

# ASSESSMENT OF KNOWLEDGE OF ASTHMA AND RELATED SYMPTOMS IN SCHOOL-AGE CHILDREN ATTENDING THE PRIMARY HEALTH CLINIC IN MAKAH CITY IN SAUDI ARABIA 2019.

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## Abstract:

### Background

Asthma is a global problem, its prevalence varies among different countries and cities and age groups. In children, asthma is one of the most common chronic diseases and one of the leading causes of morbidity and mortality. Bronchial asthma is the most common chronic disease of childhood. In recent years a consistent increase in the prevalence of asthma has been reported from various regions of the world. Concomitantly, the social and economic impact of the disease is also increasing. Children with asthma face multiple challenges that encompass learning how to cope with. Bronchial asthma (BA) is a public health problem in all countries irrespective of their level of development, being generally under-diagnosed and undertreated, and most asthma-related death commonly occurs in low-income and lower-middle income countries. As for Saudi Arabia, it is estimated that more than 2 million Saudis have asthma and the percentages range from 8% to 25% in Saudi children. In 2004, the highest prevalence of asthma was reported by physicians in Saudi Arabia (25%).

**Aim of the study:** To Assessment of knowledge of asthma and related symptoms in school-age children attending the primary health clinic inMakah city in Saudi Arabia 2019.

**Method:** A cross-sectional study was conducted attending the primary health care centers in Makkah, Saudi Arabia. An asthma knowledge questionnaire was used to measure the knowledge. During the March to June, 2019, participants were (80).

**Results:** General knowledge about asthma the majority of participant had average information were (43.75%) while weak Knowledgewere (12.25%) the data ranged from (4-15) by (Mean± SD) (12.113±4.12), while Knowledge about associated aspects of asthma the majority of participant had average information were (67.5%) while weak Knowledgewere (12.25%) the data ranged from (5-10.) (Mean± SD), (6.387±2.75).

**Conclusion:** In conclusion, the screening methodology adopted in this study could be applied for all children at the beginning of the school year, being simple and noninvasive measure. The prevalence of asthma in school children in is greater than that reported from most developing countries and closer to the rates reported indeveloped countries. Avoidance of pet's ownership at home, improving social class and premarital counseling for atopic persons are all recommended

**Keywords:** Assessment, knowledge, asthma, related, symptoms, school-age, children, PHC

### 1. Introduction:

Subsequently, hospital admissions are increasing steadily.[1,2] During the last few decades, profound changes have occurred in the environments of most societies, including urbanization, an enormous increase in motor vehicles and factories, changes in life styles, and exposure to new allergens. These factors in addition to familial tendency and history of respiratory infections, have been shown to lead to development of asthma.[3,4] The prevalence of asthma cannot be measured in terms of lung function abnormalities since most asthmatic children have normal lung function.[5,6] There is no agreed definition of asthma that is suitable for use in epidemiological surveys. However, if people are simply asked . Whether they (or their children) have ever had asthma, the answers are remarkably specific, as screening test for the disease. [7,8]

Bronchial asthma affects any group age. Based on the Global Initiative for Asthma report, it is estimated to be currently affecting 300 million individuals. When the disease is uncontrolled, it decreases the quality of life, restrains from certain activities, and may sometimes cause death. Hence, it is considered as a serious health problem worldwide. It is estimated that the prevalence of asthma globally to be between 1% and 18% in different countries' populations.[9]The prevalence of asthma cannot be measured in terms of lung function abnormalities since most asthmatic children have normal lung function.[10,11] There is no agreed definition of asthma that is suitable for use in epidemiological surveys. However, if people are simply asked whether they (or their children) have ever had asthma, the answers are remarkably specific, as screening test for the disease.[12]

Asthma is reported to be one of the most common chronic diseases in childhood, impairing not only the quality of life of the patients but also their families and incurring high costs to the health care system and society [13]. In the Middle East, asthma prevalence ranging from 5% to 23% has previously been reported to be lower than in developed countries [14,15]. This variation in rates suggests that environmental factors and variations in the presence of aeroallergens may affect its development. Genetic factors and temperature have a very close inverse correlation with the seasonal distribution of asthmatic attacks while humidity has a direct correlation. There are insufficient data to fully explain the variations in prevalence within and between populations [16].Bronchiolitis usually happens in the winter and early spring. It most often affects children younger than 2 years old (The Saudi initiative of bronchiolitis diagnosis, management, and prevention (SIBRO) aimed to facilitate pediatricians and general practitioners to manage such conditions. The roles of supportive therapy; oxygen; bronchodilators; anti-inflammatory, antibacterial, and antiviral agents; and make recommendations to influence clinician behavior on the basis of the evidence. The prevention methods are reviewed, as is the potential role of complementary and alternative medicine (CAM). [17]

Bronchiolitis is an acute inflammatory illness of the small bronchioles, which is usually caused by a viral infection. The most common agent is a respiratory syncytial virus (RSV). This condition may manifest at any age, but symptoms are usually severe only in young infants [18]. The prevalence of bronchiolitis in the KSA ranges between 25%-88%. RSV belongs to the pneumoviridae family (a single-stranded RNA) with two subtypes, A and B. Bronchiolitis is a well-recognized condition; it affects around 1%–3% of all healthy children and more than 10% in high-risk groups. Bronchiolitis represents a large public health burden throughout the world where 2%–10% of cases require hospitalization. About 5% of RSV bronchiolitis cases require Intensive Care Unit (ICU) admission. [19]

## 1.2 Literature Review

Locally, in Asir region, Saudi Arabia, a similar study conducted to assess the knowledge and awareness among mothers of asthmatic children revealed that mothers had deficiencies in their knowledge about asthma; most mothers did not know the mechanism of the disease and its potential complications. [20]

Another similar local 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. They believed that medication should be stopped once the coughing is over and after an acute asthma attack has resolved. [21,22]

World Health Organization report (2016) about epidemiologic studies have shown that the prevalence of asthma is increasing all over the world, especially in non-industrialized countries [23]. present the overall prevalence of childhood asthma in Dekerness district using questionnaire diagnosed asthma was found to be 13.4% which is higher than the different school-based studies carried out in Egypt which varied over time and regions. It varied from 8.2% in Cairo [24] to 14.7% in El Nozha region [25], up to 46.1% in Al Maadi and Al Maasara region [26]. While in the Nile Delta region, the overall prevalence was 7.7% [27], in Damietta Governorate was 9.1% [28] while in Menoufiya Governorate, it was 6.5% [29]. The asthma prevalence in Assiut city, Upper Egypt was 6.2% [26], in Abu Khalifa village. In El-Ismailia Governorate, it was 9.6% [27] while in Fayoum city it was 6.3% [28]. These variations in prevalence rates may be attributed to different population studied, asthma

Stempel et al, found that in a Chicago community survey, that knowledge about the disease of family members of asthmatic patients was no better than that of the general public, also revealed that there are several myths related to asthma attacks and their treatment. The carers had many misconceptions regarding triggers of asthma. Among them were rice and foods rich in oil. This belief leads to withholding of a wide variety of healthy nutritious foods from growing children, thereby having an adverse effect on their nutritional status and overall growth pattern. [29]

Fadzil et al reported in Previous studies that were conducted on parents with asthmatic children have also shown low asthma knowledge results, such as the mean score of the parents was 15.5, which was 50% of the total score.[20] There was a higher score in another study, with a mean of 18.3 for parents with asthmatic children who were admitted to New Castle Mater Hospital and John Hunter Hospital.[16] In addition, in another study, parents scored 19.9 in the Royal Children Hospital, Australia.[30] Comparably, one of the highest percentages on the asthma knowledge test was an average of 72% by parents.[18]

Another study conducted in Lebanon found that majority of parents did not recognize asthma by its name, but referred to it as chest allergy or recurrent dyspnea. Most of them were confused about the etiology of asthma, 66.5% thought that herbs were a useful treatment for asthma, and 48% of parents were worried that inhaler therapy could cause an addiction. [31]

### 1.3. Rationale:

Local reports in Saudi Arabia (SA) suggest that the prevalence of asthma is increasing. Poor knowledge about asthma and related symptoms, fear of the use of new drugs, and the lack of awareness of the importance of disease control are common among primary care physicians who care for asthma patients in KSA. Consequently, many asthma patients continue to be underdiagnosed, undertreated, and at risk of acute exacerbations resulting in work or school missing days, increased use of costly acute healthcare services, and decrease quality of life.

### 1.3 Aim of the study:

To Assessment of knowledge of asthma and related symptoms in school-age children attending the primary health clinic inMakah city in Saudi Arabia 2019

### 1.4 Objectives:

Assessment of knowledge of asthma and related symptoms in school-age children attending the primary health clinic inMakah city in Saudi Arabia 2019

### 1.5 Study design:

This study is descriptive type of cross-sectional study was conducted among school-age children asthma applying a convenience sampling technique .

### 1.6 Study Area

This study was conducted at Makkah Mokarramah,during the March to June, 2019 which is one of the major cities in Saudi Arabia with an estimated population of approximately 2 million.There are 38 primary health care (PHC) centers at Makkah Mokarramah ,Saudi Arabia. Primary health care is a cornerstone in the national health transformation as a part of the Vision 2030 in Saudi Arabia.13 Primary health care centers provide preventive, curative, and rehabilitative health services including treatment of common illnesses, immunization, maternal and child health, screening, and oral health. In each PHC center, a dedicated clinic run by a general practitioner and other healthcare professionals is assigned for follow up of children diagnosed with asthma. The clinic provides clinical care as well as educational services for patients. Asthma clinics in PHC centers follow the Saudi guidelines for asthma including management and education for patients. Children with asthma are diagnosed in the hospital by specialist physicians and then referred to the PHC centers for follow up. The number of registered physician-diagnosed children with asthma in the PHC centers in the Makkah Mokarramah region is approximately 2000. The primary data were collected from caregivers of children with asthma coming for a follow-up visit in the asthma clinic in PHC centers in at Makkah Mokarramah, Saudi Arabia.

### 1.7Study Population

The target study population were school age, with sample size of (80) distributed to all geographical areas. The inclusion criteria of the study were: i) children diagnosed with asthma; ii) children aged school age; iii) visiting PHC centers with their caregivers for follow up; and iv) caregivers can speak Arabic. Children with other chronic diseases or their caregiver was not a first-degree relative were excluded from this study, the frequency of outcome variable of 50% with an accepted margin of error of plus-or-minus 5 and a confidence level of (95%). 4 PHC centers were randomly selected to be included in the study these centers were selected from the list of PHC centers in Makkah Mokarramah, Saudi Arabia using simple random sampling technique. Within these centers, caregivers of children with asthma attending a follow-up visit in the asthma clinic were recruited sequentially.

### 1.8 . Sample size

was calculated based on 18.3% of parents who correctly answered more than 60% of the questions in Using 95% confidence interval and a 5% margin of error, the sample size was estimated to be 80 . The sample size was calculated by using open Epi epidemiologic calculator. A nonrandom, convenience sampling technique was used to obtain the sample

## 2. Data collection tool

Data were collected using a questionnaire developed by the investigator, based on the study objectives and after a literature review of similar studies the questionnaire is divided into three sections. The first section includes the demographic characteristics and background of the study population and their asthmatic children, self-education about the disease. The individuals' demography consisted of age, sex, marital status, number of children if any, education, place of residence, job, if the person suffers from asthma, and whether they have children who suffer from bronchial asthma or know someone who suffers from asthma. Followed by 30 questions about asthma awareness covering various aspects, and then a section about self-education about asthma and the sources of the information they know about asthma.This survey was performed using a Structured Asthma Knowledge Questionnaire in their native language (Arabic) that was answered through interviews with (80) randomly selected participant Arabians The data was collected, translated, entered to a database and analyzed.

### 2.1 Data entry and analysis:

The data had been entered and analyzed using Statistical Package for Social Sciences software version 22.0. Descriptive statistics (e.g., number, percentage) and analytic statistics using Chi-square tests ( $\chi^2$ ) to test for the association and/or the difference between two categorical variables will be applied. A  $P < 0.05$  was considered statistically significant.

### 2.2 Pilot study

A pilot study has been conducted in the same sector due to the similarity to the target group using the same questionnaire to test the methodology of the study. As a feedback, the questionnaire has been clear and no defect has been detected in the methodology

### 2.3 Ethical considerations

Permission from the Makkah joint program of Saudi pediatric residency program will be obtained. Permission from the Directorate of health and education, verbal consents from all participants in the questionnaire were obtained. All information was kept confidential, and results will be submitted to the department as feedback .

### 2.4 Budget: Self-funded

### 3.Result

**Table 1** Distribution of demographic data (age, gender, Occupation, Number of children, Level of education) in our study (n=80)

<b>Age (years)</b>		
<25		5
25-35		75
35-45		75
>45		
<b>Number of children</b>		
1		5
2		75
3 or more		5
<b>Level of education</b>		
Illiterate		5
Primary		
Preparatory		5
Secondary		5
University		
<b>Occupation</b>		
Work		25
Not work		75
<b>Family income</b>		
<5000		
5000-10000		5
10000-15000		5
>15000		
<b>Age of child</b>		
<5		5
>5		5
<b>Gender of child</b>		
Male		5
Female		5

In our study showed that the only (28.75%) of the participated were (35-45) years while <25 years were (22.5%), regarding the Number of children the majority of the participated 3 or more were (62.5%) followed by 2 were (28.0%), The majority of the participated the level of education were Primary (35.00%). and the majority of Occupation were work (66.25%), regarding Family income the majority of the participated <5000 were (30.0%) regarding age of the majority of the participated <5 were (77.5%), regarding gender of child the majority of the participated female were (52.5%)

**Table 2** Distribution of the general knowledge and associated about asthma questions

	Strongly agree		Disagree		Strongly disagree		Percentage of
	Agree	Disagree	Disagree	Strongly disagree	Agree		
<b>General knowledge about asthma</b>							
The main cause of asthma is airway inflammation	5	5	25	75	19		
Asthma attacks can be prevented if medications taken even when there are no symptoms between attacks	5	75	75		69		
Flu infections are the main causes or triggers of asthma attacks	25	25		5	06		
If an asthmatic child gets the flu, you should stop using the inhaler even if there is no coughing or wheezing	5	75		75	25		
Asthmatic children might have attacks that are severe enough to require hospitalization in an intensive care unit or they might even die from an attack	75	75	25	25	00		
All medications for asthma do not work unless they are administered every day					00		
<b>Knowledge about associated aspects of asthma</b>							
Parents/guardians should ask a doctor to tell the school that an asthmatic child should not exercise or participate in physical education classes	5		75	5	81		
Children who have asthma should not participate in sports that make them run too much					25		
It's best not to smoke or let anyone else smoke near a child who has asthma			25	5	06		
If the parents/guardians of a child with asthma smoke outside the house, it won't affect the child			5		5	00	

Tables 2 regarding the general knowledge about asthma show some participants missed answering the first question in the first part of knowledge; therefore, the exact number of responses was mentioned but also the majority of participant agree in Asthmatic children might have attacks that are severe enough to require hospitalization in an intensive care unit or they might even die from an attack were (43.75%) and % of agreement were (75.0%) , Asthma attacks can be prevented if medications are taken even when there are no symptoms between attacks were (43.75%), and % of agreement were (74.69%) Flu infections are the main causes or triggers of asthma attacks were (41.25%) and % of agreement were (69.06%)

Regarding the Knowledge about associated aspects of asthma the majority of participant Strongly agree in it is best not to smoke or let anyone else smoke near a child who has asthma (55.0%) and % of agreement were (84.06%), also the majority of participant agree in Parents/guardians should ask a doctor to tell the school that an asthmatic child should not exercise or participate in physical education classes were (40%) and % of agreement were (77.81%),

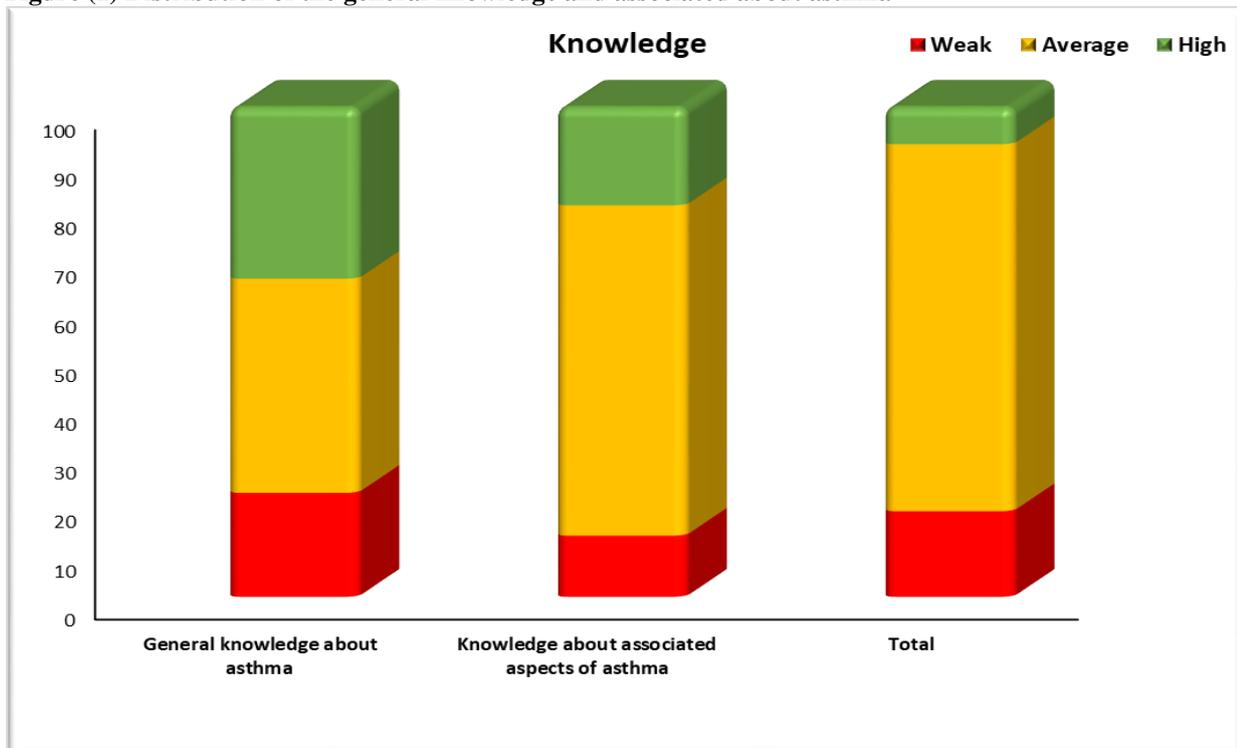
Children who have asthma should not participate in sports that make them run too much were (35.0%), and % of agreement were(61.25%)

**Table (3)** Distribution of the total general knowledge and associated about asthma

Items	Knowledge			Score	
	Weak	Average	High	Range	Mean±SD
General knowledge about asthma				5.	113±4.12
	25	75			
Knowledge about associated aspects of asthma				60.	687±2.75
	15	85			
Total				76.	623±5.144
	17.5	75	7.5		

Table 3 Regarding General knowledge about asthma the majority of participant had average information were (43.75%) while weak Knowledge were (12.25%) the data ranged from (4-15) by (Mean± SD) (12.113±4.12), while Knowledge about associated aspects of asthma the majority of participant had average information were (67.5%) while weak Knowledge were (12.25%) the data ranged from (5-10.) (Mean± SD), (6.387±2.75), regarding total the majority of participant had average information were (75.0%) while weak Knowledge were (17.5%) the data ranged from (8-26) by (Mean± SD)( 18.623±5.144)

**Figure (1)** Distribution of the general knowledge and associated about asthma



**Table 4. Distribution of the responses of parents on their children's Asthma symptoms**

<b>Symptoms</b>		
Wheezing (at any time)		75
Asthma (at any time)		25
<b>Symptoms in past 12 months</b>		
Wheezing		5
Sleep disturbance		
Severe episode		25
Exercise-induced wheezing		
Night cough		5
Morning tightness		25
Morning mucus		5
Wheezing with allergens		5
Use of bronchodilators		5
Bronchitis		
At any time		5
Wheezing with cold or bronchitis		25

Table 4 Regarding Symptoms about asthma the wheezing (at any time) the majority of participant were (93.75%) but asthma (at any time) were (56.25%) .

Regarding Symptoms in past 12 months found the majority of participant respectively. Wheezing were (82.5%), wheezing with allergens were (82.5%), wheezing with cold or bronchitis were (76.25%), use of bronchodilators were (72.5%), bronchitis was (35.0%), Morning tightness were (31.25%)

#### 4. Discussion

As the most frequent chronic disease in infancy, asthma places a heavy burden on public health. The prevalence of asthma varies among different geographical zones and within the same country [32]; The results of this study provide an update and a standardized description of the extension and study of school-age children attending the primary health clinic in Makah. Asthma and related symptoms in school children living in Makah. (see table4). Regarding Symptoms about asthma the wheezing (at any time) the majority of participant were (93.75%) but asthma (at any time) were (56.25%). Regarding Symptoms in past 12 months found the majority of participant respectively. Wheezing were (82.5%), wheezing with allergens were (82.5%), wheezing with cold or bronchitis were (76.25%), use of bronchodilators were (72.5%), bronchitis was (35.0%), Morning tightness were (31.25%). The lack of a gold standard for diagnosis of asthma makes accurate assessment and comparison between surveys difficult. [33] Therefore, standard respiratory questionnaires were developed, and recently the ISAAC questionnaire was found to be useful for estimating the prevalence of asthma in childhood. Our study is the first one using the ISAAC protocol in Makah. In two previous surveys in Turkey [34,35] a similar modified version of the questionnaire compiled by the American Thoracic Society and the United States Heart and Lung Institute, was used [36]

Pearce et al reported the prevalence of asthma as 6.9% in Ankara and 10.2% in Samsun (a city on the Black Sea coast) in primary school children. It is not possible to compare these figures with the results obtained in our study as, in these studies, asthma was defined strictly as recurrent wheezing (at least three episodes) or diagnosis of asthma by a physician. The reported cumulative prevalence of physician-diagnosed asthma was 1.4% in Ankara. [34]

One reason is that if the child has difficult or hard to control asthma parents will visit the health facilities more, will see the doctor and educator more and will be more knowledgeable about asthma. Another reason may be that at the specialized clinic of asthma education is part of the care provided for each patient's visit by trained asthma educators. However, in the analysis, participants were not subcategorized according to clinical setting, and hence, we do not know whether there is any difference between the two groups in regard to knowledge or practice. Family history of asthma is a cardinal feature of asthma, and the majority of participants in this study reported having a family history of the condition, in common with local and international trends. [23,24] Explored the mothers' knowledge of asthma using a different scoring tool. [28] They found average knowledge of the symptoms of asthma, mainly wheeze, cough, and chest tightness. They also knew that the common cold, changes in the weather, and insecticides were aggravating factors for asthma, but were unaware of the potential dangers of smoke, food, and psychological stress. The majority of mothers in that study did not know the mechanisms of asthma. [29]

#### 5. Conclusions

Our estimates of the prevalence and severity of asthma symptoms in schoolchildren aged <5,>5 , schoolchildren of both age groups presented similar estimates of current asthma symptoms, as other studies, with children presenting a higher prevalence than adolescents. The associations with current asthma symptoms established for each age group included a set of alimentary and behavioral habits, some demonstrated in other global studies, others not. This lack of finding consistency demonstrates the complex relationships among asthma symptoms, pre-disposition, and environmental lifestyles. Therefore, future in-depth research is needed to assess the interactions between asthma symptoms and current lifestyles in both the population and around the world.

## 6. References

- To, T., Stanojevic, S., Moores, G., Gershon, A. S., Bateman, E. D., Cruz, A. A., & Boulet, L. P. (2012). Global asthma prevalence in adults: findings from the cross-sectional world health survey. *BMC public health*, *12*(1), 1-8.
- Beasley, R., Ellwood, P., & Asher, I. (2003). International patterns of the prevalence of pediatric asthma: the ISAAC program. *Pediatric Clinics*, *50*(3), 539-553.
- Warner, J. O., Pohunek, P., Marguet, C., Roche, W. R., & Clough, J. B. (2000). Issues in understanding childhood asthma. *Journal of allergy and clinical immunology*, *105*(2), S473-S476.
- Silvestri, M., Sabatini, F., Defilippi, A. C., & Rossi, G. A. (2004). The wheezy infant-immunological and molecular considerations. *Paediatric respiratory reviews*, *5*, S81-S87.
- Lau, S., Illi, S., Platts-Mills, T. A. E., Ripo, D., Nickel, R., Grüber, C., ... & Multicentre Allergy Study Group. (2005). Longitudinal study on the relationship between cat allergen and endotoxin exposure, sensitization, cat-specific IgG and development of asthma in childhood—report of the German Multicentre Allergy Study (MAS 90). *Allergy*, *60*(6), 766-773.
- Burney, P. G., Chinn, S., & Rona, R. J. (1990). Has the prevalence of asthma increased in children? Evidence from the national study of health and growth 1973-86. *British medical journal*, *300*(6735), 1306-1310.
- Al Ghamdi, B. R., Mahfouz, A. A., Abdel Moneim, I., Khan, M. Y., & Daffallah, A. A. (2008). Altitude and bronchial asthma in south-western Saudi Arabia. *EMHJ-Eastern Mediterranean Health Journal*, *14* (1), 17-23, 2008.
- Hancox, R. J., Milne, B. J., Taylor, D. R., Greene, J. M., Cowan, J. O., Flannery, E. M., ... & Sears, M. R. (2004). Relationship between socioeconomic status and asthma: a longitudinal cohort study. *Thorax*, *59*(5), 376-380.
- Liu, T., Wang, F., Wang, G., & Mao, H. (2018). Efficacy and safety of benralizumab in patients with eosinophilic asthma: a meta-analysis of randomized placebo-controlled trials. *Frontiers of medicine*, *12*(3), 340-349.
- BinSaeed, A. A., Torchyian, A. A., Alsadhan, A. A., Almidani, G. M., Alsubaie, A. A., Aldakhail, A. A., ... & Alsaadi, M. M. (2014). Determinants of asthma control among children in Saudi Arabia. *Journal Of Asthma*, *51*(4), 435-439.
- Al Frayh, A. R., Shakoor, Z., ElRab, M. G., & Hasnain, S. M. (2001). Increased prevalence of asthma in Saudi Arabia. *Annals of Allergy, Asthma & Immunology*, *86*(3), 292-296.
- Saraçlar, Y., Yiğit, S., Adalioğlu, G., Tuncer, A., & Tunçbilek, E. (1997). Prevalence of allergic diseases and influencing factors in primary-school children in the Ankara Region of Turkey. *Journal of Asthma*, *34*(1), 23-30.
- Abudahish, A., & Bella, H. (2006). Primary care physicians perceptions and practices on asthma care in Aseer region, Saudi Arabia. *Saudi medical journal*, *27*(3), 333-337.
- Masoli, M., Fabian, D., Holt, S., Beasley, R., & Global Initiative for Asthma (GINA) Program. (2004). The global burden of asthma: executive summary of the GINA Dissemination Committee report. *Allergy*, *59*(5), 469-478.
- Sobki, S. H., & Zakzouk, S. M. (2004). Point prevalence of allergic rhinitis among Saudi children. *Rhinology*, *42*, 137-140.
- Al-Harbi, S., Al-Harbi, A. S., Al-Khorayyef, A., Al-Qwaiee, M., Al-Shamarani, A., Al-Aslani, W., ... & Yousef, A. (2016). Awareness regarding childhood asthma in
- Peterson-Sweeney, K., McMullen, A., Yoos, H. L., & Kitzman, H. (2003). Parental perceptions of their child's asthma: management and medication use. *Journal of Pediatric Health Care*, *17*(3), 118-125.
- Zaraket, R., Al-Tannir, M. A., Bin Abdulhak, A. A., Shatila, A., & Lababidi, H. (2011). Parental perceptions and beliefs about childhood asthma: a cross-sectional study. *Croatian medical journal*, *52*(5), 637-643.
- US Department of Health and Human Services. (2006). The health consequences of involuntary exposure to tobacco smoke: a report of the Surgeon General.
- Fadzil, A., & Norzila, M. Z. (2002). Parental asthma knowledge. *The Medical Journal of Malaysia*, *57*(4), 474-481.
- Liu, A. H., Zeiger, R., Sorkness, C., Mahr, T., Ostrom, N., Burgess, S., ... & Manjunath, R. (2007). Development and cross-sectional validation of the Childhood Asthma Control Test. *Journal of Allergy and Clinical Immunology*, *119*(4), 817-825.
- National Heart, Lung, and Blood Institute. (2002). Global initiative for asthma: global strategy for asthma management and prevention. *Bethesda, MD: National Institutes of Health*.
- World Health Organization (WHO). Bronchial asthma. Available via <http://www.who.int/mediacentre/factsheets/fs206/en/> (Accessed 11 September 2016).
- El-Hefny AM, Nassar SI, El-Heneidy FM, Said M, ElBeleidy AS, El-Marsafy E, Moustafa NA, El-Falaky M, Haddad Z. Epidemiology of childhood asthma in Cairo. *Med J Cairo University*. 1994; *62*(2):505-518.

25. Georgy, V., Fahim, H. I., El Gaafary, M., & Walters, S. (2006). Prevalence and socioeconomic associations of asthma and allergic rhinitis in northern Africa. *European Respiratory Journal*, 28(4), 756-762.
26. Georgy, V., Fahim, H. I., El Gaafary, M., & Walters, S. (2006). Prevalence and socioeconomic associations of asthma and allergic rhinitis in northern Africa. *European Respiratory Journal*, 28(4), 756-762.
27. Zedan, M., Settin, A., Farag, M., Ezz-Elregal, M., Osman, E., & Fouda, A. (2009). Prevalence of bronchial asthma among Egyptian school children. *Egypt J Bronchol*, 3(2), 124-130.
28. Sears, M. R., Burrows, B., Flannery, E. M., Herbison, G. P., & Holdaway, M. D. (1993). Atopy in childhood. I. Gender and allergen related risks for development of hay fever and asthma. *Clinical & Experimental Allergy*, 23(11), 941-948.
29. El-Mashad, G. M., Mahmoud, A. A., & Hafez, A. A. A. (2016). The prevalence of bronchial asthma among primary school children in Menoufiya Governorate (El-Bagour Center). *Menoufia Medical Journal*, 29(1), 89.
30. Abdallah, A. M., Sanusy, K. A., Said, W. S., Mahran, D. G., & Mohamed-Hussein, A. A. (2012). Epidemiology of bronchial asthma among preparatory school children in Assiut district. *Egyptian Journal of Pediatric Allergy and Immunology (The)*, 10(2).
31. Halim, W. B., Khalil, K. A., Sobhy, S. A., & Hasb-Allah, S. A. (2013). Prevalence of bronchial asthma among secondary schools students at Abu Khalifa village-Ismailia Governorate. *The Medical Journal of Cairo University*, 81(2).
32. Tabak, C., Wijga, A. H., de Meer, G., Janssen, N. A., Brunekreef, B., & Smit, H. A. (2006). Diet and asthma in Dutch school children (ISAAC-2). *Thorax*, 61(12), 1048-1053.
33. Cesaroni, G., Farchi, S., Davoli, M., Forastiere, F., & Perucci, C. A. (2003). Individual and area-based indicators of socioeconomic status and childhood asthma. *European Respiratory Journal*, 22(4), 619-624.
34. Pearce, N., Weiland, S., Keil, U., Langridge, P., Anderson, H. R., Strachan, D., ... & Ruffin, D. (1993). Self-reported prevalence of asthma symptoms in children in Australia, England, Germany and New Zealand: an international comparison using the ISAAC protocol. *European Respiratory Journal*, 6(10), 1455-1461.
35. Saraclar, Y., Şekerel, B. E., Kalayci, Ö., Cetinkaya, F., Adalioğlu, G., Tuncer, A., & Tezcan, S. (1998). Prevalence of asthma symptoms in school children in Ankara, Turkey. *Respiratory medicine*, 92(2), 203-207.
36. Von Mutius, E. (1996). Epidemiology of asthma: ISAAC-International Study of Asthma and Allergies in Childhood. *Pediatric Allergy and Immunology*, 7(S9), 54-56