

# Perceptions of Ndola based Parents and Teachers on the Participation of Asthmatic School Children in Physical Education

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## Abstract

**Introduction:** Lack of participation of asthmatic children in physical activity negatively impacts these children's mental and physical health. Asthmatic children are more likely to be obese, have higher levels of emotional difficulties and struggle with low self-esteem. Lack of physical activity leads also to aerobic deconditioning which further exacerbates the asthma. Meanwhile, studies have shown that a significant proportion of the general population hold the notion that asthmatic children cannot exercise or play hard.

**Objectives:** This study aimed at determining the perceptions of parents and teachers on the participation of primary school children with asthma in physical education in Ndola. It is necessary to highlight the perceptions that parents and teachers have on this matter as they are most likely the adults in whose care children with asthma will be.

**Methods:** The study was conducted as a cross-sectional survey among parents and teachers of children attending selected primary schools in Ndola Urban. Self-administered questionnaires assessing the knowledge, practices and factors affecting practices of parents and teachers with regards to participation of asthmatic children in physical activity were distributed to the participants. The data were analysed using IBM SPSS Statistics for Windows, version 26.0 (SPSS Inc., Chicago, Ill., USA).

**Results:** Data were collected from 205 participants (91 teachers and 114 parents). 63.5% were female and average age range was between 26-35 years. Among the parents, 49.1% had moderate knowledge and 40.4% had poor knowledge. Knowledge was not significantly associated with socio-demographic factors. Among the teachers 64.8% were moderately knowledgeable, 26.4% had good knowledge and 8.8% had poor knowledge. Having asthma or knowing someone with asthma were found to be significantly associated with knowledge levels among the teachers ( $P<0.05$ ). Teachers who were themselves asthmatics or knew someone with asthma had better knowledge levels than those that did not. Most of the parents (45.6%) had poor practices while almost half (49.5%) of the teachers had average practices. The practices of parents were significantly associated with marital status ( $P<0.05$ ). Married parents had a better practice score than those that were single or divorced. No significant associations were noted between practices of teachers and their socio-demographic factors

**Conclusion:** It has been concluded that perceptions of both parents and teachers on the participation of primary school children with asthma in PE is quite poor in Ndola. Efforts should be directed towards correctly informing these two groups of caretakers on the management of childhood asthma and allowance of physical activity in asthmatic children.

**Keywords:** Global asthma network • Leukotriene receptor antagonist • Tropical diseases research centre

**Abbreviations:** BMI: Body Mass Index; DEBS: District Education Board Secretary; EIA: Exercise-Induced Asthma; EIB: Exercise Induced Bronchoconstriction; GAN: Global Asthma Network; GBD: Global Burden of Disease; GINA: Global Initiative for Asthma; IV: Intravenous; LTRA: Leukotriene Receptor Antagonist; MOH: Ministry of Health; NAKQ: Newcastle Asthma

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Knowledge Questionnaire; NHLBI: National Heart Lung and Blood Institute; PE: Physical Education; RSA: Republic of South Africa; SABA: Short-Acting Beta Agonist; TDR: Tropical Diseases Research Centre

## Introduction

### Background information

Asthma is the most common chronic condition in children and a major cause of school absenteeism, accounting for 13 million missed school days per year in the United States (US) alone [1]. A comprehensive definition of asthma as adopted by the Global Initiative for Asthma (GINA) is “a heterogeneous disease, usually characterized by chronic airway inflammation, defined by the history of symptoms such as wheeze, shortness of breath, chest tightness and cough that vary over time and in intensity, together with variable expiratory flow limitation [2]”.

It is reasonable to expect that in most patients with asthma, control of the disease can and should be achieved and maintained, and this is the primary goal of treatment. However, acute exacerbation of symptoms can be brought about by allergens, airway infection, passive smoking, air pollution, climate changes, exercise and psychological factors [3]. In such cases, recommended choice of treatments includes inhaled beta-adrenergic agonist such as salbutamol (Ventolin) and inhaled corticosteroids such as beclomethasone. In more severe cases, Intravenous (IV) hydrocortisone, IV aminophylline and oral prednisolone are the standard course of treatment [4].

In 2016, the Global Burden of Disease (GBD) study estimated that 339.4 million people worldwide currently suffer from asthma and, according to reports from centres for disease control, this is expected to rise to over 400 million by 2025.

The prevalence of asthma in most countries is increasing, especially among children [5]. In 2006, approximately 14% of the world's children experienced asthma symptoms [6].

In Zambia, an epidemiologic study conducted in Lusaka to estimate the burden of asthma shows that the prevalence of asthma in children aged 7-8 years old is 5%, while that in adolescents aged 13-14 is 8%, which is similar to those measured in neighbouring countries [7]. Another study carried out by Kampengele among urban school children in Lusaka revealed that the prevalence of Exercise-Induced Bronchoconstriction (EIB) is at a notable 12%. EIB, less commonly known as Exercise Induced Asthma (EIA), is a condition that is common among asthmatic patients affecting 90% of them [8].

Despite this high prevalence, knowledge of the general public on asthma remains poor and misconceptions are profound. From the survey carried out in Lusaka by Jumbe-Marsden, et al. the researchers found that knowledge about asthma was very poor, even among asthmatics (though significantly better than in the general public), and they identified many misconceptions of the 1540 participants they surveyed, nearly 60% believed that people with asthma cannot exercise or play hard, 37% believing inhalers are addictive and 54.7% believing hospitalizations are not preventable.

Parents are the primary caregivers of their children, and in the case of an asthmatic child, they have a major influence on whether or

not their child will be allowed participation in physical education. In the same vein, children spend up to half of their day at school under the care and supervision of teachers. Teachers make decisions regarding the participation of asthmatic children in physical education and administration of both regular and emergency drug treatment. Thus, they may be the first to assist a student who is having an asthma attack in the school. It therefore becomes imperative that these two groups of caregivers (parents and teachers) should have satisfactory knowledge on the management of childhood asthma [9]. Few school teachers, however, receive instruction about asthma or how to manage asthmatic children [10].

No study has been carried out in Zambia to determine the knowledge and perceptions on asthma, with the primary focus being on physical education and a study population of parents and teachers. Studies from other countries have, however, revealed that there are significant knowledge gaps and misconceptions among these caregivers especially concerning physical activity [11].

### Problem statement

Lack of participation by children with asthma in physical activity (and education) has a negative impact on these children's mental and physical health [12]. Knowledge on asthma is poor in Zambia. Nearly 60% of the general public in Lusaka believe that people with asthma cannot exercise or play hard [13]. Insufficient knowledge on the management of childhood asthma among parents and teachers would lead to them excluding asthmatic children from physical education and competitive sport. The asthmatic children will end up being teased as weak, which will affect how they interact with their friends.

Glazebrook, et al. found that children with asthma were more likely to be obese and had higher levels of emotional difficulties. Within the same group, more active children had better mental health. In addition, studies reviewed all agree that physical activity is beneficial to a young child in terms of bone development, motor skills, improved cardiovascular fitness, and self-esteem [14].

Exercise is a known trigger of bronchoconstriction and almost 90% of asthmatic patients experience Exercise-Induced Bronchoconstriction (EIB). EIB is highly prevalent among school aged children with an estimated 12% of urban school children in Lusaka affected [15]. This high prevalence necessitates assessment of preparedness of teachers in the care and management of asthmatic children. The resulting unpleasant symptoms could prompt teachers to wrongly restrict asthmatic children from physical education because of not wanting to take responsibility for a child's severe attack. Parents would likewise demand that their child not be allowed to participate in physical education believing it is in the best interest of their child.

EIB, though, is preventable and treatable, and the numerous health benefits an asthmatic child stands to obtain from physical education, far outweigh the potential risk.

Physical activity is especially important in children with asthma. Activities such as running and swimming are associated with

improved fitness and decreased severity of asthma symptoms. Regular exercise and level of physical conditioning are major determinants of exercise tolerance in children with controlled asthma [16].

It is for these reasons that the consensus of many authors is that inactivity or reduced activity in the presence of an asthma diagnosis should not be accepted [17]. Parents and teachers should thus allow asthmatic children to participate in competitive sports and physical education in schools so as to avoid detrimental effects on the children's physical and social wellbeing [18].

## Rationale and justification

Physical inactivity in children with asthma is detrimental to these children's physical and psychological well-being. Previous research into childhood asthma has shown that there is poor knowledge and understanding of the disease especially concerning management and participation of affected children in physical activity, with many people believing asthmatic children cannot participate in physical activity.

This study aims at highlighting the perceptions parents and teachers have on the participation of asthmatic children in physical education, and to assess their knowledge on the management of childhood asthma. This is necessary as they are the adults in whose care children with asthma are usually left and they make decisions regarding participation in physical education and administration of medication. Identification of the areas of inadequate knowledge and misconception helps facilitate for recommendations to be made on which areas need sensitisation and on where to correctly inform. This ultimately gives a chance to children with asthma to fully participate in physical education allowing them to reach their full potential of physical and mental health like their peers without asthma.

Previous studies looking into similar topics differ from this study in setting (clinics compared with primary schools in this study), focus (physical activity compared with physical education in this study), target population (general public compared with parents and teachers in this study), and location (Lusaka compared with Ndola in this study).

This study adds to the medical science body of knowledge in Zambia and sub-Saharan Africa as data on the perceptions of parents and teachers on the participation of children with asthma in physical education, which is currently either scant or unavailable, has become more available.

Assessment of teachers knowledge, especially, will help guide the Teaching Council of Zambia at the level of teacher training curriculum development enabling them to integrate some form of education on the management of the most common chronic condition affecting children left in their care. Teachers are likely to feel more confident in their position of responsibility if they are able to discern when the child is becoming unwell and take what action is required [19].

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## Literature Review

### Physical activity in asthmatic children and EIB

If young people do not get rewarding experiences out of physical exercise early on, they will find it much harder to maintain healthy

levels of physical fitness and body weight in adulthood. Research has shown that children with asthma engage in fewer physical activities than their peers. The asthmatic children tend to have a higher Body Mass Index (BMI) and are 4 times more likely to be obese. This is indicative of a potential positive feedback cycle of disadvantage for children with asthma, whereby obesity increases the risks of asthma, and asthma exacerbates obesity by restricting exercise. In fact, studies indicate a comorbidity of asthma and obesity in urban children [20].

A study on the physical activity in urban school-aged children with asthma found that children with asthma were less active than their peers and that more than 20% of children with asthma were still not reaching the goal of normal physical activity. About 21% of asthmatic children were found to be active for less than 30 minutes in a day verses only 11% in non-asthmatic children [21].

Health beliefs of the parents and disease severity play an important role in the physical activity of children with asthma. Fear of asthma attacks could limit the children's activity and result in increased dependence on others, and eventually impose a negative impact on the practices of children and parents, which could include barring of asthmatic children from physical education [22]. Lang, et al. reported that children whose parents believed exercise could improve asthma were more likely to be highly active for more than 120 minutes/day.

Exercise-Induced Bronchoconstriction (EIB), exercise induced bronchospasm, and Exercise Induced Asthma (EIA) are all terms used to describe the phenomenon of transient airflow obstruction associated with physical exertion.

EIB is a phenomenon in which wheezing and dyspnea occur temporarily during or after exercise. Its pathology is yet to be clarified. Cooling in the airway caused by hyperventilation during exercise and elevated osmolality in the airway epithelium due to water loss are potential mechanisms responsible for the underlying pathophysiology [23].

EIB is a condition that occurs in 90% of asthmatics, and in Zambia, it occurs in about 12% of urban school children. EIB can be avoided by administration of appropriate prophylactic bronchodilator medication. Exercise does not have to be restricted because it otherwise benefits the child's growth in various ways discussed below.

With few exceptions, most countries and organizations recommend that children and youth participate in at least 60 minutes of moderate-to-vigorous intensity physical activity on a daily basis. Children with asthma are able to participate in any physical activity if symptoms are well controlled. When asthma is controlled, there should be no more than the occasional recurrence of symptoms and severe exacerbations should be rare. Swimming is less likely to trigger EIB than running and other land based cardiovascular exercises and has also been shown to decrease the severity of asthma symptoms [24].

Parents of children with asthma should keep an accurate history of symptoms, trigger exposures, treatments and course of recovery from episodes of bronchospasm. In addition, children with asthma should be diagnosed with EIB and checked for a positive response to beta-2 agonist medication. Children with asthma who suffer from EIB

should take inhaled beta-2 agonists 15 min to 60 min before exercise as prophylaxis. However, beta-2 agonists use should be limited because they may induce airway hyper-responsiveness. Leukotriene Receptor Antagonists (LTRAs) may be used but reduction of EIB by training regularly is preferable. Other non-pharmacological interventions include warm-up for 10-15 minutes and warm-down for 10-15 minutes, breathing through the nose or mask rather than the mouth to reduce the loss of heat and moisture during exertion.

A recent systematic review of the health benefits of physical activity and fitness in school aged children and youth found that physical activity was associated with numerous health benefits. Exercise was found to improve blood pressure and bone mineral density, whereby inactivity was associated with obesity and depression in children and youths [25,26]. There was a dose-response relationship observed in observational studies that indicates the more physical activity, the greater the health benefit.

These findings are similar to those of Warburton, et al. who revealed that regular physical activity is effective in the primary and secondary prevention of cardiovascular disease, diabetes mellitus, specific cancers (breast and colon cancer) and osteoporosis. Further, regular physical activity and a high fitness level were associated with a reduced risk of premature death from any cause. Routine physical activity was also associated with improved psychological well-being through reduced stress, anxiety and depression.

It therefore becomes clear the benefits of exercise may not, therefore, be only physical but may impact on mental health by enhancing self-esteem, physical self-worth, and social competence. Lang, et al. agrees that participation in physical activity is an important part of a child's normal psychosocial development and self-image. Participation in physical activity, particularly at school, is an important contributing factor for psychological well being by, for example, reducing the body dissatisfaction that can be associated with asthma.

Considering benefits of exercise that are specific to asthmatic children, bronchial hyper responsiveness has been noted to decrease with increasing hours of exercise per week. Improved physical activity in children and young people with asthma, has been associated with significant improvements in aerobic fitness and asthma related benefits such as reduced hospital admissions, reduced absenteeism from school, fewer consultations with health professionals, reduced medication use, and improved ability to cope with asthma.

In individuals with EIB, physical education and the resulting aerobic conditioning lessens the prospect of an asthma attack by reducing the ventilator requirement for any activity. Although improved fitness of children with asthma is highly desirable, patients must be emphatically discouraged from adopting the view that they can overcome their disease solely by being in good physical shape. Exercise may decrease EIB severity by increasing the threshold for triggering bronchospasm. Consensus of many authors is that swimming can increase aerobic fitness and decrease asthma morbidity.

## Global perceptions

Improving the knowledge, changing the attitudes and practices of parents of chronically ill children has been shown to improve disease

control. The validity of this is supported by one Brazil study that found parents of children with mild or moderate (controlled) asthma scored more on the Newcastle Asthma Knowledge Questionnaire (NAKQ) than parents of children with severe (poorly controlled) asthma.

Koshapor, et al. also noted that with greater intensity of disease symptoms, attitudes and practices of parents became worse. Likewise, a study carried out in 2013 in Riyadh, Central Saudi Arabia, to explore the caregiver's knowledge and its relationship to asthma control among children, found that the prevalence of uncontrolled asthma was three times higher in children of the participants who have misconceptions about the proper time to stop asthma medication. Furthermore, AlOtaibi and AlAteeq reported that parents who give their children asthma medications regularly, visit the doctor regularly, and do not give herbal medications have more knowledge compared with others. In the cross sectional study carried out by Roncada et al. in the southern region of Brazil on the parents of children with a medical diagnosis of asthma (asthma group) together with parents of children in remission or healthy children (control group), it was found that of the 154 participants in total, only 30.5% (47) had acceptable knowledge about asthma. Majority of these fell in the asthma group.

In Iran, on the other hand, knowledge, attitudes and practices of parents regarding physical activity of children with asthma were desirable with data obtained showing 61% of parents had an ideal knowledge of physical activities of their asthmatic children and 38% of parents had intermediate knowledge. The least and weakest correct answers recorded were related to sports activities and daily activities such as walking. Only 37% correctly stated that sports activities such as swimming and gymnastics would improve their child's breathing, while only 45% indicated that they would walk their child to school for better breathing.

Another Saudi study exploring the knowledge and practice of parents and guardians about asthma in their children reported 78% of the participants had moderate knowledge about asthma but poor knowledge about asthma medication and physical activity in asthmatic children. During acute asthma attacks, more than half of the participants (54%) massaged their child's chest or back, and 52% provided the child homemade or herbal remedies. Regarding physical activity, 72% of participants agreed that children who have asthma should not participate in sports that make them run too much while 79% indicated that parents/guardians should ask a doctor to tell the school that an asthmatic child should not exercise or participate in physical education classes [27].

Concerning knowledge of teachers about management of asthma, various researchers have found that most teachers are worried about their lack of preparedness to cope with an asthma attack and therefore feel uncomfortable managing asthma in their classrooms because they are not trained to handle an asthma emergency.

In the survey carried out by Bevis and Taylor on 98 teachers from primary schools in inner London, it was evident that teachers in that sample had limited knowledge and understanding of asthma and were even aware of it. Only 5% thought that they knew enough about asthma and only 4% reported that they had received teaching and training about asthma. This is consistent with the findings of Jaramillo and Reznik whose study revealed that many US teachers were not trained and did not know school policies on asthma.



In one particular Turkish survey of 792 Istanbul primary school teachers, the mean asthma knowledge score was 74.3% which actually showed that they had satisfactory knowledge on the signs, symptoms and treatment of asthma, and the nature of the disease, but they were not good at subjects like the role of exercise, aspirin and antitussive drug usage in asthma. Knowledge on provoking factors was found to be particularly poor with only 28.4% of these teachers being aware that cold wind is a trigger for asthma, which is similar to the findings of Bevis and Taylor who reported 27% true response rate concerning cold wind as a trigger for asthma.

Ones, et al. reported that 31% of teachers were not aware of salbutamol and terbutaline as quick relief treatment for acute exacerbations. Bevis and Taylor similarly reported that 39% of primary school teachers did not know or were unsure whether salbutamol was a quick relief drug for asthma exacerbations, while knowledge on terbutaline was virtually non-existent. Though it would be unreasonable to expect teachers to have in-depth knowledge on the drug treatment of asthma, they should however have some idea of the types of drugs to administer either for prophylaxis (before physical activity) or when a child is wheezy.

The National Heart, Lung, and Blood Institute (NHLBI) of the United States (US) in its guidelines on asthma management for classroom teachers recommends that classroom teachers encourage student's full participation in physical activity. In this regard, Ones et al. (2006) reported that most teachers knew that asthmatic children can participate in sports. The knowledge score rate for the question concerning asthmatic children participation in sport was 74%.

In contrast, Bevis and Taylor stated that teachers' understanding of sports and games was less than ideal. While 78% of their respondents correctly stated that full participation in games should be encouraged, 67% did not know that taking drugs before games should prevent an asthmatic attack and therefore did not ensure necessary drugs were taken before games and only 18% knew that salbutamol is the best drug to take before games. In addition, 37% did not know that swimming is the best sport for asthmatics while 66% were unaware that wheezing after exercise is suggestive of asthma.

Some researchers have found a significant relationship between knowledge and practices of parents towards physical activity in children with asthma, and educational level of the parents. Roncada, et al. found no correlation between levels of knowledge about asthma and schooling of parents. Demographic variables such as age, gender and ethnicity have not been found to significantly affect level of knowledge of parents. Other variables found to have an effect on parents' knowledge and practices include years of childhood disease and severity of childhood disease.

Lang, et al. reported certain interesting findings. While many parents reported living within walking distance of a park, playground or recreation center, not many children actually used them regularly. Even though approximately half of the parents considered their neighbourhood safe, this issue was not associated with activity in their children.

There is little information in literature concerning the factors associated with teacher practices and knowledge on asthma. Two studies found no correlation between teachers' age, education level (diploma, degree, etc.) and location of primary school, and the level

of asthma knowledge. These studies, though very insightful, did not also highlight the practices of teachers concerning the actual level of participation in physical activity they allow for asthmatic children.

## Myths and misconceptions

Popular myths and misconceptions regarding childhood asthma often involve inhaled medication. Different studies have shown that ranging from 44-48% of parents believe that inhalers can lead to addiction or drug dependence. In contrast, only about 14% of parents reported being afraid of oral corticosteroids. Additionally, a Brazilian study found that only 39% of parents affirmed that the use of inhaled bronchodilators does not damage the heart and only about one third of the children had used prophylaxis. In the same study, 24% of parents reported that their children had visited a "witch doctors or faith healers". In Saudi Arabia, 49% of the parent and guardians stated that inhalers can have an effect on the heart and damage it [28,29].

Studies elsewhere have shown that majority of parents of asthmatic children perceive asthma as a barrier to physical activity in their children. A study done in Nottingham, UK found that 61% of these parents reported the child's asthma as a barrier to physical activity. The negative effect of such misconceptions was reflected in the children's responses of which 66% of the children reported asthma as a barrier to exercise.

Considering the high prevalence of asthma in children, these findings reveal a bleak outlook in terms of management and control of the disease that requires agent attention.

## Regional perceptions

Literature on the knowledge and practices of parents and teachers on childhood asthma in sub-Saharan Africa is scant. This could be attributed to the fact that this is one of the hardest hit regions by "competing" infectious diseases such as HIV/AIDS and Tuberculosis, and as such, more effort is directed into research on these diseases. This however should not take away from asthma whose prevalence is on the rise.

Govender and Gary in their cross-sectional survey of primary school teachers in KwaZulu-Natal, South Africa (RSA) concluded that knowledge of asthma and its management was deficient and that some of the misconceptions harboured could lead to unsafe practices. As with studies done elsewhere in the world, primary school teacher's level of asthma knowledge was not significantly associated with age, gender, years of teaching experience, educational qualification, or contact with an asthmatic individual.

RSA primary school teachers demonstrated a reasonable amount of knowledge on the factors that could trigger an asthma attack in a child. An area of concern was that only 36.3% were able to identify blue discoloration of the lips as a sign of severe acute asthma attack. Of relevance to a school setting, only 30% of teachers knew that swimming is an acceptable and beneficial sport for asthmatic children, while 52% did not know that preventive medication should be taken by an asthmatic child before exercise and sports.

## Myths and misconceptions

Myths and misconceptions about asthma are commonplace in sub-Saharan Africa. For instance, in Maputo, 11% of adults think that asthma is contagious and over 50% believe an asthmatic child cannot lead a normal life, even during the period between attacks. Govender and Gary reported that particularly alarming was that almost a quarter (23%) of the primary school teachers in KwaZulu-Natal thought that asthmatic children had low IQ levels. The figure was only 11% for London primary school teachers. Another concern raised in RSA was that less than half (46%) of the teachers correctly indicated that asthmatic children should engage in sports and exercise with 49% believing that asthma medications are addictive and weaken the heart.

Such myths and misconceptions may influence them into unsafe practices as can be shown by a Cape Town study in which parents of asthmatic children were found to rely on syrups and home remedies while they also exhibited a marked resistance to inhaled therapy and a relatively low compliance with prescribed treatment.

## Local perceptions

The health-care system in Zambia is primarily focused on acute care delivery with a particular focus on infectious diseases. The country, though, is currently experiencing an epidemiological transition, from communicable to non-communicable diseases. The national treatment guidelines were recently updated in line with international recommendations, and recommend inhaled medications as the primary treatment option for individuals with asthma, but this is not yet widely practiced. Researchers have found a poor understanding of disease progression and management on the part of patients, families and health care providers.

Jumbe Marsden, et al. conducted a cross sectional survey in Lusaka on the knowledge and perceptions of asthma in Zambia and concluded that knowledge about asthma is poor among Zambians and misconceptions are prevalent. Among the entire surveyed population (1540 participants), 54.7% believed hospitalisations are not preventable, only 45.3% believed asthma symptoms can be prevented with the right medications and 37% believed inhalers are addictive. Nearly 60% thought that people with asthma cannot exercise or play hard.

Concerning medication, Wa Somwe, et al. reported that most asthmatics (68%) used oral Short-Acting  $\beta_2$ -Agonists (SABA) for symptom control, while inhaled steroids were used by only 14%. Almost half (49%) of the participants did not think that asthma symptoms were preventable with medications. Nearly 30% did not think an inhaler is a good treatment for asthma and 43% believed inhalers were addictive. Jumbe Marsden, et al. had similar findings stating that while the majority of individuals with asthma thought inhalers are a good treatment for asthma, many asthmatics reported that inhalers are addictive and inferior in efficacy to tablets hence their preferred treatment was oral SABA medication.

No research has been conducted in Zambia on the knowledge and perceptions of parents and/or teachers regarding physical activity in children with asthma. With the misconceptions identified in the general population in Lusaka combined with the high prevalence of the disease especially in children, this is an area of critical concern.

Despite some of the studies showing that participants had reasonable knowledge of asthma, common symptoms and provoking factors, two things that seem to stand out are the consistent lack of knowledge regarding medication and participation of children with asthma in physical activity. This is very concerning as both of these findings could negatively influence practices of parents and teachers towards asthmatic children.

## Objectives

**General objective:** To determine the perceptions of parents and teachers on the participation of primary school children with asthma in physical education in Ndola.

**Specific objectives:** To assess the levels of knowledge on the management of childhood asthma among parents and teachers at selected primary schools in Ndola.

To determine the practices of parents and teachers regarding the participation of primary school children with asthma in physical education at selected primary schools in Ndola.

To establish the factors influencing the knowledge and practices of parents and teachers on the participation of primary school children with asthma in physical education.

## Research questions

- Do parents and teachers have acceptable knowledge on the management of childhood asthma?
- What are the practices of parents and teachers regarding participation of primary school children with asthma in physical education?
- What factors influence the knowledge and practices of parents and teachers on participation of primary school children with asthma in physical education?

## Hypothesis

Parents and teachers believe that asthmatic children cannot and should not be allowed to participate in physical education.

## Measurement

### Operational definitions

**Asthma attack:** Exacerbation of asthma symptoms

**Child:** A boy or girl aged 5 to 16 years

**Knowledge:** Being familiar with childhood asthma and understanding ways of management

**Misconceptions:** An idea which is wrong based on failure to understand the mechanisms of asthma e.g., Inhalers are addictive

**Myths:** A commonly believed but false idea concerning children with asthma e.g. Asthmatic children cannot exercise or play hard

**Perceptions:** Beliefs and opinions people have concerning physical activity in children with asthma

**Physical activity:** Any movements of the body that cause at least moderate to high energy expenditure e.g., walking to school, running, sports, playing outdoors, physical education.

**Physical education:** outdoor classes at school in which pupils do exercises and learn to play sports as a way of maintaining physical fitness.

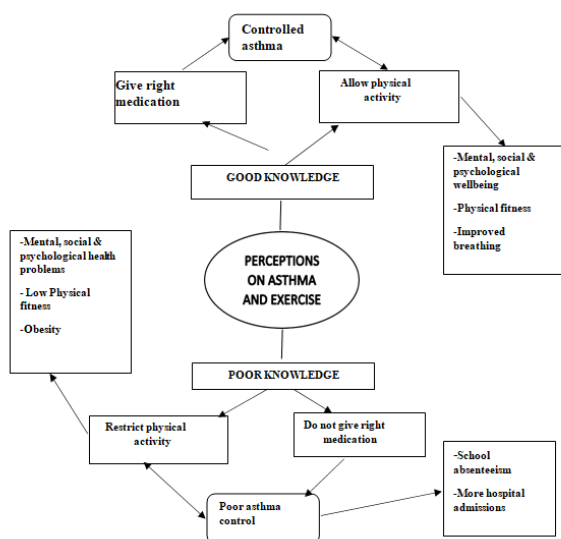
**Physical fitness:** State of health and wellbeing where an individual is able to carry out daily activities without undue tiring (Figure 1).

**Scales of measurement**

Knowledge will be measured on a scale of 1–9 depending on the score on asthma knowledge questions

- 0-3: Knowledgeable
- 4-6: Moderately knowledgeable
- 7-9: Not knowledgeable
- Practices will be measured on a scale of 1–9 depending on the score on practices questions
- 0-3: Bad practices
- 4-6: Better practices
- 7-9: Good practices

**Conceptual framework**



**Figure 1.** Conceptual framework.

Perceptions of parents and teachers on the participation of asthmatic school children in physical activity are largely influenced by asthma knowledge level. Good knowledge level will lead to better practices regarding administration of medications and allowance of exercise. This in turn has a number of physical, psychological and social health benefits. The opposite is true of poor asthma knowledge. Poor knowledge will lead to lack of proper administration of medicines and restriction of exercise and consequently physical, psychological and social disadvantage for asthmatic children (Figure 1).

**Methodology**

**Study site**

The study was conducted in selected primary schools in Ndola Urban as follows:

- Ndola primary school-public school located along Kanongesha road, Town centre.
- Kansenshi combined school-public school located along Chela Road, Kansenshi.
- Ndola first steps schools-private school located along Kabelenga road, Northrise.
- Blissful rain school-private school located along Mkuni road, Kansenshi.
- Leadway primary school-private school located along Cross crescent road, Kansenshi.
- Kopa christian academy-private school located along Kopa Road, Northrise.
- Dominican convent primary school-catholic mission girls school located along Evelyn Road, Town centre.

**Target population:** The target population was parents and teachers of both asthmatic and non-asthmatic children attending the selected primary schools in Ndola Urban. Parents and teachers had been chosen as their knowledge and perceptions have the greatest impact on an asthmatic child's health status.

**Study design:** The study was a cross-sectional survey conducted among parents and teachers of children attending the selected primary schools in Ndola Urban. Due to limited finances, human resource and time, it was carried out as a mini survey.

**Sample size**

The sample size was calculated as follows:

$$n = Z^2 n / d^2$$

Where:

n=Sample size based on infinite population

$$z = 1.96$$

K=Estimated asthma knowledge level

$$Q = 100 - P$$

D=Margin of error

Asthma knowledge level is assumed to be at 50% (a study carried out in Lusaka found asthma knowledge to range from 30-50%). Using a margin of error of 5% at 95% confidence level, sample size for infinite population is:

$$n = 1.96^2 \times 50(100-50) / 5^2$$

$$n = 385$$

Adjusting the sample size for a finite population was done as follows:

$$N = n / (1 + n/n)$$

Where;

$N$ =sample size adjusted for finite population

$n$ =sample size based on infinite population

$P$ =Population size

The number of teachers at the 7 primary schools enrolled into this study was 119 ( $P=119$ )

$N=385/1+119$

$N=91$

The number of parents with pupils at the selected primary schools was estimated to be 1120 (7 schools with an average of 7 classes each and an average of 20 pupils in each class).

$N=385/1+385/980$

$N=276$

A total of 91 teachers and 286 parents were thus sampled for this study.

### Sampling procedure

The sampling design that was used is the mixed sampling design. Convenience sampling technique was used to sample primary schools from Ndola Urban. This enabled the researcher to only select primary schools that are easily accessible and easy to contact from Ndola Teaching Hospital where the main researcher is based. A simple random sampling technique was applied to sample parents and teachers of school children attending the selected schools. This accorded all parents and teachers at the schools an equal opportunity for selection to participate in the study.

### Inclusion criteria

- Teachers employed at selected primary schools
- Parents with a child or children at the selected primary schools
- Ability to communicate effectively either in English, Bemba or Nyanja (the most widely spoken languages in Ndola)

### Exclusion criteria

- Teachers employed in secondary schools
- Parents with no child or children at selected primary schools
- Inability to communicate effectively in either English, Bemba or Nyanja

### Data collection

Data was collected using questionnaires adapted from questionnaires used in similar studies around the world. Two different questionnaire types were used one specific for teachers and the other for parents. The reason for this is that there is a modest difference between the knowledge that is reasonable to be required of parents and that to be required of teachers.

The first parts of both questionnaires collected information on relevant socio-demographic factors such as age and gender, with the main differences being on level of education and area of residence asked in the parents' questionnaire and level of qualification and years of teaching experience asked in the teachers' questionnaire. Other parts of the questionnaires assessed knowledge and practices

of parents and teachers on childhood asthma and common areas of misconception. Perceptions parents and teachers have on participation of asthmatic children in physical education were deduced from the same.

Printed questionnaires were distributed to the sampled teachers at the schools for them to fill out. Questionnaires were also distributed to the children of the sampled parents for them to take back home with them. It was explained to the children that the questionnaires were meant to be filled in by their parents and returned back to the school at a later date.

### Data analysis

After collection, the data were entered into IBM SPSS Statistics for Windows, version 26.0 (SPSS Inc., Chicago, Ill., USA) for analysis. The data were presented in frequency tables and analysed using the *chi square* test at 5% significance level to compare different variables for significant associations with knowledge and practices of parents and teachers on asthmatic children's participation in physical education.

### Ethical consideration

Ethical approval was obtained from the Tropical Diseases Research Centre (TDRC) Research Ethics Committee and National Health Research Authority.

Permission to enrol schools in this study was obtained from the District Education Board Secretary's (DEBS) office and the Copperbelt Provincial Health Office. Permission was also sought from the various school authorities (*i.e.*, Headmasters, Principals or Managers) of the selected schools before enrolling their schools in the study.

Written informed consent was obtained from the participants after the purpose of the study was fully explained to them and they had been assured of strict confidentiality and that participation was completely voluntary with an option to withdraw at any point without any consequence.

In line with COVID-19 guidelines, facemasks were worn by the researcher at all times during face-to-face interactions with participants and participants were encouraged to do the same. Social distancing of not less than 1.5 metres was maintained.

All data collected during this study was treated with utmost confidentiality and used for no other purpose aside from that stipulated.

### Study limitation

The major limitation is that the sample size was considerably small compared to the estimated number of parents and teachers in Ndola and this was compounded by a low response rate amongst the parents. Another limitation is that convenience sampling technique was used to select schools from Ndola Urban that are easily accessible to the researcher instead of a simple random technique. Both of these limitations, therefore, mean that the results may carry a larger deviation from the actual situation and may therefore not be generalisable to the entire population.



## Results

Data were collected from 205 participants (91 teachers and 114 parents) out of the 376 participants (91 teachers and 276 parents) that were sampled. This represented response rates of 100% among the teachers and 41% among the parents. All the sampled respondents met the inclusion criteria and their data were analysed.

The poor response rate among the parents has been attributed to the reliance on the children to take the questionnaires back home to their parents and return them to the school at a later date. Some children reported to have lost, damaged or forgotten to bring back the filled in questionnaire to school. This led to only a few parents' questionnaires being available at the time of collection from the schools.

### Socio-demographic characteristics of the parents

Majority of the parents 72 (63.2%) were female, and most (36.8%) fell within the 26–35-years age range. 92 (80.7%) were married with the remaining 22 (19.3%) being either single or divorced. In addition, 58 (52.7%) parents had attained a tertiary level of education and were employed in various sectors including business (29.6%) and education (16.7%) as the two most common employment sectors. Fifty parents (44.6%) lived in low-cost residential areas, 38 (33.4%) in medium-cost and only 24 (21.4%) in high-cost. Of all the parents, only 26 (22.8%) responded yes when asked if they or any of their family members suffered from asthma (Table 1).

Variable	Indicator	Frequency	Valid percent	Cumulative percent
Age	Under 18 years	4	3.5	3.5
	18-25 years	14	12.3	15.8
	26-35 years	42	36.8	52.6
	36-45 years	40	35.1	87.7
	Above 45 years	14	12.3	100
Gender	Male	42	36.8	36.8
	Female	72	63.2	100
Marital status	Single	18	15.8	15.8
	Married	92	80.7	96.5
	Divorced	4	3.5	100
Educational level	Primary	14	12.7	12.7
	Secondary	38	34.5	47.3
	Tertiary	58	52.7	100
	Missing response	4		
Residential area	Low cost	50	44.6	44.6
	Medium cost	38	33.9	78.6
	High cost	24	21.4	100
	Missing response	2		
	Health	10	9.3	9.3
Employment sector	Education	18	16.7	25.9
	Business	32	29.6	55.6
	Science and Technology	10	9.3	64.8
	Agriculture	6	5.6	70.4
	Hospitality	4	3.7	74.1
	General worker	12	11.1	85.2
	Security wings	8	7.4	92.6
	Student	2	1.9	94.4
Unemployed	6	5.6	100	

	Missing response	6		
Family history of asthma	Yes	26	22.8	22.8
	No	88	77.2	100

**Table 1.** Socio-demographic characteristics of parents.

Socio-demographic characteristics of the teachers of the 91 teachers in this study, 47 (51.6%) fell within the 26–35 years age group, while the minority were participants aged above 45 years who were only 7 (7.7%). In addition, 58 (63.7%) were female. Majority of the teachers, 73 (80.2%), had studied teaching up to the diploma level and most (42.9%) had between 5–10 years of teaching experience. Regarding asthma experience only 2 (2.2%) had asthma while 40 (44.4%) reported knowing someone with asthma.

Further, 79 (87.8%) reported that they had never received any training in asthma care, with 88 (~100%) stating that in-service training on asthma management is necessary of the 11 (12.2%) that had received some training in asthma care, 4 had received the training from a first aid course, 2 from the parents of an asthmatic child and only 1 had received their training from college. Others stated that they had received their training from home or from a hospital (Table 2).

Variable	Indicator	Frequency	Valid Percent	Cumulative percent
Age	18-25 years	15	16.5	16.5
	26-35 years	47	51.6	68.1
	36-45 years	22	24.2	92.3
	Above 45 years	7	7.7	100
Gender	Male	33	36.3	36.3
	Female	58	63.7	100
Educational level	Certificate	4	4.4	4.4
	Diploma	73	80.2	84.6
	Degree	14	15.4	100
Teaching experience	Under 5 years	33	36.3	36.3
	5-10 years	39	42.9	79.1
	Over 10 years	19	20.9	100
Do you have asthma?	Yes	2	2.2	2.2
	No	89	97.8	100
Do you know anyone close with asthma?	Yes	40	44.4	44.4
	No	50	55.6	100
	Missing response	1		
Have you received any training in asthma care?	Yes	11	12.2	12.2
	No	79	87.8	100
	Missing response	1		

**Table 2.** Socio-demographic characteristics of teachers.

### Parents' knowledge level

An evaluation of parents' knowledge (Figure 2) on asthma was carried out and demonstrated that only 12 (10.5%) had good knowledge on the subject matter. Fifty-six (49.1%) had moderate knowledge and 46 (40.4%) had poor knowledge. Analysis per question found that 50 parents (44.6%) correctly reported that when a child with asthma exercises or runs, he or she may have trouble with asthma. However, only 18 (15.8%) knew that flu infections are the main triggers of asthma attacks. When asked about asthma

medications, 68 (59.6%) agreed that asthma attacks can be prevented if medications are taken even when there are no symptoms between attacks but again, only 18 (16.1%) agreed that if an asthmatic child gets the flu, they should apply the inhaler even if there is no coughing or wheezing (Table 3).

It was also evident that misconceptions among this population are quite common with 54 (47.4%) reporting that it is not good for children to use the inhaler while 40 (35.1%) reported that inhalers can have an effect on the heart or damage. Another 22 (19.3%) agreed that inhalers led to dependence or addiction.

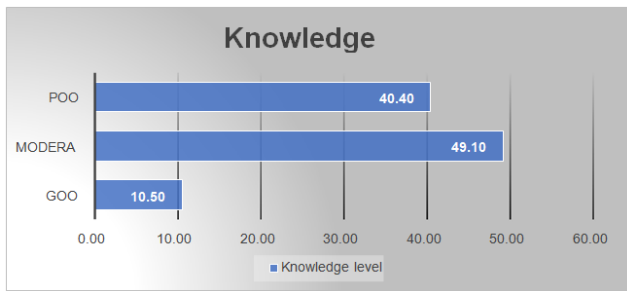


Figure 2. Parents' knowledge level.

Variable	Indicator	Frequency	Valid percent	Cumulative
The main cause of asthma is airway inflammation	Not sure	14	12.5	12.5
	Yes	92	82.1	94.6
	No	6	5.4	100
	Missing response	2		
Asthma attacks can be prevented if medications are taken even when there are no symptoms between attacks	Not sure	4	3.5	3.5
	Yes	68	59.6	63.2
	No	42	36.8	100
After a child's asthma attack, once there are no symptoms, the use of the inhaler and medications should be stopped	Not sure	10	8.8	8.8
	Yes	58	50.9	59.6
	No	46	40.4	100
Flu infections are the main causes or triggers of asthma attacks	Not sure	12	10.5	10.5
	Yes	18	15.8	26.3
	No	84	73.7	100
If an asthmatic child gets the flu, you should apply the inhaler even if there is no coughing or wheezing	Not sure	18	16.1	16.1
	Yes	18	16.1	32.1
	No	76	67.9	100
	Missing response	2		
When a child with asthma exercises or runs, he or she may have trouble with asthma	Not sure	22	19.6	19.6
	Yes	50	44.6	64.3
	No	40	35.7	100
	Missing response	2		
Use of inhalers can lead to dependence or addiction	Not sure	16	14	14
	Yes	22	19.3	33.3
	No	76	66.7	100
Inhalers can have an effect on the heart or damage it	Not sure	30	26.3	26.3
	Yes	40	35.1	61.4
	No	44	38.6	100
It is not good for children to use the inhaler for too long	Not sure	16	14	14
	Yes	54	47.4	61.4
	No	44	38.6	100

Table 3. Analysis of parents responses per asthma knowledge question.

Correlation of parents sociodemographic characteristics and demographic characteristics found no statistically significant knowledge level correlation of asthma knowledge level and socio-demographic correlations ( $P < 0.05$ ) (Table 4).

<b>Knowledge level</b>						
<b>Variable</b>	<b>Indicator</b>	<b>Poor</b>	<b>Moderate</b>	<b>Good</b>	<b>Total</b>	<b>P-value</b>
Age	Under 18 years	2	2	0	4	0.354
	18-25 years	6	6	2	14	
	26-35 years	12	22	8	42	
	36-45 years	20	20	0	40	
	Above 45 years	6	6	2	14	
	Total	46	56	12	114	
Gender	Male	18	16	8	42	0.453
	Female	28	40	4	72	
	Total	46	56	12	114	
Marital status	Single	6	10	2	18	0.46
	Married	38	44	10	92	
	Divorced	2	2	0	4	
	Total	46	56	12	114	
Educational level	Primary	8	4	2	14	0.446
	Secondary	12	20	6	38	
	Tertiary	26	30	2	58	
	Total	46	54	10	110	
Employment sector	Health	4	4	2	10	0.222
	Education	6	12	0	18	
	Business	18	12	2	32	
	Science and Technology	4	4	2	10	
	Agriculture	4	0	2	6	
	Hospitality	2	0	2	4	
	General worker	0	10	2	12	
	Security wings	4	4	0	8	
	Student	0	2	0	2	
	Unemployed	2	4	0	6	
Total	44	52	12	108		
Residential area	Low cost	20	22	8	50	0.277
	Medium cost	14	22	2	38	
	High cost	12	10	2	24	
	Total	46	54	12	112	
Family history of asthma	Yes	10	12	4	26	0.55
	No	36	44	8	88	
	Total	46	56	12	114	

**Table 4.** Sociodemographic characteristics of parents by knowledge level.



### Teachers knowledge level

An assessment of teachers knowledge on asthma (Figure 3) was made based on their responses to knowledge questions it was found that 59 (64.8%) were moderately knowledgeable. Twenty-four (26.4%) had good knowledge and only 8 (8.8%) had poor knowledge. Analysis per question found that while 80 (87.9%) knew that cold weather is among the common triggers of asthma attacks, only 39 (43.8%) knew that exercise is also among the triggers. Concerning asthma medications, 81 teachers (89%) knew that inhalers are used to relieve an attack but only 35 (38.9%) knew that preventative medications can be taken by the asthmatic child before exercise and sports.

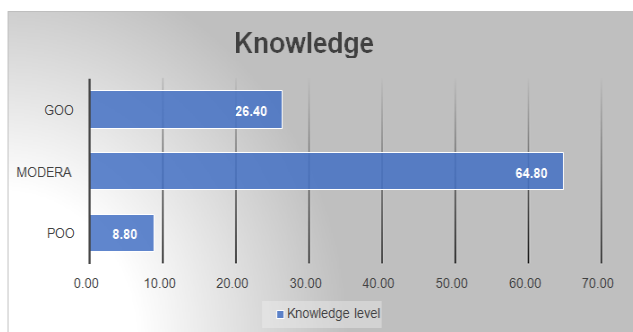


Figure 3. Teachers knowledge level.

Knowledge level						
Variable	Indicator	Poor	Moderate	Good	Total	P-value
Age	18-25 years	1	11	3	15	0.945
	26-35 years	5	28	14	47	
	36-45 years	1	16	5	22	
	Above 45 years	1	4	2	7	
	Total	8	59	24	91	
Gender	Male	2	26	5	33	0.286
	Female	6	33	19	58	
	Total	8	59	24	91	
Educational level	Certificate	1	2	1	4	0.599
	Diploma	7	46	20	73	
	Degree	0	11	3	14	
	Total	8	59	24	91	
Teaching experience	Under 5 years	4	21	8	33	0.392
	5-10 years	2	28	9	39	
	Over 10 years	2	10	7	19	
	Total	8	59	24	91	
Has asthma?	Yes	0	0	2	2	0.038*
	No	8	59	22	89	
	Total	8	59	24	91	

### Correlation of teachers sociodemographic characteristics and knowledge level

Correlation of teachers asthma knowledge and socio-demographic characteristics found significant correlations between knowledge level and having asthma and between knowledge level and knowing someone with asthma (P<0.05). Having asthma or knowing someone with asthma made a respondent more likely to have good knowledge level (Table 5).

Knows anyone close with asthma	Yes	0	27	13	40	0.028*
	No	8	31	11	50	
	Total	8	58	24	90	
Has received training in asthma care	Yes	1	6	4	11	0.56
	No	7	52	20	79	
	Total	8	58	24	90	

\*Correlation is significant at the 0.05 level (2 tailed)

**Table 5.** Socio-demographic characteristics of teachers by knowledge level.

### Parents practices

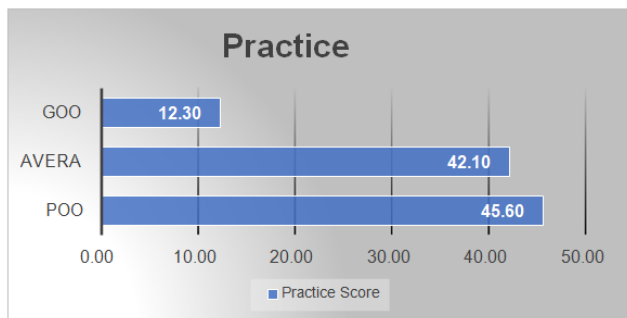
From the 114 respondents among the sampled parents, it was found that 52 (45.6%) had poor practices regarding participation of primary school children with asthma in Physical Education (PE). Forty-eight (42.1%) had average practices whereas only 14 (12.3%) had good practices. Analysis of their responses per question revealed that even though only 24 (22.2%) wrongly stated that PE is

dangerous for asthmatic children, 56 (50%) of parents stated that parents/guardians should ask a doctor to tell the school that an asthmatic child should not participate in sports or PE, with 68 (60.7%) saying that children who have asthma should not participate in sports that make them run too much. The Table below shows in more detail the responses of parents to practice questions (Table 6 and Figure 4).

Variable	Indicator	Frequency	Valid percent	Cumulative
A child with asthma can do as much physical activity as children his or her age that do not have asthma	Not sure	26	23.2	23.2
	Yes	46	41.1	64.3
	No	40	35.7	100
	Missing response	2		
Children with asthma should apply the inhaler before exercise or sports to prevent symptoms	Not sure	18	16.1	16.1
	Yes	18	16.1	32.1
	No	76	67.9	100
	Missing response	2		
Children who have asthma should not participate in sports that make them run too much	Not sure	12	10.7	10.7
	Yes	68	60.7	71.4
	No	32	28.6	100
	Total	112	100	
	Missing response	2		
Exercise is important for children with asthma	Not sure	16	14.3	14.3
	Yes	72	64.3	78.6
	No	24	21.4	100
	Total	112	100	
	System	2		
An asthmatic child can be allowed to walk to school to improve breathing	Not sure	16	14.5	14.5
	Yes	80	72.7	87.3
	No	14	12.7	100
	Total	110	100	
	Missing response	4		

Swimming can improve a child's asthmatic attacks	Not sure	28	25	25
	Yes	24	21.4	46.4
	No	60	53.6	100
	Total	112	100	
	Missing response	2		
Sports such as football are effective in improving asthmatic child's breathing	Not sure	22	21.2	21.2
	Yes	38	36.5	57.7
	No	44	42.3	100
	Total	104	100	
	Missing response	10		
Physical Education (PE) is dangerous for children with asthma	Not sure	22	20.4	20.4
	Yes	24	22.2	42.6
	No	62	57.4	100
	Total	108	100	
	Missing response	6		
Parents/guardians should ask a doctor to tell the school that an asthmatic child should not participate in sports or physical education classes	Not sure	16	14.3	14.3
	Yes	56	50	64.3
	No	40	35.7	100
	Total	112	100	
	Missing response	2		

**Table 6.** Analysis of parents responses per asthma practice question.



**Figure 4.** Parents practice score.

**Correlation of parents' sociodemographic characteristics and practice score**

Practice score was correlated with the sociodemographic characteristics of the parents. Significant correlation was only found between marital status and practice score (P<0.05) (Table 7). It is noted that married parents are more likely to exercise good practices than single or divorced parents.

Practice score						
Variable	Indicator	Poor	Average	Good	Total	P-value
Age	Under 18 years	0	4	0	4	0.305
	18-25 years	10	4	0	14	
	26-35 years	20	18	4	42	
	36-45 years	14	18	8	40	
	Above 45 years	8	4	2	14	
	Total		52	48	14	
Gender	Male	22	14	6	42	0.574

	Female	30	34	8	72			
	Total	52	48	14	114			
Marital status	Single	14	4	0	18	0.000*		
	Married	38	44	10	92			
	Divorced	0	0	4	4			
	Total	52	48	14	114			
Educational level	Primary	6	8	0	14	0.1		
	Secondary	22	12	4	38			
	Tertiary	22	26	10	58			
	Total	50	46	14	110			
Employment sector	Health	2	8	0	10	0.927		
	Education	8	8	2	18			
	Business	16	10	6	32			
	Science and Technology	6	2	2	10			
	Agriculture	4	2	0	6			
	Hospitality	4	0	0	4			
	General worker	6	6	0	12			
	Security wings	2	2	4	8			
	Student	0	2	0	2			
	Unemployed	2	4	0	6			
	Total	50	44	14	108			
	Residential area	Low cost	28	20	2		50	0.108
		Medium cost	12	18	8		38	
High cost		12	8	4	24			
Total		52	46	14	112			
Family history of asthma	Yes	12	12	2	26	0.667		
	No	40	36	12	88			
	Total	52	48	14	114			

\*Correlation is significant at the 0.05 level (2 tailed)

**Table 7.** Socio-demographic characteristics of parents by practice score.

### Teachers practices

From the 91 respondents among the sampled teachers, it was found that 40 (44%) had poor practices regarding participation of asthmatic primary school children in Physical Education (PE). Forty-five (49.5%) had average practices whereas only 6 (6.6%) had good practices. Even though only 20 (22%) thought that asthmatic children

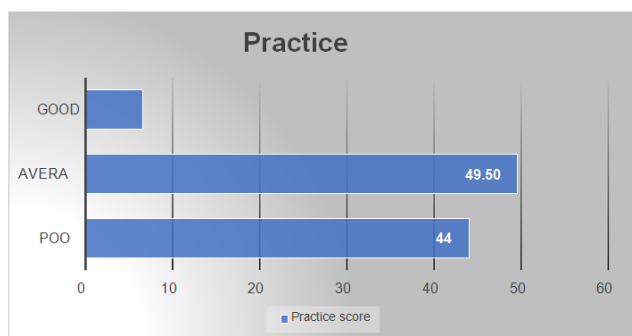
should not be allowed to take part in sports, 53 (58.2%) teachers stated asthmatic school children should avoid exercise and sports that make them run too much and 63 (70%) did not know that sports such as football are effective in improving an asthmatic child's breathing (Table 8 and Figure 5).

Variable	Indicator	Frequency	Valid percent	Cumulative
A child with asthma can do as much as other children without asthma	True	41	45.1	45.1
	False	34	37.4	82.4



	Unsure	16	17.6	100
When a child with asthma exercise's he/she may have trouble with asthma	True	61	67.8	67.8
	False	15	16.7	84.4
	Unsure	14	15.6	100
	Missing response	1		
Asthmatic children should avoid exercise and sports that make them run too much	True	53	58.9	58.9
	False	20	22.2	81.1
	Unsure	17	18.9	100
	Missing response	1		
Physical Education (PE) is dangerous for children with asthma	True	22	24.2	24.2
	False	45	49.5	73.6
	Unsure	24	26.4	100
Asthmatic children should not be allowed to take part in sports or PE	True	20	22	22
	False	42	46.2	68.1
	Unsure	29	31.9	100
Children with asthma should apply the inhaler before exercise or sports to prevent symptoms	True	21	23.3	23.3
	False	39	43.3	66.7
	Unsure	30	33.3	100
	Missing response	1		
Sports such as football are effective in improving an asthmatic child's breathing	True	27	30	30
	False	27	30	60
	Unsure	36	40	100
	Missing response	1		
Swimming is the best sport for asthmatics	True	12	13.3	13.3
	False	39	43.3	56.7
	Unsure	39	43.3	100
	Total	90	100	
	Missing response	1		

**Table 8.** Analysis of teachers responses per asthma practice question.



**Figure 5.** Teachers practice score.

### Correlation of teachers sociodemographic characteristics and practice score

correlation of practice score with sociodemographic characteristics of the teachers found no statistically significant correlation ( $P < 0.05$ ) (Table 9).

Practice score							
Variable	Indicator	Poor	Average	Good	Total	P-value	
Age	18-25 years	6	7	2	15	0.194	
	26-35 years	18	27	2	47		
	36-45 years	11	10	1	22		
	Above 45 years	5	1	1	7		
	Total	40	45	6	91		
Gender	Male	16	15	2	33	0.552	
	Female	24	30	4	58		
	Total	40	45	6	91		
Educational level	Certificate	4	0	0	4	0.136	
	Diploma	30	39	4	73		
	Degree	6	6	2	14		
	Total	40	45	6	91		
Teaching experience	Under 5 years	12	18	3	33	0.455	
	5-10 years	19	19	1	39		
	Over 10 years	9	8	2	19		
	Total	40	45	6	91		
Has asthma?	Yes	1	1	0	2	0.768	
	No	39	44	6	89		
	Total	40	45	6	91		
Knows anyone close with asthma	Yes	16	20	4	40	0.282	
	No	24	24	2	50		
	Total	40	44	6	90		
Has received training in asthma care	Yes	6	2	3	11	0.545	
	No	34	42	3	79		
	Total	40	44	6	90		
Where if any training	College	0	0	1	1	0.19	
	First aid course	2	1	1	4		
	Parents of asthmatic child	2	0	0	2		
	Other	2	2	0	4		
	Total	6	3	2	11		
Knowledge level	Poor	5	3	0	8	0.368	
	Moderate	24	32	3	59		
	Good	11	10	3	24		
	Total	40	45	6	91		

**Table 9.** Sociodemographic characteristics of teachers by practice score.

## Discussion

This study describes for the first time the perceptions of parents and teachers on the participation of primary school children with a

asthma in Physical Education (PE) in Ndola. In order to establish their perceptions, an evaluation of their knowledge on childhood asthma and their practices regarding participation of asthmatic school children in PE was conducted.

The levels of knowledge among the parents were found to be generally poor. Over 40% of parents were found to have poor knowledge while 49.1% had a moderate knowledge level. Only 10.5% of the parents had good (acceptable) knowledge levels. Misconceptions were also identified among the parents with 47.4% reporting that it is not good for children to use the inhaler while 35.1% reported that inhalers can have an effect on the heart or damage. Another 22 (19.3%) agreed that inhalers led to dependence or addiction. No significant relationships were found between knowledge level and demographic factors such as age, gender, marital status or educational qualification. These findings are in agreement with those of Jumbe Marsden, et al. who concluded knowledge on asthma is poor in Zambia, where there remain many misconceptions on asthma and its management.

Studies done elsewhere have shown varying rates of knowledge among the parents. In Brazil, Roncada, et al. found that only 30.5% of parents had acceptable knowledge on asthma while AlOtaibi and AlAtteeq reported moderate knowledge levels among 79.6% of parents in their Saudi study. Koshapor, et al. reported that 61% of parents in Iran had ideal knowledge. Similar to the findings in the present study, 49% of the parent and guardians in Riyadh stated that inhalers can have an effect on the heart and damage it. In agreement with the findings of the current study, demographic variables such as age and gender ethnicity have not been found to significantly affect level of knowledge of parents. Koshapor, et al. did, however, report a significant association between the level of knowledge and attitude of parents with educational level.

The level of knowledge among the teachers in this study was found to be generally moderate. Almost two thirds of participants (64.8%) were moderately knowledgeable and 26.4% had good knowledge whereas only 8.8% had poor knowledge. A study done in Turkey also found that

primary school teachers had satisfactory knowledge on the signs, symptoms and treatment of asthma, and the nature of the disease. In the present study, knowledge on the common triggers of asthma attacks was particularly good with 87.9% knowing that cold weather is among the common triggers. An area of concern is that only 43.8% knew that exercise is also among the triggers. These findings are in agreement with those of Govender and Gary who reported that RSA primary school teachers demonstrated a reasonable amount of knowledge on the factors that could trigger an asthma attack in a child. Bevis and Taylor and Ones, et al. however, had reported poor knowledge concerning provoking factors. Only 27% and 28.4% respectively knew that cold wind is a trigger for asthma in those studies.

Concerning asthma medications 89% of teachers in the current study knew that inhalers are used to relieve an attack but only 38.9% knew that preventative medications can be taken by the asthmatic child before exercise and sports. Govender and Gary found that 47.8% of teachers knew that preventative medications can be taken by the asthmatic child before exercise and sports.

This study found significant relationships between knowledge level of teachers and having asthma or knowing someone with asthma ( $P$

$<0.05$ ). Such relationships were not demonstrated in studies done elsewhere.

The practices of parents regarding participation of primary school children with asthma in PE were noted to be generally poor. The majority (45.6%) had poor practices whereas 42.1% had average practices and only 12.3% had good practices. While only 22.2% wrongly stated that PE is dangerous for asthmatic children, 50% of parents stated that parents/guardians should ask a doctor to tell the school that an asthmatic child should not participate in sports or PE, with 60.7% saying that children who have asthma should not participate in sports that make them run too much. No associations were noted between parents' practice score and demographic factors such as age, gender, educational level or occupation. A significant relationship was only found between marital status and practice score ( $P < 0.05$ ).

In Riyadh, the wrong response rates to practice questions were even much higher with 79% of parents indicating that parents/guardians should ask a doctor to tell the school that an asthmatic child should not exercise or participate in PE while 72% of participants agreed that children who have asthma should not participate in sports that make them run too.

In addition, the same study found that knowledge and practices of parents towards physical activity in children with asthma was higher amongst mothers.

Regarding the practices of teachers, it was found 44% had poor practices regarding participation of asthmatic primary school children PE. Nearly half had average practices whereas only 6.6% had good practices. Even though only 22% thought that asthmatic children should not be allowed to take part in sports, 58.2% teachers stated asthmatic school children should avoid exercise and sports that make them run too much and 70% did not know that sports such as football are effective in improving an asthmatic child's breathing. Further, 76.6% did not know that children with asthma should apply the inhaler before exercise or sports to prevent symptoms. These findings are worrying particularly in a school setting. In contrast, Bevis and Taylor found that 78% of their respondents correctly stated that full participation in games should be encouraged. In this study, no significant relationship has been found between teachers' practice score and sociodemographic factors. This is in agreement with the finding of Ones, et al.

All the respondents among the teachers in the current study thought that in-service training in asthma care was necessary for teachers. Various researchers have found that most teachers are worried about their lack of preparedness to cope with an asthma attack and therefore feel uncomfortable managing asthma in their classrooms because they are not trained to handle an asthma emergency.

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## Conclusion

From the finding in this study, it becomes apparent that the perceptions of both parents and teachers on the participation of primary school children with asthma in PE remain quite poor. While there is some reasonable knowledge and practices among the two groups of caretakers, there still remains many areas of deficient knowledge and practices where they need to be correctly informed.

## Recommendations

There is need for a short educational program on asthma targeted towards Ndola-based teachers to correctly inform them on physical activity in asthmatic children and to also increase their ability to handle emergency situations such as asthma attacks or EIB.

Physicians should pay particular attention to sensitise parents and guardians of asthmatic children regarding the safety of inhaler medications and the allowance of physical activity in these children. There is need for a full epidemiological study to be conducted on the perceptions of parents and teachers regarding physical activity in asthmatic children to better highlight on the factors affecting knowledge and practices.

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To my mother, Mrs Charity Bwalya, to whom I owe every good thing in my life and without whom, medical study would be but a dream.

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