ASTHMA:
PREVALENCE, KNOWLEDGE, ATTITUDE AND PRACTICES AMONG SECONDARY SCHOOL PUPILS IN DAR ES SALAAM AND BAGAMOYO

By

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A Dissertation Submitted in Partial Fulfillment of the Requirements for the Degree of Master of Medicine (Internal Medicine) of the Muhimbili University Health and Allied Sciences (MUHAS).

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CERTIFICATION

The undersigned certify that they have read and hereby recommend for the examination a dissertation entitled ***Asthma: Prevalence, Knowledge, Attitude and Practices, among Secondary School Pupils in Dar es Salaam and Bagamoyo*** in fulfillment of the requirements for the degree of Master of Medicine (Internal Medicine) of the Muhimbili University of Health and Allied Sciences. (MUHAS)

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DECLARATION AND COPYRIGHT

I, Dr Meshack Denson Shimwela, declare that this dissertation is my own original work and that it has not been presented and will not be presented to any other University for a similar or any other degree award.

Signature 

Date 25th NOV 2007

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DEDICATION

This work is dedicated to my wife Mrs. Grace M Shimwela for her kindness, tolerance and everlasting support throughout my studies,

To my daughter Joan-Lwaki for missing me most of the time that she needed my presence.

ABSTRACT

Background; Scanty information is available on factors associated with increase in the prevalence of Asthma. Little is known about knowledge, attitude and practices of asthma and its determinants in the general population.

A descriptive cross sectional study was done in Ilala district in Dar es Salaam region and Bagamoyo district in Pwani region. To determine prevalence, knowledge, attitude and practices towards asthma among secondary school pupils.

Study procedure; A questionnaire was administered to all consenting pupils. Information recorded included self reported asthma, wheeze in the last twelve months, socio-demographic characteristics, weight height and peak expiratory flow measurements before and after exercise.

Results; Prevalence of wheeze in the last 12 months was 11.5% in Bagamoyo and 22.7% in Ilala ($p<0.001$). Prevalence of self reported asthma was 17.6% Ilala and 6.4% Bagamoyo ($p<0.001$). There was a positive linear correlation between Peak Expiratory Flow Rate (PEFR) and height in both districts($R=0.5$) in Bagamoyo, ($R=0.7$) in Ilala. The mean PEFR of male pupils was 478.05(±77.99) in Ilala and 484.04(±79.18) in Bagamoyo ($p<0.33$). That of female pupils was 400(±57.00) in Ilala and 393.92(±62.02) in Bagamoyo ($p<0.28$). Prevalence of exercise-induced asthma at percentage reduction in PEFR of 20% was 12/516(2.4%) of pupils in Bagamoyo, and 28/439(6.3%) of pupils in Ilala ($P<0.002$) and at 12% reduction in PEFR was 36/439(8.1%) among pupils in Ilala and 40/516(7.7%) among pupils in Bagamoyo. ($P< 0.798$) A reduction by 15% in PEFR was observed in 7.2% of pupils in Ilala and 4.3% of pupils in Bagamoyo ($P<0.04$). Knowledge of asthma symptoms was higher among pupils in Ilala than Bagamoyo. Cough, wheeze and chest tightness were the main reported symptoms of asthma in both districts. Pupils in Bagamoyo had unfavorable attitudes towards asthma practices than pupils in Ilala ($p<0.009$).

Conclusion; Prevalence of asthma is high among secondary school pupils of Ilala than Bagamoyo. Most of the diagnoses of asthma are made outside the hospital, with non-medical persons. Traditional herbs/practices are still used as one of the main remedies of asthma. Negative attitudes towards sharing activities with asthmatic peers are seen more among pupils of Bagamoyo than Ilala.

DEFINITION OF TERMS

Attitude; Pupil's opinions in the form of like or dislike on information about asthma.

Body mass index; Is a fraction of weight in kilogram (Kg), divided by height in meters square (m^2), recorded to the nearest Kg/m^2.

Knowledge; Refers to the term used to recall the facts about asthma in terms of cause, diagnosis, acquisition, signs, treatments and prevention.

Practices; Refers to set of activities that imply personal protection and care towards asthma or its provoking factors.

Rural; Living or characteristic of farming or country life, less industrialized area with low level of pollutants.

Self reported asthma; A pupil who has reported to have been diagnosed having asthma.

Urban; Relating to/or concerned with a city or densely populated area /a place in or characteristic of a city life / with high level of pollutants.

Wheeze; A subject who has reported breathing problems with whistling in the chest, whether or not this was associated with exercise.

LIST OF ABBREVIATIONS

BMI	Body mass index
COPD	Chronic obstructive airway/Pulmonary disease
FRC	Functional residual capacity
FEV1	Forced expiratory volume in 1 second
FVC	Forced vital capacity
MUHAS	Muhimbili University of Health and Allied Sciences
NIMRI	National Institute of Medical Research
PEFR	Peak expiratory flow rate
RV	Residual volume
TLC	Total lung capacity

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1. BACK GROUND AND LITERATURE REVIEW

1.1. Introduction

Asthma is a chronic inflammatory pulmonary disorder that is characterized by reversible airways obstruction and Airway hyper-responsiveness, which is accompanied with excessive mucus secretions.[1, 2]

There are several causes of airway narrowing during asthma attack; this includes bronchial smooth muscles contraction, mucous plugging from mucous gland hyper secretion, sub-mucosal, peri-bronchial and interstitial edema due to loss of capillary and arteriolar cellular interconnections. Also includes cellular infiltrative changes which involve plasma cells, lymphocytes, macrophages, and leukocytes[2] there is involvement of airway smooth muscle mediators and anatomic elements of the airway mucosa and Immune mediators, such as leukotrienes, prostaglandins, platelet-activating factor, histamine and other bronchial constrictors.[2, 3]

The characteristic Symptoms of bronchial asthma include breathlessness, anxiety, and cough. Also more often chest tightness, dypsnoea and diaphoresis are seen in clinical practices. These symptoms are exacerbated during exercise[2]. Signs of bronchial asthma presents with one or more of the following, presence of barrel chest, global or focal wheezes, pallor, Pulsus paradox us, use of accessory muscles during respiration, exercise limitation, also presents with tachypnoea, tachycardia, mild systolic hypertension, over inflated & increased anterior-posterior chest diameter. [1, 2]

Asthma has been defined in many ways, however community screening of asthma used, the term self reported asthma, history wheeze in the last twelve months (current wheeze) and exercise induced asthma have been used to define asthma. [4, 5, 6]

A reduction in Peak Expiratory Flow Rate (PEFR) by 20% compared to pre-exercise PEFR is taken as an exercise induced asthma. Similar results can be obtained by the use of Spiro metric measurements, which are taken before and five minutes after the exercise test, Forced Expiratory Volume in one second

(FEV1) is a functional reference where by a difference of 12 % to 20% drop in FEV1 is most probable asthma sufferer. [7]

During asthma attack the total lung capacity (TLC), functional residual capacity (FRC), and residual volume (RV) increases.[8, 9]

The hallmark of airway obstruction is explained as a reduction in ratio of the forced expiratory volume in one second (FEV1) to the forced vital capacity (FVC). [2] Some patients with Asthma like symptoms may not have asthma but obstruction of extra thoracic airway.[10]

1.2. Prevalence of asthma

There are world wide variations of asthma prevalence, similarly in Africa; the prevalence of asthma has been shown to vary between countries, regions and different geographical areas within a country. [6, 11.]

Most reports published up to 1989, showed that 2-10% of children in Africa present each year with one or more episodes of asthma[12] In Kenya prevalence of asthma among 10 years olds was 2.5% in rural and 9.5%in urban subjects. And 10.2% in 13-14 years old rural school children [13, 14.] Half of asthma cases in Africa occurs below the age of 10 years with male; female preponderance of 2; 1. [15]

In Tanzania prevalence of self reported asthma among children aged 5-14 years is 3.4% ± 1.2 in boys and 2.6± 0.9 among girls of rural area, while it is 6.6%±2.4 in boys and 2.6%±1.2 among girls of same age group in urban area [16.] Age Standardized prevalence of current wheeze in adults is similar in men in the urban and rural areas of Tanzania. In boys of Shari- Moshi aged 5-14 years the prevalence was current wheeze 2.5%±1% wheeze ever 2.5±1% and self reported asthma ranged between 5.6% and 2.2%. Same age group boys in Ilala ranged from 8% to 4.2% [16.] Asthma was reported as the leading cause of emergency visit to the casualty department of Kenya National Hospital in Nairobi as early as 1960s. [17]

1.3 Environment and asthma

Most asthma patients are asymptomatic at most of the time, with periodic exacerbations which are induced by various factors, such as family and personal history of atopy, Cigarette smoke, Inter current bronchiolitis or pneumonia, dusty and windy environments. Air pollution and exposure to pets or previously dampened floor coverings that harbor molds, other known and probably unknown allergic factors, some of which can be determined with several modalities of allergy testing. [18]

Induction of specific immunoglobulin 'E' response and development of childhood asthma are determined by independent factors. A prospective cohort study was done for seven years to asses the relevance of mite and cat allergens exposure for development of childhood asthma. It was found that sensitization to indoor allergens was associated with wheeze and increased bronchial hype-responsiveness. How ever there were no relation between early indoor allergen exposure and the prevalence of asthma, wheeze and bronchial hype responsiveness. [19]

Asthma is a heterogeneous disease where by genetic and environmental factors such as occupational exposure, viruses, and allergens, can trigger an attack [15]. Ro'nmark and his colleagues in Sweden found that, in addition to hay fever and a family history of asthma, allergic sensitization such as ex-smoking status and increased body mass index was a significant risk factor for incident asthma independent of sex and allergic status of an individual[20]. Most asthmatics are a topic, and exposure to certain stimuli initiates an inflammatory response which evokes structural changes in airway mucosal and resulting into airway hyper responsiveness and variable airflow obstruction. Which in turn cause most asthma symptoms, known stimuli includes environmental allergens, occupational sensitizing agents and respiratory viral infection.[21]

Higher rates of exercise induced bronchial spasms (EIB) have been reported for urban than for rural African school children. The change from traditional to a westernized life stile has been implicated. The EIB rates have been reported to be higher in African children, these findings supports a view which is gaining

increasing credence that increase in prevalence of childhood asthma is associated with urbanization or is the consequence of various harmful environmental exposures acting on susceptible population[22]. Prevalence of exercise induced bronchial-spasm was found to be higher among children living in urban areas than in rural areas of African countries. This increase is much the same way as that occurred in many industrially developed countries.[23]

Westernization seems to be surprisingly rapid, in a survey of Ethiopian town dwellers admitted based on recall of information that Asthma seems to have emerged only some 10 years earlier.[15]

Doubt has been expressed that such secular trends in asthma can be attributed entirely to the environmental changes imposed by urban living and or westernized lifestyles; a question has been raised as to whether urban populations are also becoming more susceptible to developing asthma. [21, 24].

Although majority of the population on the African continent is still rural most countries are experiencing rapid urbanization with increasing westernized lifestyles which may have a significant impact on the distribution and determinants of childhood asthma. There is also some evidence that asthma prevalence is increasing in Africa as has been shown for countries in Europe, North America and Australia[25, 26, 27].

1.4 Asthma screening and diagnosis

There is no gold standard definition of asthma; previous studies have suggested that self reported asthma has acceptable validity and reliability in predicting prevalence of asthma. [28].

This supports the use of self reported asthma and history of wheeze in the last twelve months as the reliable diagnostic tool in community screening of asthma.[6,23, 29].Questionnaires have been used for asthma screening in community settings for many years and have an estimated sensitivity of 80% and specificity of 70%, for this reason a standardized international questionnaire have been used to diagnose asthma in a community based areas. But this varies with clinical

predictability of the question; languages used and culture orientation of that community where the screening is taking place [4, 29, 30.]

Apart from the use of questionnaire, the diagnosis of asthma can be established by demonstrating reversible airway obstruction in asthmatic patient. Reversibility is traditionally defined as a more than or equal to 15% increase in FEV1 after two puffs of a β-adrenergic agonist. When Spiro meter results are normal at presentation the diagnosis of asthma is made by showing a reduction or heightened airway response to challenge with histamine, methacholine or isocapnic hyperventilation with cold air, also peak expiratory flow rate (PEFR) gives similar results as FEV1. [2.]

Exercise induced bronchial spasm which is a common feature of asthma and the exercise challenge test provides a non-invasive tool for determining airway hyper responsiveness.[2] Exercise induced bronchial spasms is a six minutes exercise test whereby a patients lung function measurements such as FEVI, FVC are taken before and five minutes after the test, FEV1or PEFR are functional references where by either difference of 12 % to 20% drop in FEV1or PEFR is most probable asthma sufferer. [7, 28.] Exercise induced asthma test measures differences in response at a given "dose"(near maximal exercise) compared with the provocative dose (or concentration) of an agonist required to elicit a given response, and may therefore be more useful in detecting excessive airway narrowing. The exercise challenge test also circumvents difficulties arising from the use of questionnaires in communities with different language and cultural orientations. [30, 31,32.]

A simple exercise test is very useful for detecting exercise-induced asthma. The 3-minutes step test was done in comparison to treadmill exercise for evaluating exercise-induced asthma in asthmatic children and to assess whether responses to both tests are influenced by baseline lung function and habitual physical activity. Although the 3-min step test yields a lower % fall in forced expiratory volume in one second (FEV1) and a lower value of the area above the FEV1 curve than treadmill testing. It is a quick, economical reproducible and portable alternative procedure for identifying exercise-induced asthma in outpatients and

epidemiological studies. Baseline lung function and habitual physical activity has no influence on the amount or duration of exercise-induced asthma.[31] The six minutes provocation test proved safe in asthma induction and there were no significant electro-cardio-graphic (ECG) changes. [32]

Among the limitations in the use of Spiro meter for measuring lung function test as a screening tool for asthma detection. Altitude should be considered as among the major determinant of changes in Spiro metric flow rates. [33]

Forced expiratory volume in one second does not decline more rapidly in asthmatics or even in those with asthma and chronic obstructive pulmonary disease compared with non-asthmatics. However, subjects with asthma and chronic obstructive pulmonary disease have much lower mean levels of forced expiratory volume in one second than either subjects with asthma or chronic obstructive pulmonary disease alone [34] Less common evaluations include tests of airway resistance and single-breath carbon monoxide diffusion capacity but the findings are highly variable.[22]

1.5 Treatments of asthma

Treatments of asthma involve elimination of individual from causative agent for allergic individuals' desensitization or immunotherapy is helpful. Drugs treatments of asthma involve inhibitor of smooth muscle contraction. These are quick relief such as β-adrenergic agonist, methylxanthines and anticholinergics. There are drugs that prevent and reverse inflammation; these are long term control medication such as glucocorticoids, long acting β-adrenergic agonist, mast cells stabilizing agents' leukotrienes modifiers and methylxanthines. [2]

Among the factors that influence the management of asthma is the knowledge of patients on triggering factors, drugs, and the disease it self. A cross sectional study in Atlanta revealed that patients reading level was the strongest predictor of asthma, and knowledge score, a multivariate analysis revealed inadequate literacy was common and strongly correlated with poorer knowledge of asthma and improper use of metered dose inhaler. [36]

A few patients are completely resistant to corticosteroids, but many patients are relatively resistant and require relatively high doses of corticosteroids to control their symptoms, these are steroid dependent. Some patients develop progressive loss of lung function, as in patients with chronic obstructive airway/pulmonary disease (COPD). Management of patients with difficult asthma should be supervised by a respiratory specialist and should involve careful assessment to confirm a diagnosis of asthma, identification and treatment of exacerbating factors, particularly allergens, and recording of peak expiratory flow patterns. A period of hospital admission may be the best way to assess and manage these patients. Treatment involves optimizing corticosteroids therapy, assessing additional controllers such as long-acting inhaled or subcutaneous β2-agonists or subcutaneous, theophylline and anti leukotrienes. In some patients, the use of immunosuppressive treatments may reduce steroid requirements, although these treatments are rarely effective, and have side-effects. In the future, non-steroid anti-inflammatory treatments may be the key player in treating asthma patients. [37.] Psychosocial factors can limit one's ability to effectively manage asthma. This can result in asthma morbidity that limits quality of life. This was found among adolescents with asthma, in New York United States of America, where by a large proportion of them did not know the name of their asthma medicine. Adolescents in this study reported feelings of anxiety, fear, and embarrassment about their asthma status. Feelings of control over asthma symptoms were associated with positive attitudes toward self-treatment, while embarrassment was correlated with negative attitudes. These findings have implications for counseling adolescents with asthma about self-management strategies. [38.]

1.6 Asthma knowledge, attitude and practice

Gibson and his colleagues conducted a survey among adolescents with asthma, their peers and their teachers in new castle Australia, in order to establish their knowledge concerning asthma and degree of quality of life impairment due to asthma. It was found that 30% of asthma was provoked by smoke, and many of them avoided the situation because of asthma triggers. Asthma knowledge was low among teachers, pupils without asthma and some pupils with asthma. Specific knowledge on the prevention and treatment of exercise induced asthma was poor. Although specific knowledge towards asthma was low, they had favorable attitudes towards asthma. [38, 39.]

In assessment of knowledge about asthma and their attitude towards asthmatic peers among healthy high school pupils of Israel. Compared with asthmatic pupils studying at the same school, the level of knowledge was quite satisfactory, with the knowledge of the asthmatic pupils being somewhat higher than that of the healthy pupils, but without statistical significance. There was a correlation with the age of the pupils in both groups. The source of pupils' knowledge came principally from the media (television and newspapers), the family (talking with parents), treating physicians, and school nurses. The healthy pupils displayed less tolerance toward the asthmatic disease and its limitations on activity than that displayed by the asthmatic pupils. A correlation was found between the level of knowledge and attitude, with an increased level of knowledge implying a more tolerant attitude. A correlation was found between tolerant attitudes and increasing age, increasing parental education and the pupils' behavior [1.] There is global problem with asthma management, either under treatment due to ignorance or distorted information or knowledge of patients about their disease. [39, 40]

During assessment of knowledge, attitude, and perception of asthma, among asthma patients in India, it was found that asthmatic patients were generally ignorant about their ailments and had misconceptions, which needed to be rectified. Large numbers of patients were unaware of the cause of the disease. There were myths associated with asthma, which hindered them from getting

correct knowledge about the disease. Patients did not have any knowledge about the types of treatments for asthma, reflecting poor level of health education. Shopping around for doctors was found to be a common finding in asthma patients. Patients tried various alternative modes of treatment besides allopathic treatments. There was lack of awareness among patients about the benefits of inhaled therapy. [40, 41.]

Misconceptions regarding the nature and treatments of asthma may contribute to under treatment seen in most patients with asthma. The study was done to evaluate the perception of patients with asthma in India. Very few patients were taking treatment for asthma according to advice from their doctors. Some patients were found to stop treatments when they became free of symptoms or when they were able to tolerate their symptoms. Majority of patients were using complementary medicine and home remedies, such as tea, hot water, walking, ginger and turmeric, were perceived to provide relief in asthma. The study concluded that Patients with asthma had many barriers in the way of optimal treatment. These included failure to recognize warning symptoms, belief in a permanent cure not continuing treatment for as long as needed and an inclination to seek complimentary medicines. [42.]

Inaccurate perception of airway obstruction is a risk factor in fatal asthma and a common problem in asthma management. Perceptual inaccuracy often has been attributed to severity of airway disease. In asthmatic patients dypsnoea is highly subjective experience with its magnitude determined by psychological and situational factors rather than airway patho-physiology. [43.]

There is a need to elucidate all aspects of asthma In terms of control of the disease, Knowledge barriers, patient behavior/attitude barriers, self-efficacy (patient/pears beliefs), and patient/provider communication barriers. [44.]

Little is known about the general public's perception of the diagnosis of asthma and the impact of asthma on individuals, their families, and their communities. There appear to be few published survey instruments specifically designed to gain insights into how the general public perceives asthma. [45.]

Inadequate attention paid to the psychological and social aspects of asthma could be a significant factor responsible for increase in morbidity and mortality from asthma despite major advances in our understanding of the patho-physiology of the disease, and asthma is not just a physical condition, but also has psychosocial components, which varies from person to person. [46.]

2. RESEARCH QUESTIONS

1. What is the prevalence of asthma among secondary school pupils?
2. What do pupils do when they realize they have asthma?
3. What is the pupils' attitude towards asthma?
4. What kind of treatments do pupils get when they have asthma?

3. PROBLEM STATEMENT

Asthma is one of the most common disorders in children and its prevalence has been on the rise over the past few decades.[47, 48 and 49.] The greatest increase has been seen among children and young adults living in the inner cities [49 and 50.] However, there have been variations in prevalence rates by different age groups and regions of the world [22 and 51.] Many publications estimate the worldwide prevalence of asthma in children up to 15 years of age to vary from 5% to 31% [52 and 53.] Prevalence of asthma in Africa is also increasing. [54, 55, 56] For instance, it was reported to be the leading cause of emergency visits to the casualty department of Kenyatta National Hospital in Nairobi in 1960s [17.] Despite high prevalence of asthma, there is evidence for inadequate knowledge, unfavorable attitudes and practices among asthmatics in developed countries [1, 38 and 39.] Similar observation has been made in developing countries.[40, 41, 42] However; there is little information on knowledge, attitudes and practices in Africa.

4. RATIONALE

The prevalence of asthma is increasing world wide while scanty information is available on factors associated with its increase in prevalence [16, 22, 54, 55 and 56]. Little is known about the knowledge, attitude and practices on asthma and its determinants among secondary school pupils [45 and 46]. This study intended to determine the prevalence, level of knowledge, attitude and practices towards asthma, among secondary school pupils of Dar es Salaam and Bagamoyo. Since good knowledge, favorable attitudes and practices towards asthma are integral parts in the management of asthma, the findings of this study therefore, will assist in improving the management of asthmatics.

5. STUDY OBJECTIVES

5.1 Broad Objective

To the determine prevalence, knowledge, practices and attitude towards asthma and associated factors among secondary school pupils in urban Dar es Salaam and Bagamoyo.

5.2 Specific Objectives

5.2.1. To determine prevalence of asthma among secondary school pupils in Dar es Salaam and Bagamoyo.

5.2.2. To asses the level of knowledge and attitude towards asthma among secondary school pupils in Dar es Salaam and Bagamoyo.

5.2.3. To describe various treatments of asthma used by asthmatic secondary school pupils in Dar es Salaam and Bagamoyo.

5.2.4. To determine factors associated with asthma among secondary school pupils in Dar es Salaam and Bagamoyo.

6 METHODOLOGY

6.1 Study design and setting

A descriptive cross sectional study was conducted among secondary school pupils of Ilala and Bagamoyo districts. The two districts are about 65 kilometers apart and share same altitude from sea level. Ilala is a municipal district within Dar es Salaam city, covers an area of 210 square kilometers with a population of 637,573 people. It is a hub of transportation of passengers and goods in and outside Dar es Salaam. Ilala has 18 secondary schools, which cater for approximately 14,423 pupils. Bagamoyo is a rural ancient town in Pwani region, located along the coast towards North-East of Ilala district. It has a population of 230,164 people with nine registered secondary schools [57 and 58].

6.2 Study population

The study involved secondary school pupils from secondary schools of Ilala and Bagamoyo districts. All pupils were residing within the study area.

6.3 Inclusion criteria

Form I to IV secondary school pupils residing within the study district for whom consent was obtained.

6.4 Exclusion criteria

Known chronic respiratory diseases (Other than asthma)

Pupils with known heart diseases

6.5 Sample size; -

$N=Z^2P\ (100-P)/\varepsilon^2$.

Where by;-

N = Estimated Sample size

Z = critical value =1.96

P = Prevalence of asthma in Dar es Salaam 6%.

ε = marginal error estimated to be 2%

N=541.66~ 600 pupils. (At 95% confidence interval)

Therefore this study included 600 pupils from each district.

6.6. Sampling Procedure

A multi stage sampling technique was used to select pupils to participate in the study. First stage was convenient selection of Ilala and Bagamoyo districts, because they share same altitude from sea level, but differ in the quality of urbanization.

Second stage was random selection of six secondary schools from the list of all secondary schools in each study district, by the use of a random number table.

The list of all secondary schools was obtained from the ministry of education and culture [59, 60].

From the selected secondary schools, forms I to IV classes were involved.

Then random selection of 25 pupils from each class was done. A total of 600 pupils from each district were enrolled. All these pupils filled self-administered questionnaires. All pupils with self reported asthma or wheezes were identified. The remaining pupils were subjected to exercise asthma induction test.

6.7. Study Procedure

The study had two phases; first phase was explanation of the study to pupils and teachers about the objectives of the study and procedures that were to be done. An information sheet was given to each pupil to take home. The sheet provided information to parents regarding the study. Parents were requested to give a signed consent. For those living in hostels, a witnessed consent from their teachers (matron/patron) was used.

During the second phase a short physical examination which included general examination, followed by cardio-respiratory clinical examination; was done to all

consented pupils followed by filling in a questionnaire by the pupils themselves. Weight was measured in Kilograms, using a calibrated bathroom scale "SECA" brand from the United Kingdom. Height was measured in centimeters using a board meter.

Peak Expiratory Flow Rate (PEFR) was measured to all pupils, using a micro-Spiro meter (Micro Medical Limited England).the highest of the three readings was recorded.

Pupils who had no asthma or wheeze in the last twelve months were subjected to exercise asthma induction test, by fast walking around the football ground for six minutes, followed by repeated measurement of PEFR (five to ten minutes after exercise). This was done with assistance from trained assistants.
In this study asthma was defined as presence of both self reported asthma and wheeze in the last twelve months. Also as a reduction in PEFR by 20% compared to pre-exercise PEFR was taken as exercise induced asthma.

7. Ethical issues

The study received ethical clearance from the MUHAS ethics board. Permission to do the study in Schools was granted by regional, District and School authorities. Consent for pupil participation was sought from parents, guardians or their teachers. In a situation where a pupil developed wheeze / Rhonchi or other features of asthma, during the time of the exercise test. Salbutamol inhaler was administered through a spacer until the pupil was free from symptoms. Every child identified to have symptoms of asthma was referred to appropriate health care facilities Confidentiality on candidate's information was highly maintained.

8. Data entry and analysis

Information obtained above was collected using questionnaire. All questionnaires were daily checked for completeness and consistency. Then data were entered into computer using SPSS version 10 for further cleaning, categorizing of

continuous variables and eventually analyses. Chi-squared test was used especially when comparing different proportions. A P-value of less than 5% was considered statistically significant.

9. RESULTS

Characteristics of the study population

A total of 1229 pupils were recruited into the study. Of these, 619(50.4%) pupils were from Bagamoyo and 610(49.6%) from Ilala. The mean age were 16.8 ±1.8 years ranging from 12 to 25 years old (Table1)

Table 1. Age and sex distribution of pupils in the two districts

Age group (yrs)	Bagamoyo		Ilala		Grand total n (%)
	Male n (%)	Female n (%)	Male n (%)	Female n (%)	
≤15	64(13.6)	25(16.9)	93(36.3)	131(37.0)	313(25.5)
15-17	169(35.9)	80(54.1)	100(39.1)	174(49.2)	523(42.6)
17-19	165(35.0)	38(25.7)	48(18.8)	46(13.0)	297(24.2)
19+	73(15.5)	5(3.4)	15(5.9)	3(0.9)	96(7.8)
Total	471(38.3)	148(12.1)	256(20.8)	354(28.8)	1229(100)

Prevalence of self reported asthma and wheeze

In both districts a total of 106/1229 (8.6%) pupils reported to have both, asthma and wheeze in last twelve months. Of these 32/619 (5.17%) pupils were from Bagamoyo and 74/610 (12.1%) pupils from Ilala. (P<0.001) (Table 2)

Prevalence of self-reported asthma among male and female pupils of Ilala, was significant higher than that of Bagamoyo. The prevalence of both, Self reported asthma and wheeze in the last 12 months was 5.1 %(24/619) in Bagamoyo and 12.9%(33/610) in Ilala. (P<0.0001)among males. And 5.4 %(8/619) in Bagamoyo and 11.6% (41/610) in Ilala (P<0.0001) among female pupils.

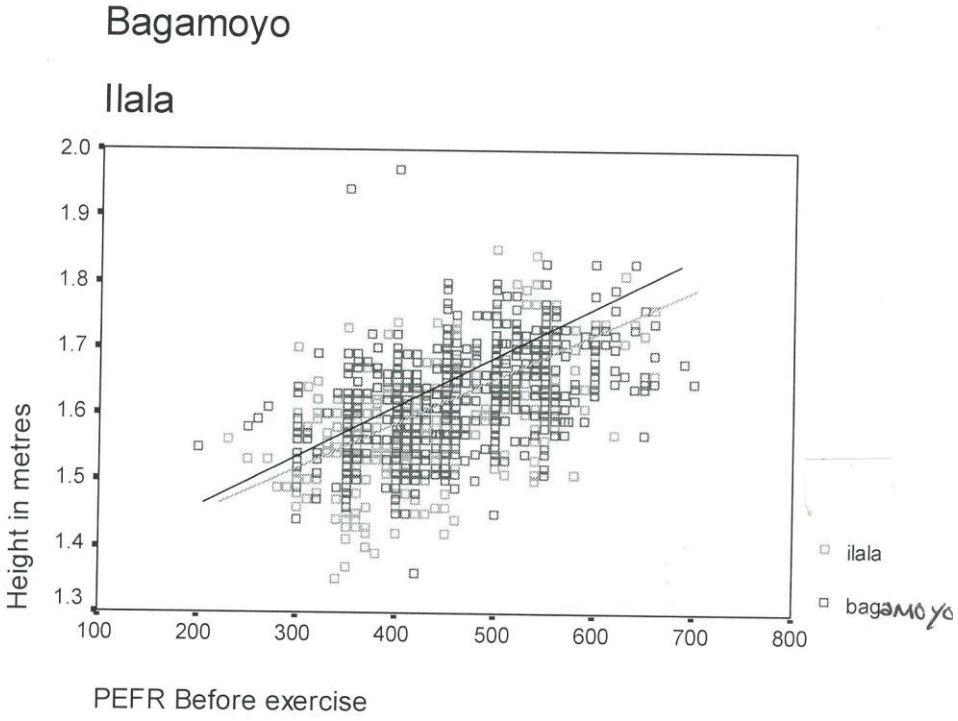
Table 2. Prevalence of wheeze and self reported asthma by sex in Bagamoyo and Ilala districts.

	ASTHMA STATUS	DISTRICT		p-value
		Bagamoyo (N=619)	**Ilala (N=610)**	
Male n (%)	Self reported asthma	30 (6.4)	45 (17.6)	0.001
	Wheeze in the last 12 months	54 (11.5)	58 (22.7)	0.001
	Self reported asthma and wheeze in the last 12 months	24 (5.1)	33 (12.9)	0.001
Female n (%)	Self reported asthma	11(7.4)	59(16.7)	0.001
	Wheeze in the last 12 months	21(14.2)	83 (23.5)	0.001
	Self reported asthma and wheeze in the last 12 months	8 (5.4)	41(11.6)	0.001

Peak expiratory flow rate (PEFR)

The mean PEFR of male pupils was 478.05±77.99 in Ilala and 484.04±79.18 in Bagamoyo ($p<0.33$). Similar observations were noted among female pupils where a mean PEFR of 400.00±57.00 in Ilala and 393.92±62.02 in Bagamoyo. ($p<0.28$) was observed. However the mean PEFR of girls in both districts was lower than their male counterparts. There was a positive correlation between height and PEFR at a two tailed significant level of 0.01 in both study areas. In every increase of height by 1 meter there is an increase in PEFR of 0.537 l/s and 0.446 L/s for Ilala and Bagamoyo respectively (R=0.7 In Ilala and R=0.5 in Bagamoyo) as shown in figure 1.

Figure1. Relationship between PEFR and Height in Ilala and Bagamoyo districts



Exercise induced asthma diagnosed by reduction in PEFR

With a reduction of PEFR by 12%, exercise-induced asthma was diagnosed in 36/439(8.1%) of pupils in Ilala and 40/516(7.7%) of pupils in Bagamoyo. (P< 0.798) A reduction by 15% was observed in 7.2% of pupils in Ilala and 4.3% of pupils in Bagamoyo (P<0.04), while a reduction by 20% was observed in 2.4% of pupils in Bagamoyo, and 6.3% of pupils in Ilala (P<0.002). (Table 3)

Table3. Prevalence of exercise-induced asthma at different PEFR percentage reduction levels.

Percentage reduction	PEFR	Bagamoyo N=516 n (%)	Ilala N=439 n (%)	p-value
12%		40 (7.7)	36 (8.1)	0.798
15%		22 (4.3)	32 (7.2)	0.044
20%		12 (2.4)	28 (6.3)	0.002

Information about having asthma

Among pupils who had both reported asthma and wheeze in the last 12 months, 19/32(58.6%) in Bagamoyo, and 45/74 (61.1%) in Ilala were told about their asthma status for the first time by their parents, followed by, 9/32(29.3%) in Bagamoyo, and 23/74(30.6%) in Ilala who received the first information from hospital personnel's. The remaining information was obtained from other people such as traditional healers, grand mother, school teachers, etc.

Knowledge about asthma

Knowledge about asthma for those who did not have asthma 426/610 (69.8%) and 333/619(53.8%) from Ilala and Bagamoyo respectively. showed that their general knowledge about asthma came from asthma patients in both districts 50/333(15.3%) in Bagamoyo and 106/426(25%) in Ilala, followed by school teachers, media, parents/care takers, peers and hospital workers. (Table 4)

Table 4. Reported sources of information about asthma in the two districts.

Source of information	Bagamoyo		Ilala	
	n	%	n	%
Asthma patients	50	(15.3)	106	(25)
School / teachers	38	(11.5)	49	(12.8)
Parents /care takers	31	(9.2)	70	(11.5)
Media	37	(11.1)	27	(6.4)
Peers	26	(7.9)	26	(6.1)
Hospital workers	17	(5)	32	(7.4)
Don't know	247	(74.2)	189	(44.4)
Total	333	(100)	426	(100)

Knowledge on Asthma symptoms

Among patients with self reported asthma and wheeze in the last 12months, shortness of breath was the commonest reported symptom associated with asthma attack. It was reported in 8/41(19.4%) of pupils in Bagamoyo and 25/104 (24%) of pupils in Ilala. Cough was reported as symptom of asthma in 9/41 (20.8%) pupils in Bagamoyo and 17/104 (15.8%) pupils in Ilala. Other reported

symptoms were Chest tightness 5/41(12%) in Bagamoyo and 25/104 (24.4%) in Ilala, and wheeze, which was 3/41 (6.4%) in Bagamoyo and 7/104 (6.7%) in Ilala.

Attitudes towards asthmatic pupils

Pupils in the two districts had different attitudes towards playing, studying, eating or sleeping together with their asthmatic peers. However, a significant proportion of pupils in Bagamoyo had negative attitude towards asthmatics as compared to pupils in Ilala (Table 5). A sub group analysis showed that the fear tends to decrease with increase in class level ($p<0.001$) table not shown.

Table 5. Reported unfounded attitudes towards asthmatics in the two districts

Fear	Bagamoyo n (%)	Ilala n (%)	p-value
Playing together	128 (20.7)	78 (12.8)	0.0001
Studying together	95 (15.3)	59 (9.7)	0.003
Eating together	117 (18.9)	82 (13.4)	0.009
Sleeping in the same room	169 (27.3)	114 (18.1)	0.0001

Reported trigger factors of asthma

Among asthmatic pupils, dusts and cat hairs/fur was the commonest asthmatic trigger reported in both districts. Other triggers were sea food, exercise, cold weather, perfumes, cough, pollens, butterflies and cigarette smoke, in descending order.

About one fifth (21.3%) of pupils in Ilala and 16.3% of pupils in Bagamoyo reported avoidance of the triggers as the means of preventing asthma attacks. (Table 6)

Table 6. Reported trigger factors in the two districts

Trigger factor	Bagamoyo n %	Ilala n %
Dusts/kapok tree dusts	67 (10)	117 (17.5)
Cat hairs/fur	68 (10.2)	80 (12.0)
Cold whether	29 (4.3)	37 (5.6)
Prawns	18 (2.7)	13 (2.0)
Exercise	9 (1.3)	17 (2.6)
Fumes/perfumes	3 (0.5)	11 (1.6)
Aspirin	4 (0.6)	5 (0.8)
Cigarette smoke	5 (0.75)	4 (0.6)
Cough	0	4(0.6)
Don't know/remember	467 (69.7)	400 (60.0)
Total	670 (100)	668 (100)

Reported Treatments of asthma

Regarding treatments of asthma, 562/619 (90.8%) of pupils in Bagamoyo and 479/610(78.5%) of all pupils in Ilala did not know the treatments of asthma.($p<0.001$) For the few who knew some form of treatment 5/57(9.2%) in Bagamoyo and 28/131(21.5%) in Ilala, treatments included a list of modern medicines 33/57 (58%) in Bagamoyo, and 92/131(70%) in Ilala, followed by

traditional herbs 19/57(33.3%) Bagamoyo and 23/131(17.6%) in Ilala, honey 2/57(4%) in Bagamoyo, 9/131(7%) in Ilala. Others were raw eggs, induced vomiting, aeration and heavy clothing.

10. DISCUSSION

It is a challenging phenomenon to have a gold standard definition of asthma in epidemiological surveys. However self reported asthma and history of wheeze in the last twelve months has been used as the reliable diagnostic tool in community screening of asthma.[4, 6, 29]

This study was done in Bagamoyo, a rural setting. And Ilala which is an urban setting. The prevalence of self reported asthma was 6.6% in Bagamoyo and 17.1% in Ilala. As seen in this study, the prevalence of asthma is higher in urban as compared to rural setting. Similar information was obtained in Kenya, whereby prevalence rates of 2.5% and 9.5% were found in rural and urban areas respectively.[13]

In Bangladesh rural residents aged 15 years and above, the prevalence of asthma was 5.3%.[61] also in a survey done in south Wales among 12 year old school children in three years interval 1973, 1988, and 2003, the prevalence of self reported asthma was 9.8%, 15.2%, 19.7% respectively indicating an increase in prevalence.[56]

However a study done in Shari-Moshi a rural area in Tanzania, reported lower rates compared to those reported in Bagamoyo. It was found to be 3.4 %(±1.2) among boys, and 2.6 %(±0.9) among girls aged between 5 and 15 years old in Shari-Moshi. The prevalence of self reported asthma was 6.6% (±2.4) in boys and 2.6% (±1.2%) in the same age group.[16]

Higher asthma rates in this study were recorded in Ilala an urban setting. Urbanization has been reported to be associated with higher prevalence rates of asthma, so as in this study.[14, 49] Ilala being more urbanized than Bagamoyo may

explain the higher rate in prevalence of self reported asthma; this on the other hand is contributed by higher chances of case reporting in Ilala due to improved health facilities and infrastructure in Ilala compared with Bagamoyo which is a rural setting. We can not conclude whether residence in urban areas is associated with higher prevalence of asthma, since the two districts were selected conveniently and not randomly. A study involving randomly selected rural and urban areas should be done to determine whether there is a difference between urban and rural setting. However these results, give a reflection of the burden of asthma in the general population. As is seen in other age groups in Tanzania, Cameroon.[16]and Kenya[14]

In this study PEFR that was done to all pupils in Bagamoyo and Ilala, showed that mean PEFR was similar among males in Ilala and Bagamoyo. And females in both districts had similar mean PEFR. The mean PEFR of girls in both districts was lower than their male counterpart. These findings were similar to those reported in Nigeria by Ebomoyi and Iyawe in the study aimed at determining variations of PEFR and anthropometric determinants in a population of healthy adults aged between 18 to 30 years.[62]

In this study the mean PEFR for females was 371.99 ± 65.67 L/min; this was significantly less than that of males. Low levels of PEFR among females was described to be due to physiological differences between the two sexes, since PEFR varies with chest circumference, height, weight and age which differ between males and females. In this study there was a positive correlation between height and PEFR as expected in both districts. Similar findings were observed by Ebomoyi [62] and Azah[63] in Nigeria.

Prevalence of exercise induced asthma which was described by a ≥20% reduction of PEFR after a six minutes exercise in pupils who reported no asthma or wheeze was 12/516 (2.4%) in Bagamoyo and 28/439(6.3%) in Ilala. Exercise induced asthma test is often used as an objective method for diagnosis of asthma in epidemiological studies.[22, 64 and 65.]

The cut off point between 10% to 20% reduction in peak expiratory flow rate has been used to estimate the response to exercise induced broncho - spasms.[66, 67, and 68.]

In this study higher prevalence rate of asthma was observed at 12% reduction in PEFR in both districts. Similar results were found in Ghana by Addo Yobbo among 9 to 16 years old pupils, in a study designed to establish the normal response to exercise in Ghanaian pupils. Using a cut off point of a reduction of ≥ 12.5% in PEFR the prevalence was 6.5% in urban and 1.5% in rural areas [69.] These differences were explained by social and environmental factors such as wealth, life style of the study population. A similar trend was found in urban (5.8%) and rural (0.1%) Zimbabwean children at a cut off point of ≥ 15% reduction in PEFR [65]

The cut off point of 15% in reduction of PEFR is favorable cut off point to be used in our setting. Since we have similar environment, and social factors as those found in Zimbabwe, Ghana and Nigeria.

Exercise tests are used for research purposes it is not often used in clinical practice as a screening tool for asthma, but can be reserved for those patients in whom the diagnosis of asthma is still in doubt.[33]

Exercise tests do not require laboratory setting but needs to be medically supervised with bronchodilators available if they are required.

In this study prevalence of wheeze in the last 12 months was 11.5% in Bagamoyo and 22.7% in Ilala. The crude prevalence of wheeze and self reported asthma was 5.2% in Bagamoyo and 12.1% in Ilala; these findings were similar to the prevalence of current wheeze in urban Kenya 12.1% and rural Kenya 3.5%.[14] Similar information with urban-rural difference was seen in Tanzania.[16.]

Among non-asthmatic pupils, sources of information about causes of asthma came from asthma patients; followed by school teachers and parents.

Among pupils who had both history of wheeze in the last twelve months, and self reported asthma. The main source of information came from people who made the first diagnosis namely parents followed by hospital personnel. Brook and Kishon

found similar results among Israeli high school pupils who were compared with asthmatic peers in the same school concerning their knowledge about asthma and their attitude towards asthmatic peers. The level of knowledge was quite satisfactory contrary to our study, with the knowledge of the asthmatic pupils being somewhat higher than that of the healthy pupils. In this study knowledge was associated with increased level of education. The source of pupils' knowledge in Israel came principally from media (television and newspapers), the family (talking with parents), treating physicians, and school nurses. Similarly in this study health worker ranked low in terms of sources of information[1]. In both districts dusts followed by exposure to cat hairs (animal dander) were found to be the most known asthma triggers. As it was observed in urban and rural Kenya.[14] and in Connecticut-USA. [70].

Some pupils reported that avoidance of these causative agents/triggers as the main way to avoid asthma attacks, this was also seen by Gibson in Australia among adolescents with asthma, their peers, and their teachers in order to establish the level of knowledge concerning asthma and its management, their attitudes towards asthma, and quality of life impairment due to asthma. It was found that Asthma was provoked by exposure to passive smoking in 30% of asthmatic students and up to 51% of students avoided situations because of possible asthma trigger[71].

There are variations among asthma triggers according to place and person. Identification of these triggers depends on knowledge of an individual. Therefore there is a need to implement measures to increase general knowledge of asthma triggers in the public so as to increase the general public knowledge of the disease.

More unfounded attitudes in this study towards sharing activities with asthmatics were found to be significantly higher in Bagamoyo than Ilala. A sub group analysis showed that the fear tends to decrease with increase in class level. The influence of education and peers exposure might have played a role to these differences in class level. In both districts normal pupils had less tolerant attitude towards asthmatic pupils than asthmatic pupils.[1]

However Ilala being more urbanized than Bagamoyo, Information on asthma is higher in Ilala than Bagamoyo as well as there are more asthma patients in Ilala than Bagamoyo and this might have lead to more knowledge on asthma and reduce fear of sharing activities with asthmatics.[1]

Regarding treatments of asthma, 562/619 (90.8%) pupils in Bagamoyo and 479/610(78.5%) pupils in Ilala did not know the treatments of asthma ($p<0.001$). For the few who knew some form of treatments, traditional herbs followed modern medicines were mentioned as the main remedy for asthma. Similar information was seen in India by Gupta et al[40, 42].

Little information is available on the use of herbs in the treatment of asthma in Tanzania; therefore there is a need to ascertain the effects, efficacy and potency of these drugs (herbs) in treating asthma.

11. Conclusion

1. Prevalence of asthma is high among secondary school pupils of Ilala than Bagamoyo.

2. Most of the diagnoses of asthma are made outside the hospital, with non medical persons.

3. Apart from the use of modern medicines traditional herbs/practices are still used as one of the main remedies of asthma.

4. Negative attitudes towards doing activities with asthmatic peers are seen more among pupils of Bagamoyo than Ilala.

12. Recommendations;

Sincere and sustained efforts are required to disseminate knowledge about all aspect of asthma and its management among secondary school pupils and to dispel their negative attitudes towards asthmatic peers.

Second there is a need to ascertain the effects, efficacy and potency of herbs drugs in treating asthma.

The cut off point of 15% reduction in PEF is an important tool in the diagnosis of exercise-induced asthma.

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