require goal setting from both the patients (children), family members, and care providers in the school. This intervention will encompass the third step to define the appropriate plan of action and identifying the responsible persons who will carry out each part of the plan. The fourth and fifth step will not be subsumed in this research, which is to implement the plan and follow-through after implementation of the plan.

Corbin and Strauss' Chronic Illness Trajectory Framework as Applied in the Management of Uncontrolled Bronchial Asthma

The trajectory of uncontrolled bronchial asthma, in order to develop nursing management a clinical and public health guideline to control the illness, must be understood to develop action plans and interventions to match the medical problem and its associated symptoms that affect the quality of life of school children. The Corbin and Strauss' chronic illness trajectory framework can be broken down into phases which describes the definition of each phase in accordance to the medical problem and its corresponding goal of management. This will be the basis for the management guidelines to be developed as part of the output of this research. The first phase is the pre-trajectory phase where lifestyle behaviors of the child and the parents with the risk or is in the process of developing chronicity of the uncontrolled bronchial asthma will be identified so as to prevent onset of chronic illness. The second phase is the trajectory onset where assessment of noticeable symptoms will be conducted. It is in this phase where the individual's coping will be identified upon diagnosis or as part of the ongoing medical problem. The goal of this phase is to form appropriate trajectory and scheme based on common biopsychosocial challenges of the child, and this trajectory can be the basis of goal of asthma control.

In the trajectory phase, the four trajectories of illness identified by Panico, Stuart, Bartley, and Kelly (2014), depending on the severity of the uncontrolled bronchial asthma, will be used. These are Trajectory 1, characterized by low levels of all symptoms and the children are least likely to report symptoms that are severe and those that limit their daily activities. This is a trajectory with both low levels of wheeze and other atopic symptoms. Trajectory 2 has low levels of wheezing, but has high prevalence of atopic symptoms such as eczema and hay fever. The third, Trajectory 3 is characterized by high prevalence of both wheezing and other atopic symptoms. Children in this group report the most severe wheezing symptoms and are debilitated or limited by periodic episodes of wheezing. The Trajectory 4, on the other hand, has high levels of wheeze but low levels of other atopic symptoms (Panico, Stuart, Bartley, and Kelly, 2014).

This will lead to the next phase, which is the stable phase where the illness course and symptoms are under control. Life activities are managed with limitations of the presence of the asthma, where control management is instituted at home and in schools. The goal of the stable phase is to maintain stability while performing daily activities without exacerbation of symptoms. There will be times where symptoms may not be controlled so the fourth phase is the unstable phase, where the child may have difficulty in performing daily activities. The goal of care is to return to stability and that care is managed within the bounds of the home. When inevitable, the fifth phase, called the acute phase, may be experienced where severe and unrelieved symptoms occur as an exacerbation and may require prompt medical care and hospitalization. This is where daily life activities are disrupted and placed on hold, such that for the case of the children, can include absenteeism and increase number of absences, decline in academic grades due to poor academic concentration and absenteeism, and social isolation from school activities. The goal of this phase once reached is to return to stability (Corbin, 1998).

The goal of the control management guidelines to be developed from the empirical bases of this research is to prevent the child from succumbing to the next four phases of the trajectory, which are crisis, where critical and life-threatening condition confronts the child and family requiring emergent medical care, that once resolved and life threat has been removed, can proceed to the next phase which is comeback, a gradual return to acceptable way of living set with limitations. This is a rehabilitative procedure and a biopsychosocial healing. The next phases are what we prevent, which are downward, a rapid or gradual decline of health with increasing disability and difficulty in controlling symptoms of bronchial asthma, and dying due to shutting down of body processes from the clinical sequelae and consequences of uncontrolled bronchial asthma (Corbin, 1998).

Through this trajectory framework and the output of this research, the asthma control guidelines, nurses play significant roles in delivering health education, implementing plan of care based on the guidelines or plans and interventions developed, and work independently and collaboratively with healthcare professionals in the health system and with the education system to manage and control bronchial asthma among school children. In this control management intervention, the nurse will be the vital link in the healthcare delivery system working with children and families, schools, and primary and secondary healthcare institutions.

II. Material And Methods

This study will employ quantitative descriptive correlational design. The researcher will utilize this design because it describes variables and examines relationships between the independent variables and the dependent variable. Quantitative research design can be defined as an objective, systematic plan to gather data that has application to other situations or populations (Boswel& Cannon, 2011). Quantitative research is often identified with traditional scientific method that gathers data objectively in an organized, systematic, controlled manner so that the findings can be generalized to other situations or populations (Polit& Beck, 2012). It is the exploration and description of phenomena in real-life situations; it provides an accurate account of characteristics of particular individuals, situations, or groups. The purpose of descriptive research is to observe, describe, and document aspects of situation as it naturally occurs and sometimes to serve as a starting point for hypothesis generation or theory development (Boswel& Cannon, 2011).

Boswel and Cannon (2011) stated that a descriptive correlational design examines the relationships between two or more variables within a situation without knowing the reason for the relationship. Polit and Beck (2012) asserted that the aim of descriptive correlational research is to describe relationships among variables rather than to infer cause-and-effect relationship.

In this research, the relationship of the variables which are the risk factors, illness trajectory, health status and quality of life as independent variables, and academic performance as dependent variables will be described, without identifying causation among these variables. Following the research design and the results of data analysis, risk factors that greatly influence poor academic performance based on correlation coefficients will be identified and will be the focus of the proposed intervention for uncontrolled bronchial asthma management among school children. The illness trajectory, a categorization based on wheezing and other atopic symptoms, will identify which of the four categories is the most common illness trajectory among school children with uncontrolled bronchial asthma. While it is an assumption that the presence of worst symptoms is attributed to poor academic performance, this study will explore if this greatly affects just the absences from school and social isolation, or if it affects learning process as well measured through weighted grade average. If tested significant through data analysis, measures or interventions to minimize these symptoms will be included in the proposed asthma management guidelines. The child health questionnaire will explore the 14 domains namely, general health perceptions, physical functioning, role or social physical functioning, bodily pain, role or social emotional functioning, role or social behavioral functioning, parent impact-time, parent impact-emotional, self-esteem, mental health, behavior, family activities, family cohesion, and change in health (Raat, et al., 2005). Raat, et al. (2005). The pediatric asthma quality of life questionnaire (PAQLQ) will also explore three domains specifically activity initiation, symptoms and emotional function. Upon data exploration, it will be identified which of these domains need further attention in the proposed asthma management guidelines to improve health and quality of life with the assumption that good quality of life among school children and good health status affects academic performance. Data analysis will determine which of the domains greatly affects poor academic performance through their correlation coefficients.

Results of the data analysis will be the basis for designing nursing interventions or asthma management guidelines for the advanced practice nurse to implement to improve the health and quality of life of children so they can perform well in schools and improve on the measures of academic performance such as improvement in class attendance, improvement of grades, and reduction of social isolation.

Sample Size: Using the incidence of passive smoking exposure among those with and without asthma, (13.8% and 7.2%, respectively) (Lawson, Janssen, Bruner, Hossain, & Pickett, 2014), using 95% confidence interval for computing z deviate corresponding to α and β errors, comparing two proportions for hypothesis testing, the computed minimum sample size is 337.

Participants: The coverage of this study will be focused on determining the association or effect of uncontrolled bronchial asthma, through its risk factors and illness trajectory, and quality of life, to the children's academic performance, specifically, attendance, general weighted average, and cases of social isolation. Study samples are the school children aged 5 to 12 years old in government schools diagnosed with uncontrolled bronchial asthma. Government schools in Riyadh, KSA will only be included as the study site for this research. Because a primary criterion is set for inclusion, this study will used purposive sampling based on the following inclusion criteria.

1. Diagnosed with uncontrolled bronchial asthma
2. Aged 5 -12 years old
3. Currently enrolled in a government or public education system in Riyadh, KSA
4. Exhibited symptoms within 1 year from the time of the study

School children undiagnosed with uncontrolled bronchial asthma, children with healthy respiratory function with no symptoms of wheezing, children with controlled asthma will be excluded from this study. School children in private schools will also be excluded in the study.

Data will be collected from parents of school children diagnosed with uncontrolled BA, who are enrolled in government or public education system in Riyadh, KSA.

Prior to collection of data, the proposal will be submitted to the ethics review board for ethics approval. Since the subjects are children, informed consent will be obtained from the parents or legal guardians as legal representatives of the study participants. An informed consent form together with the questionnaire will be submitted to the ethics review committee. The informed consent will contain the following:

Protection of human rights: The study will be conducted in compliance with the procedures presented in the research proposal and the ethical guidelines approved by the Ministry of Health of the Kingdom of Saudi Arabia.

Confidentiality: In this study, the participant's health information will be collected and used to conduct the study; to determine the sociodemographic and economic characteristics of families of the children, risk factors associated with uncontrolled BA, illness trajectory of the chronic disease among these children, their health status and quality of life, and their academic performance. However, participant identification will only be available to the researcher. To ensure confidentiality, the study participants will be given an individual, non-identifiable code. The master file will be only accessible to the researcher and will be kept in a locked and secure room in the researcher's office. The electronic database when data will be cleaned, encoded, and organized will be password-protected only known to the researcher. No personal identifier will be used in any publication or communication used to support this dissertation. The participant's identification number will be used in the event it becomes necessary to identify data specific to a single subject.

Consent process: The written informed consent will be obtained from legal representatives of the study participants. Consent will be documented by signature or thumbprint on consent forms.

1. Parents or legal guardians of prospective participants will read the informed consent or that will be read out to the ones who are not literate, and they will be encouraged to ask questions regarding the study during an organized parent assembly in the school.
2. Signature (or thumbprint, if illiterate) of the parents or legal guardians of each of the study participants will be obtained and dated prior to any study-related activity.
3. Prior to securing consent, a letter of communication will be sent to the parents of potential study participants explaining the purpose of the study. The parent will be given at least 2 days to decide whether to participate in the study or not. A reply slip will be attached to the letter and will be submitted to the teacher-in-charge. Those who replied to participate will be invited for the parent assembly.
4. A witness will sign as well in the informed consent form in the event a subject or parent is not literate.
5. The informed consent form must be signed and dated by the study personnel who obtain the consent.
6. The parent or legal guardian will be provided with a copy of the signed consent form for their retention.
7. For children 7-12 years old, verbal assent is acceptable. At 12-17 years old, the participant will sign a simplified Assent Form different from the Informed Consent Form which the parents of guardians sign. Consent will be documented by signature or thumbprint on consent forms.

In the event that there is large number of attrition among study participants, the researcher will increase the number of participating schools in the adjacent cities of Riyadh, KSA.

The researcher will ask the assistance of teachers to check for completeness and accuracy of the questionnaire immediately upon submission of the questionnaire during the parent assembly. Missing data will be asked to provide by the parent or legal guardian. In the event that during data encoding and organization, an obscured data cannot be identified, the researcher will contact the parent or legal guardian by phone or email and be asked to supply the data, and will be documented accordingly.

Measures: The following are the variables to be used in the study:

1. Risk factors - These are factors that increase the risk of developing uncontrolled bronchial asthma or exacerbate the symptoms associated with it. This research will describe the following risk factors as follows:

- 1.1. Diet (nutrition and dietary habits)
- 1.2. Obesity (measured through bmi)
- 1.3. Concurrent infection
- 1.4. Smoking status in the family (smoker in the household)
- 1.5. Presence of allergies
- 1.6. Presence of pets
- 1.7. Exacerbation during changes in weather
- 1.8. Frequency of exercise
- 1.9. Feelings of stress
- 1.10. Place of residence (urban or suburban, as proxy measure for traffic density and air pollution)
- 1.11. Illiteracy of parents

These factors have been identified as risk factors in the asthma literature. Diet will include options of food that are potential allergens for individuals with hypersensitivity disorders. This will be a multiple response question where parents will tick several food choices that the child usually eats from a list of common food allergens. This will assess if regular intake of these food also triggers incidence of exacerbation of asthma. Obesity will be determined through identification of height and weight to calculate for the BMI, and data will be obtained from school clinics from students' health records. Frequency of exercise will be measured with regularity of physical activities, and will be assessed through two sub-indicators: number of hours per day of physical activity (less than 30 minutes, 30 minutes to 1 hour, and more than 1 hour) and the number of days in a week when the child spends exercise of physical activities. Illiteracy of parents will include the highest educational attainment of parents and their awareness of risk factors and management of uncontrolled bronchial asthma. The other risk factors will be measured by the presence or absence of these risk factors, including some sub-categories, answerable by yes or no.

2. Illness trajectory - This refers to the severity of uncontrolled bronchial asthma of the school children. The ISAAC core questionnaire for wheezing and asthma for children aged 6 and 7 years old will be used to identify the illness trajectory, which is a validated instrument to measure childhood asthma, wheezing and atopic symptoms of asthma. Based on the answers of parents using the tool, the illness will be categorized into four trajectories: 1. low levels of wheeze and low levels of other atopic symptoms; 2. low levels of wheeze and high prevalence of other atopic symptoms; 3. high levels of wheeze and high levels of other atopic symptoms; 4. high levels of wheeze and low levels of other atopic symptoms (Panico, Stuart, Bartley, Kelly, 2014).
3. Health status and quality of life - This describes current health status and quality of life of the children with uncontrolled BA using the short parent-report Child Health Questionnaire (CHQ-PF28) and the pediatric asthma quality of life questionnaire.
4. Academic performance - This refers to the number of absences incurred by the child with uncontrolled BA (attendance), general weighted average (academic grades), and number of cases of social isolation where the child feels fatigued and unable to interact with their fellow school children, measured in one academic semester.

Instruments: The researcher will use a questionnaire to obtain data from parents of children diagnosed with uncontrolled BA. The last two sections of the questionnaire are validated instruments used in the study of asthma and quality of life of children. The questionnaire will consist of the following parts:

1. Sociodemographic and economic characteristics
2. Risk factors of uncontrolled BA
3. ISAAC core questionnaire for wheezing and asthma for children aged 6 and 7 years old
4. Short parent-report Child Health Questionnaire (CHQ-PF28)
5. Pediatric asthma quality of life questionnaire

The ISAAC core questionnaire for wheezing and asthma for children aged 6 and 7 years old can be found in the International Study in Asthma and Allergies in Childhood Manual published in December 1993. The study instrument in Chapter 7.1 and 7.2 will be used exactly in the identification of illness trajectory among the children with uncontrolled bronchial asthma. The development and validation of the instrument can also be found in the manual, and will be attached in this research proposal. It includes validation of the instrument for repeatability, content validity, construct validity, concurrent validity, and predictive validity.

The Child Health Questionnaire (CHQ-PF28) consists of 28 questions, which can be completed in estimated 5 to 10 minutes. It assesses the 14 physical and psychosocial domains of health, including general health perceptions, physical functioning, role or social physical functioning, bodily pain, role or social emotional functioning, role or social behavioral functioning, parent impact-time, parent impact-emotional, self-esteem, mental health, behavior, family activities, family cohesion, and change in health (Raat, et al., 2005). Raat, et al. (2005) in their study of reliability and validity of the instrument concluded that the discriminative validity of the CHQ-PF28 is comparable with the more comprehensive counterparts like the CHQ-PF87 and CHQ-PF50, although the internal consistency of most individual scales yielded low results, yet summary measures and multi-item scale showed adequate internal consistency with Cronbach's alpha greater than 0.70. It was concluded that the instrument is acceptable for community health applications (Raat, et al., 2005). The pediatric asthma quality of life questionnaire (PAQLQ) consists of 23 questions divided into three domains, namely activity initiation, symptoms and emotional function. Poachanukoon, Visitsunthorn, Leurmarnkul, and Vichyanond (2012) tested the construct validity of the instrument and demonstrated high internal consistencies for all three domains with high correlations of the scores from the domains with the clinical parameters of asthma, with a Cronbach's alpha of 0.83-0.95 and However, the copy of the of the instrument will be obtained from the authors at a cost for a licensing fee.

A data extraction tool will also be used to obtain data of these children from school records, specifically, number of absences for attendance, and general weighted average for academic grades. Part of the data extraction tool will be a single question to be obtained from the class teacher or adviser regarding the number of social isolation of these children during the academic semester.

Data Gathering Procedure: The researcher will ask endorsement from the Ministry of Education to conduct the study in the public education system in Riyadh, KSA. Letters of communication will be sent to the principal of the schools for permission to conduct the study. It will be coordinated with the clinic nurse to identify children diagnosed with uncontrolled bronchial asthma. Upon identification, a sampling frame will be generated and organized, and depending on the number of children who satisfied the inclusion criteria, a sampling procedure will be conducted. If there is only a small number of children who passed the inclusion criteria, total enumeration will be used.

With the help and recommendation of the school, a letter of communication will be sent to parents of these potential study participants, including a consent form explaining the purpose of the study. Upon obtaining consent, these parents will be invited to a school assembly or meeting, where the researcher will present the aims and purpose of the study, explain further the informed consent and the benefits and risks of participation in the study. The parts of the questionnaire and how these will be answered will also be explained prior to data collection. The tool is a self-administered questionnaire in Arabic, with English translation, and the parents will individually answer the questionnaire while the researcher is within the premise for possible questions during questionnaire administration.

The schoolteacher will also be provided with the data extraction tool where they can provide data for the children's academic performance.

To facilitate the administration of questionnaire during the school assembly, students of advanced practice nursing in Dublin City University – PNU University will be sought as research assistants. Training will be conducted to standardize the administration of the questionnaire and to orient the students with the purpose, objectives, and plan of analysis of the study. This will also serve as their training in research implementation. Due to the comprehensiveness and complexity of data involved in this study to develop asthma management guidelines to be implemented among primary schools, the students of advanced practice nursing will be involved in the administration of questionnaires during the parent assembly, trained accordingly to discuss sections of the ISAAC core questionnaire, quality of life and health status questionnaire, and answer questions during questionnaire administration. They will also be trained to check for accuracy and completeness of the questionnaire, as well as assist in the data extraction of academic grades from the school where school children with uncontrolled bronchial asthma are enrolled in. The students will also be trained for data cleaning, preparation, and organization before submission of database to a qualified statistician. This will serve as their training and preparation in research project management and implementation as promoters and leaders of nursing research in their respective fields of specialization.

Research outcomes: The outcomes of this research include a description of the risk factors for uncontrolled bronchial asthma among primary school children, their general health status and quality of life being afflicted with this chronic disease. Another outcome is a description of the illness trajectory common among primary school children in Riyadh, Saudi Arabia.

Through regression analysis, this study will also provide explorative description of how these risk factors, general health and quality of life, and illness trajectory affect their academic performance, limited to academic grades, absenteeism, and social isolation.

The output of this research is an asthma management control school program, which adapts existing asthma management guidelines from scientific literature and modified to address local context using the quantitative results of the study. The asthma management control school program is a promotive and preventive school initiative aimed to minimize risk and control asthma, and consequentially improve academic performance, reduce absenteeism and improve social participation in school and classroom activities.

Statistical analysis

Based on the proposed measures of the variables described in the previous section, and the possible questionnaire developed and the level of measurement of the variables, descriptive analysis will include frequency and percentage to describe the socio-demographic and economic characteristics and the lifestyle-related and environmental factors. Frequency and percentage will also be used to categorically describe the illness trajectory based on the ISAAC core questionnaire. Mean and standard deviation will be used to describe results of the child health questionnaire and pediatric asthma quality of life, and the academic performance. Associations between the independent and dependent variables can be tested using linear regression, provided that the dependent variables (number of absences, general weighted average, and number of cases of social isolation) are of interval or ratio measurements.

Statistical Package for Social Sciences (SPSS) or STATA will be used to analyze the data. A probability value of less than 0.05 ($p < 0.05$) is considered significant; hence an alpha level of 0.05, and confidence level of 95%.

III. Discussion

Because of the several illness trajectory for asthma, such as those with high or low levels of wheezing accompanied by high or low levels of atopic symptoms, the diagnosis and management of asthma in young school children is difficult, with variegated underlying etiologies, environmental and lifestyle-related factors, and outcomes. With the assumption that the results of the study of Nahhas, Bhopal, Anandan, and Sheikh (2012) are generalizable and results reflect the general population of school children in Riyadh, the highest risk among primary school children for asthma and symptoms indicative of respiratory allergic disease cannot be undermined. Consequentially, those with high levels of wheezing and high levels of atopic symptoms or both can generally impair quality of life among children, and can impede their capacity to perform well in school. Constant exacerbation of bronchial asthma can then result to frequent absenteeism, and possibly lack of zeal among students in school activities. While there is no established evidence that uncontrolled bronchial asthma can lead to poorer academic performance, this research will try to explore the possible relationship of uncontrolled bronchial asthma among children with their academic performance, controlling for variables such as quality of life, health status, and categorical classification according to illness trajectory. Also, identifying risk factors which are identified from the literature so reflect the current climate and environmental conditions in Saudi Arabia can be the basis on how to localize international guidelines of asthma, focusing on control measures to minimize exacerbation of asthma caused by identified risk factors. Recognition of risk factors can greatly help individualizing therapy for the management and control of asthma, where prevalence has no disparity in the rural and urban areas of Saudi Arabia (Hussain, Farhana, Alnasser, 2018).

Whilst prevalence of asthma is high in Saudi Arabia compared to most countries, which are relatively undiagnosed, there is dearth of initiatives to improve asthma control and identify undiagnosed asthma cases, especially that clinical presentation varies in wheezing and atopic symptoms and triggers are difficult to identify. Localizing the implementation and monitoring of asthma clinical management guidelines through school program for asthma can intensify public health initiatives in controlling asthma bronchial asthma.

Following the Corbin and Strauss' chronic illness trajectory model, identification of the risk factors, both environmental and lifestyle-related can prevent the onset of chronicity for uncontrolled bronchial asthma. Considered a pre-trajectory phase, the asthma management control program will preclude development of chronic condition through early identification of behaviors at risk. The phase of trajectory onset will encompass identification of illness trajectories based on the four categories, a non-formal clinical diagnosis of the manifestations of uncontrolled bronchial asthma to form appropriate disease projections and schemes. The significant purpose of the asthma management control program is to maintain the stable phase of the trajectory model, where the disease is under control while performing daily activities. This intends to improve quality of life and general health conditions, which are assumed to be poor among those afflicted with the disease based on current literature. The program will also incorporate measures to return to stability once there is disruption in the stable phase. While in the unstable phase, the program also intends to include adjustments to be made by both

children, parents, and school to help the child during the period of instability until the child returns to stable condition, and perform well in academic setting. The program will also explore referral networks when the child exhibits symptoms under the acute and crisis phases of the trajectory model, to resume normal daily activities, bring the child back into normal track in his academic performance, bring illness under control and remove threats such as risk factors that exacerbate the child's condition. The program will incorporate current clinical practice guidelines, results from this research to improve the domains in the quality of life and health status of children, to maintain academic performance and acceptable behavior of children as he sets motion along the trajectory projection and scheme of a child who is able to cope with the implications of the disease.

The research focuses on different factors around the diagnosis of uncontrolled bronchial asthma and how this affects academic performance of children aged 5 to 12 years old, with the assumption that it is moderated by poorer health status and quality of life brought about by worst asthma severity. The study is built on existing literature on the risk factors of asthma, health and quality of life of pediatric populations with asthma, and illness trajectories. Results will be the basis for localizing current international guidelines managing asthma, such that the school initiative as a program characterizes its recipients according to common risk factors among populations in Saudi Arabia while mobilizing local resources to manage bronchial asthma and consequentially improve quality of life and health and academic performance. While it is suggested that differences in asthma management and adherence may also explicate on the differences of severity among age groups, this quantitative analysis may be modeled to determine how uncontrolled bronchial asthma with the worse trajectories relate to health status and quality of life and predict academic performance.

The study's clinical and public health implications are also significant in the control and management of uncontrolled bronchial asthma as early as childhood. As a school initiative, public health starts within the family and school where children spend most of their time performing daily tasks and activities, and ensuring that the chronic illness does not interfere with biopsychosocial development of the child.

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