



ISSN 1810-3030 (Print) 2408-8684 (Online)

Journal of Bangladesh Agricultural UniversityJournal home page: <http://baures.bau.edu.bd/jbau>, www.banglajol.info/index.php/JBAU

Determinants and impact of asthma disease in Mymensingh zone: An empirical analysis

Homayora Yeasmin¹, Sheikh Mohammad Sayem², Farjana Misu² and Mohammad Amirul Islam²¹Food and Agriculture Organization of the United Nations (FAO), Bangladesh²Department of Agricultural Statistics, Faculty of Agricultural Economics and Rural Sociology, Bangladesh Agricultural University, Mymensingh-2202, Bangladesh

ARTICLE INFO

**Abstract***Article history:*

Received: 09 May 2018

Accepted: 08 December 2018

Published: 31 December 2018

Keywords:

Asthma; hypertension; weight change; allergic reaction

Correspondence:

Farjana Misu

✉: farjana5100@gmail.com

Asthma, a global public health problem, is affecting both developing and developed countries. Bangladesh is one of the asthma prone countries with high concentration of the disease in Mymensingh zone. This study has been conducted to identify the determinants and impact of asthma disease in Mymensingh zone of Bangladesh. Cluster sampling technique is used for sampling 100 asthmatic patients from Mymensingh zone. Different socio-economic and biological information of the asthmatic patients have been collected. Multinomial logistic regression and multivariate logistic regression have been used to find out the determinants and impact of asthma. The result suggests that the likelihood of being in severe asthma is 5.182 times higher if the public rule of smoking is not maintained in work place. Positive impact of access to sunlight and presence of cockroaches, mice or rats in household on reducing asthmatic condition was also revealed in the analyses. The multivariate logistic regression suggests that hypertension and weight change both are significantly influenced by disease status of asthma. This research identifies that along with other determinants smoking in the working places is an important determinant of asthma in Mymensingh zone of Bangladesh. Furthermore, asthma is found to have significant influence on hypertension and weight change which will guide the policy planners and health professionals to address the issues together in systematic fashion. Mymensingh zone being an asthmatic region needs special attention in the national health program.

Copyright:

©2018 by authors and BAURES. This work is licensed under the Creative Commons Attribution International License (CC BY 4.0).

Introduction

Asthma is defined as a chronic inflammatory disease of the respiratory tract, characterized by coughing, wheezing, breathlessness, airway obstruction, chest tightness, and bronchial hyper-responsiveness (WAO, 2015). These symptoms are considered as the primary indicators that a patient is suffering from the respiratory disorder. There are many factors involved in the development of asthma, including a combination of genetic, lifestyle, habit, environmental and socioeconomic factors which are not cared about by many of us. Irritation by smoke, fumes, strong smells, or exercise, breathlessness worsening at night, and responding to appropriate asthma therapy are symptoms that strongly suggest the presence of asthma (GINA, 2012). Among various infectious agents, attack of respiratory syncytial virus (RSV) in early stage of life is well known to cause asthma in later life (Henderson *et al.*, 2005). Increased temperature and carbon emission result in increased production of pollens and fungal spores that could exacerbate symptoms of allergic diseases (Beggs, 2004). The prevalence of asthma symptoms in cities with well-known high levels of air pollution was much higher than places with significantly lesser pollution (Mallol, 2008). The passive smoking could well be the most important 'non-communicable' environmental factor involved in the etiology of early asthma (Sarkaret *et al.*, 2012). The high prevalence of

asthma may be related to a diet characterized by lower consumption of fresh fruits, vegetables and fish, and high consumption of foods rich in saturated fatty acids, sugars, and salt (Woolcock, 1996). The morbidity from asthma have shown an upward trend during an era when quality medications are easily available for asthma (Alderson, 1987). Rapid advances in several fields, especially in molecular biology and statistical analysis have allowed the increased understanding of the development of chronic diseases but a clear picture of the mechanisms that lead to asthma onset and persistence is still lacking (Mapp, 2003). As a chronic disease it can also affect other chronic diseases which should be clear through this study. It is estimated that as many as 300 million people of all ages, and all ethnic backgrounds, suffer from asthma and the burden of this disease to governments, health care systems, families, and patients has been increasing worldwide and there may be an additional 100 million persons with asthma by 2025 (Masoliet *et al.*, 2004; Dougherty and Fahy, 2009).

In Bangladesh, asthma appears to be a substantial public health problem. It is recognized as an important cause of morbidity, economic loss, and mortality (Goodwin, 2007). Asthma is associated with enormous healthcare expenditures that include both direct and indirect costs. It is also associated with the loss of future potential earnings due to both morbidity and mortality (Bahadori

Cite this articleYeasmin H., Sayem S.M., Misu F. and Islam M.A. 2018. Determinants and impact of asthma disease in Mymensingh zone: An empirical analysis. *Journal of Bangladesh Agricultural University*, 16(3): 478–481.

et al., 2009). As a result it has become an important topic of consideration for the developing countries.

Mymensingh is one of the asthmatic regions of Bangladesh. Prevalence of asthma is high in this area. Moreover, people in our country, especially city people, are not too conscious to take care of chronic diseases like asthma. Actually they do not have any clear idea about the risk factors and management procedure. There has been a very few studies that identified the risk factors and management procedure of asthma disease especially in Mymensingh zone.

The primary objectives of this study are to i) find out the influential factors of asthma disease in Mymensingh zone, ii) diagnose the effect of asthma disease on other chronic diseases, and iii) recommend management and treatment policies for asthmatic patients.

Materials and Methods

Survey design

The study has been conducted in different government hospitals, diagnostic centers, doctors' personal chambers, situated in the sadarupazilas of the districts in greater Mymensingh. The greater Mymensingh zone includes Mymensingh, Kishoreganj, Netrokona, Jamalpur, Sherpur and Tagail. These districts have been selected as the study area of this research from where the information about 100 asthmatic patients has been collected through cluster sampling. From Mymensingh, Kishoreganj, Netrokona, Jamalpur, Sherpur and Tagail districts, 30, 25, 15, 10, 10, 10 samples have been collected respectively. The clusters are the centers like hospitals and doctor's chamber where the patients gather for treatment. After explaining the purpose of the study to the respondents and obtaining their verbal consent, the respondents have been interviewed using a predesigned interview schedule.

Variable assessment

Variables included in this study are disease status of asthma, different socio-demographic and socio-economic factors, e.g., age, gender, marital status, occupation, permanent residence, education level, income, expenditure, savings, expenditure on food and level of occupation, different biological factors, e.g., height, weight, weight change, type of change in weight (increase or decrease), parents' children asthma, symptoms of asthma, presence of allergic reaction, allergy type, presence of different diseases (hypertension, diabetes, cardiovascular diseases, kidney diseases), different habits (food habit, smoking habit), factors related with housing place, e.g., accessibility of sunlight into home, medium of cooking, presence of smokers into home, having pet animal, presence of cockroaches, mice, or rats, usage of carpet, and presence of ventilator in the bathroom, factors related with working place, e.g., presence of allergens, comfortability, smoking allowance, information about job change, different indicators of health, e.g., body mass index (BMI), blood pressure, and different type of

diseases the respondents are suffering from. The disease status of asthma is ordinal in nature and categorized on the basis of the times of medicine taken by the asthmatic patients daily. Patients taking medicine once, twice and thrice a day are categorized as mild asthmatic patients, moderate asthmatic patients and severe asthmatic patients respectively. In the analyses of the determinants of disease status of asthmatic patients different biological and socio-economic variables have been taken as factors and covariates. To assess the impact of asthma disease in Mymensingh zone different health related indicators, e.g., weight change and presence of hypertension have been taken as vector of dependent variable. Some recommendations of management policy for asthmatic patients have been identified by specialists' suggestions.

Statistical analysis

Strength of the relationship between disease status of asthma and different socio-economic and biological factors has been tested through Chi-Square at 5% level of significance. To find out the determinants of asthma disease multinomial logistic regression has been used on the basis of the pattern of the response variable. Different chronic disease (hypertension, weight change) are jointly influenced by severe asthma disease. Hence multivariate logistic regression could perform better than univariate logistic regression. That's why; the impact of asthma on other chronic diseases has been investigated by using multivariate logistic regression. In this study SPSS 20 has been used to analyze the data.

Results

The analyses reveal significant association between disease status of asthma and different factors like weight change ($p= 0.032$), patients' children asthma ($p= 0.028$), symptoms of asthma ($p= 0.015$), presence of other diseases ($p= 0.006$), normal food habit ($p= 0.006$), presence of allergic reaction ($p= 0.023$), presence of hypertension ($p= 0.045$), smoking allowed in the working place ($p= 0.007$), presence of asthmatic factors in the working place ($p=0.011$), accessibility of sunlight into home ($p= 0.018$), presence of cockroaches, mice or rats ($p<0.001$) [Table 1].

Table 1. Measures of association between disease status of asthma and different risk factors

Variables or Attributes	Pearson Chi-Square	
	Value	P-value
Weight change	6.894	.032
Patients' children asthma	10.853	.028
Symptoms of asthma	19.029	.015
Presence of other diseases	30.934	.006
Normal food habit	11.377	.006
Presence of allergic reaction	10.916	.023
Presence of hypertension	6.217	.045
Smoking allowed in the working place	14.032	.007
Presence of asthmatic factors in the working place	9.07	.011
Accessibility of sunlight into home	8.069	.018
Presence of cockroaches, mice or rats	24.522	.000

Note: $p < 0.05$ indicates significant relationship.

About 70% of the respondents reported that there was no strict practice of anti-smoking law in their work places [table not shown]. The regression analysis result suggests that the likelihood of being in severe asthma is 5.182 times higher if the public rule of smoking is not maintained in work place when compared to patients

without asthmatic health condition. Furthermore, the analysis reveals that the likelihood of being in severe asthma is 94.6% less if there is access to sunlight through the living rooms of the patients when compared to patients without asthmatic health condition [Table 2].

Table 2. Multinomial logistic regression estimates of the effects of different determinants of asthma disease

Disease status of Asthma	Independent Variables	B	Standard Error	Odds Ratio
Moderate (r: Mild)	Intercept	19.849	1.679	
	Accessibility of sunlight (r: No)			
	Yes	-2.668*	1.183	0.069
	Smoking allowed in the working place (r: No)			
	Yes	-1.374	1.972	0.253
	Not maintained	1.6456**	0.892	5.182
	Allergic reaction (r: No)			
	Yes	-15.840	1.034	1.320E-007
	Cockroaches, mice, or rats in home (r: Sometimes)			
	Yes	-1.566**	0.950	0.032
Severe (r: Mild)	Intercept	19.778	1.491	
	Accessibility of sunlight (r: No)			
	Yes	-2.925*	1.259	0.054
	Smoking allowed in the working place (r: No)			
	Yes	-1.798	2.362	0.166
	Not maintained	1.439	1.013	4.215
	Allergic reaction (r: No)			
	Yes	1.439	0.001	1.492E-008
	Cockroaches, mice, or rats in home (r: No)			
	Yes	0.044	1.098	1.045

Note: * and ** indicate significance at 0.05 and 0.01 probability level respectively.

The results from sample observation also suggest that the likelihood of being in severe asthma will increase by 4.5% if cockroaches, mice or rats are permanently present in the room when compared to patients without asthmatic health condition. Though the likelihood of being in moderate asthma will decrease by 96.8% if cockroaches, mice or rats are permanently present in the room [Table 2]. Researchers found higher concentrations of cockroach, mice and cat allergens present in dust samples collected from the children's homes during the first three years of life – at age three months, two years and three years – were linked to a

lower risk of asthma by age seven. (O'Connor et al., 2018). In our study, it has been found that other factors rather than hereditary factor are more responsible for the development of this disease and it is true for most of the patients in Mymensingh area.

Almost 41% asthmatic patients have been found to suffer from hypertension [Table not shown]. The multivariate logistic regression suggests that hypertension and weight change both are significantly ($p < 0.01$) influenced by disease status of asthma disease [Table 3].

Table 3. Multivariate logistic regression estimates of the impact of asthma on other biomedical factors

Dependent Variable	Parameter	B	Std. Error	Odds Ratio
Presence of hypertension	Intercept	1.833**	.138	6.25
	Disease status of asthma (r: Severe asthmatic patient)			
	Moderate asthmatic patient	-.377**	.155	0.686
	Mild asthmatic patient	.167	.366	1.182
Weight change	Intercept	2.000**	.070	7.389
	Disease status of asthma (r: Severe asthmatic patient)			
	Moderate asthmatic patient	-.065	.078	-.836
	Mild asthmatic patient	-.500**	.184	-2.719

Note: ** indicates significance at 0.01 probability level.

Discussion

The present world is troubled with a plethora of chronic diseases and asthma is one of them. Bangladesh is also facing a great problem with this disease. Here, a large number of people are suffering from asthma and also the number of sufferers has been increasing gradually. Among the most serious asthmatic zones, Mymensingh is significantly remarkable. Here people of various ages, classes and occupations are found to be plagued with this common disease. Like other studies the analyses suggests that presence of asthmatic factors in the working place, accessibility of sunlight (Kamran *et al.*, 2015), smoking allowance in the working place (Godtfredsen *et al.*, 2001), allergic reaction (Khan *et al.*, 2006), presence of cockroaches (Kang *et al.*, 1979), mice or rats, heredity components have been found to be associated with the prevalence of asthma. These factors are more or less identified in other studies (GINA, 2012). It has been also examined that asthma influences positively the presence of diseases especially hypertension, and change in body weight (Masoliet *et al.*, 2004; Dougherty and Fahy, 2009).

Conclusion

This study attempts to understand the determinants and impact of asthma in Mymensingh zone of Bangladesh using statistical techniques. The findings of this research corroborate with other studies and identified some important determinants of asthma, e.g., accessibility of sunlight, smoking allowance in the working place, allergic reaction, and presence of cockroaches, mice, or rats. Also asthma is found to have significant influence on hypertension and changing of weight. The analysis will guide the policy planners and health professionals to address the issue properly in a systematic manner. Mymensingh zone as being an asthmatic region needs proper attention with tailored policy interventions formulated based on the findings of this research. Building awareness regarding healthy household condition and smoking free office environment may be useful steps towards controlling the disease.

Acknowledgements

The authors of this manuscript gratefully acknowledge the kind support of the doctors and asthma patients of different study hospitals and doctor's chambers. This research was conducted under the National Science and Technology (NST) Fellowship 2014-15 of the first author. Such valuable support is also gratefully acknowledged.

References

Alderson M 1987: Trends in morbidity and mortality from asthma. *Population Trends* 49 18–23.
Bahadori K, Doyle-Waters MM, Marra C, Lynd L, Alasaly K, Swiston J, FitzGerald JM 2009: Economic burden of asthma: a systematic review. *BMC Pulmonary Medicine*, 9:24. <https://doi.org/10.1186/1471-2466-9-24> PMID:19454036 PMCID:PMC2698859
Beggs PJ 2004: Impacts of climate change on aeroallergens: past and future. *Journal of Clinical & Experimental Allergy* 34 1507–1513.

<https://doi.org/10.1111/j.1365-2222.2004.02061.x>
Dougherty RH, Fahy JV 2009. Acute exacerbations of asthma: epidemiology, biology and the exacerbation prone phenotype. *ClinExp Allergy* 39(2) 93–202. <https://doi.org/10.1111/j.1365-2222.2008.03157.x> PMID:19187331 PMCID:PMC2730743
Global Initiative for Asthma (GINA) 2012: Global strategy for asthma management and prevention.
Godtfredsen NS, Lange P, Prescott E, Osler M, Vestbo J 2001: Changes in smoking habits and risk of asthma: a longitudinal population based study. *European Respiratory Journal* 18 549–554. <https://doi.org/10.1183/09031936.01.00100801> PMID:11589354
Goodwin RD 2007: Environmental tobacco smoke and the epidemic of asthma in children: the role of cigarette use. *Annals of Allergy, Asthma & Immunology* 98 (5) 447–454. [https://doi.org/10.1016/S1081-1206\(10\)60759-4](https://doi.org/10.1016/S1081-1206(10)60759-4)
Henderson J, Granell R, Heron J 2005: Associations of wheezing phenotypes in the first 6 years of life with atopy, lung function and airway responsiveness in mid-childhood. *Thorax* 63 974–980. <https://doi.org/10.1136/thx.2007.093187> PMID:18678704 PMCID:PMC2582336
Kamran A, Hanif S, Murtaza G 2015: Risk factors of childhood asthma in children attending Lyari General Hospital. *Journal of Pakistan Medical Association*, 65:647. PMID:26060164
Kang B, Vellody D, Homburger H, Younginger JW 1979. Cockroach as a cause of allergic asthma: Its specificity and immunologic profile. *J Allergy Clin Immunol*, 63 80–86. [https://doi.org/10.1016/0091-6749\(79\)90196-9](https://doi.org/10.1016/0091-6749(79)90196-9)
Khan A, Braback L, Ekeus C, Hjerm A, Forsberg B 2006: Maternal obesity during pregnancy as a risk for kitchen ventilation, and asthma, allergic symptom and sensitization in young children the PIAMA study. *Journal of Allergy* 61 563–568. <https://doi.org/10.1111/j.1398-9995.2006.01037.x> PMID:16629785
Mallol J 2008: Asthma in Latin America: where the asthma causative/protective hypotheses fail. *Journal of Allergy and Clinical Immunology* 36 150–153.
Mapp, CE 2003: The role of genetic factors in occupational asthma. *European Respiratory Journal* 22(1) 173–178. <https://doi.org/10.1183/09031936.03.00011003> PMID:12882468
Masoli M, Fabian D, Holt S, Beasley R 2004: The global burden of asthma: executive summary of the GINA Dissemination Committee report. *Journal of Allergy* 59 469–478. <https://doi.org/10.1111/j.1398-9995.2004.00526.x> PMID:15080825
O'Connor GT, Lynch SV, Bloomberg GR, Kattan M, Wood RA, Gergen PJ, Jaffee KF, Calatroni A, Bacharier LB, Beigelman A, Sandel MT, Johnson CC, Faruqi A, Santee C, Fujimura KE, Fadrosch D, Boushey H, Visness CM, Gern JE 2018. Early-life home environment and risk of asthma among inner-city children. *The Journal of allergy and clinical immunology* 141(4) 1468–1475. <https://doi.org/10.1016/j.jaci.2017.06.040> PMID:28939248
Sarkar S, Song Y, Sarkar S, Kipen HM, Laumbach RJ, Zhang J, Strickland PAO, Gardner CR, Schwander S 2012: Suppression of the NF- κ B pathway by diesel exhaust particles impairs human antimicrobial immunity. *Journal of Immunology* 188 2778–2793. <https://doi.org/10.4049/jimmunol.1101380> PMID:22345648 PMCID:PMC3293992
WAO-World Allergy Organization. A World Federation of Allergy, Asthma & Clonal Immunology Societies. *Allergic Asthma: Symptoms and Treatment*, 2015.
Woolcock AJ 1996: Asthma--disease of a modern lifestyle. *Medical Journal of Australia* 165 358–359. PMID:8890840