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**Allergic Diseases, Smoking and Environmental Exposure Among University Students in
Lebanon**

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ABSTRACT

Introduction: Smoking habits among university students in Lebanon are not clearly identified, and studies correlating these habits to asthma and allergic diseases are lacking. The primary objective of this study is to assess the asthma and allergic diseases' predictors, particularly cigarette and/or waterpipe smoking and other environmental exposures, among university

students. A second objective is to evaluate the potential role of these predictors as correlates of health-related self-assessment.

Methods: A cross-sectional study, using a proportionate cluster sample of 3000 Lebanese students in both public and private universities, was conducted between January 2015 and December 2015.

Results: The number of smokers at home, living close to an electricity generator and exposure to sand and dust significantly increased the odds of having asthma or allergic diseases by two and three times respectively ($p = 0.015$; $OR = 1.183$; $CI\ 1.033-1.356$; $p = 0.01$; $OR = 2.062$; $CI\ 1.193-3.566$; $p = 0.001$; $OR = 3.558$; $CI\ 1.684-7.517$ respectively). Having tried cigarette smoking and having an air conditioner inside the means of transportation would decrease the odds of having asthma or allergic diseases by around 68% and 56.1% respectively ($p = 0.009$; $OR_a = 0.320$; $CI\ 0.136-0.753$; $p = 0.01$; $OR_a = 0.439$; $CI\ 0.234-0.822$ respectively).

Conclusion: Although students with asthma or allergic diseases tended to avoid all identifiable atopic risk factors, lesser known environmental factors such as living close to an electricity generator, exposure to sand and dust, and exposure to car exhaust fumes were associated with a higher risk of asthma and a decrease in health related self-assessment. This study also showed that students with asthma and allergic diseases smoked cigarettes and waterpipe at similar percentages, but cigarette smokers had a lower health related self-assessment.

Keywords

smoking; environmental exposure; allergic diseases; asthma; university students; Lebanon

Introduction

Asthma, as defined by the World Health Organization and the Global Initiative for Asthma (GINA) guidelines, is a chronic lung disease characterized by recurrent attacks of dyspnea and wheezing, a feeling of chest tightness and cough [1]. These symptoms may vary in severity and/or frequency between patients [1]. During the recent decades, the prevalence of asthma and allergic diseases has increased substantially reaching around 300 million people worldwide, and this number is expected to increase to around 400 million by the year 2025 [2]. It is well recognized that the incidence of asthma is the greatest in childhood then declines with age [3]. However, an interest in adult onset asthma has recently emerged because of the high morbidity associated with adult respiratory allergic diseases and that was confirmed by several European large-scale longitudinal studies (European Community Respiratory Health Survey) and the United States (National Health and Nutrition Examination Study) [4, 5].

Among adults and specifically university students, the prevalence of asthma may vary between countries. In a study conducted in Bangkok, Thailand, 8.8% of students aged between 16 and 31 years old were found to be asthmatic [6]. Similarly in Turkey, the prevalence of cumulative asthma in first year university students was around 1.4% [7]. Many risk factors could be associated with asthma in adults, including atopy to perennial and seasonal allergens, parental asthma and birth order [8]. Smoking is another confirmed risk factor that can trigger asthma attacks [9,10]. In fact, avoidance of active and passive smoking has been highly recommended for asthmatic persons [11], given the higher rates of hospitalization and reduced quality of life of smokers compared to non-smokers asthmatic patients [12]. Interestingly, a recent study showed that high school asthmatic students have a higher prevalence of waterpipe smoking compared to

the non-asthmatic ones, despite an opposite cigarette smoking behavior [13]. This discrepancy may be related to the fact that waterpipe is erroneously thought by the general population to be safer than cigarettes [14].

In Lebanon, the prevalence of cigarette and waterpipe smoking has been identified by several studies. However, data specific for smoking habits among university students is scarce and the correlations between smoking and asthma or allergic diseases are non-existing. Hence, the primary objective of our study is to assess the prevalence and predictors of asthma and allergic diseases, particularly cigarette and/ or waterpipe smoking and other environmental exposures among university students. The second objective is to evaluate the potential role of smoking and environmental exposures as correlates of health-related self-assessment.

Methods

General study design

A cross-sectional study, using a proportionate cluster sample of Lebanese students in the public and private universities, was conducted between January 2015 and December 2015. The list of Lebanese universities, provided by the Center for Pedagogic Researches, was used to adjust the sample size [15]. A sample size of at least 3000 individuals was targeted to allow for adequate power for bivariate and multivariate analysis to be carried out. Additional methodological details can be found in a related publication [16].

Ethical consideration

The Lebanese University school of Pharmacy Institutional Review Board waived the need for an approval based on the facts that it was an observational study that respected students' autonomy

and confidentiality with a minimal harm induced. We obtained permission to publish the study's results from all students via a written informed consent signed by each student.

Data collection process

Students were approached on campus during break times by a field worker. The latter explained the study objectives to the student; and after obtaining an oral consent, the student was handed the anonymous and self-administered questionnaire. On average, the questionnaire was completed by participants within approximately 20 minutes. At the end of the process, the completed questionnaires were placed in closed boxes and sent for data entry. During the data collection process, the anonymity of the students was guaranteed. Out of 4900 distributed questionnaires, 3384 (69.1%) were returned to the field worker.

The anonymous questionnaire was in Arabic language and included different sections: socio-demographic characteristics, cigarette and waterpipe smoking history, in addition to other behaviors. Diagnosed asthma was defined as a positive answer to the question "Did the doctor tell you that you have asthma?", while allergic disease was defined as the presence of "any chronic cough, wheezing or expectoration without a medical diagnosis or if they had any kind of skin or respiratory allergy" [1]. Moreover, a question about subjective health self-assessment of life was added, using a Visual Analogue Scale [17].

The status of cigarette or waterpipe smoking was classified as current smoker, tried and quit, or never smoked. For current smokers, the number of cigarettes smoked per day or waterpipes per week, and the duration of smoking were also recorded.

Environmental exposures were assessed as follows: living with at least one active smoker was a surrogate for passive smoking, heating the house centrally or by other heating methods (wood, gas or electricity) helped assess indoor pollution, while having (or not) an air conditioner in the means of transportation evaluated exposure to pollution during transportation. Other declared environmental exposures to toxins included: living within less than 100 meters close to a diesel electricity generator (Lebanon being a country with electricity deficiency and people having to use local diesel generators for their power supply), living close to a road (less than 100 meters), living in a region with heavy traffic, exposure to cars exhaust fumes, exposure to toxic gases and fumes, and finally exposure to dust and sand during work or outside working hours. The time and extent of exposure to each environmental toxin (classified as: no exposure, mild exposure, moderate exposure or severe exposure) were subjectively rated by each participant. The classification of occupational and exposure associated lung disease was taken from Fishman's data [18].

Statistical analysis

Data entry was performed by independent postgraduate students who were unaware of the objectives of the study, nor were involved in the data collection process. Statistical analysis was performed using SPSS software, version 22. The Chi-square test was used for comparison between categorical variables, without applying multiple testing in case of multinomial variables. For multivariate analysis, stepwise linear regression and backward logistic regressions were performed on asthma and allergies on one hand, and on subjective health self-assessment on another hand, taken as dependent variables respectively; independent variables included in the

model were socio-demographic and other factors that presented an association in bivariate analysis with a p-value < 0.2. A p-value of 0.05 was considered statistically significant.

Results

Sample description

Socio-demographic and socioeconomic factors are summarized as follows: the mean age of participants was 20.65 ± 1.92 years; 58.5% were females and 47.5% living in Mount Lebanon. 51.8% were enrolled in private universities compared to 48.2% in the Lebanese University. The fields of study varied between business and economics (26.1%), health field (22.3%), law (21.4%) and computer sciences (15.1%). The mean Body Mass Index (BMI) was 22.79 ± 4.31 kg/m². The majority (95.8%) was single, and 23.3% were getting paid between 1333 and 2650 USD while 22.1% between 333 and 666 USD.

Out of these 3384 students, 31 (0.92%) had a physician diagnosed asthma and 39 (1.15%) had allergic diseases, making a total of 2.07% (CI 0.016-0.0256) who have at least one of the two diseases.

Bivariate analysis for factors associated with asthma & allergic diseases

Table 2 summarizes the bivariate analysis that was done for all factors associated with asthma and allergic diseases. The results showed that living with at least one active smoker ($p = 0.027$), heating the house centrally ($p = 0.005$), along with having an air conditioner in the transportation means ($p = 0.026$) were all significantly associated with lower rates of asthma and allergic diseases. However, living less than 100 meters close to a diesel electricity generator ($p = 0.004$),

declared exposure to toxic gases and fumes ($p = 0.025$), and declared exposure to dust and sand ($p = 0.012$) were associated with higher rates of asthma and allergic diseases. There was no significant difference in cigarette smoking between asthmatic participants and healthy ones (27.1% versus 29.4%, $p = 0.68$); similar results were also shown for waterpipe smoking (21.7% versus 23.2%; $p = 0.78$).

Subjective health self-assessment correlates

When considering the subjective health self-assessment as a dependent variable, the bivariate analysis results showed that male gender, monthly income, year of specialty, heating the house by central method, and having an air conditioner in the transportation means were correlated with a better subjective health self-assessment. However, having at least one smoker inside the house, living in a house close to a high way road or to an electricity generator or in a region with heavy traffic, being exposed to sand and dust or to toxic fumes and gases were all significantly associated with a lower subjective health self-assessment score ($p < 0.05$ for all these variables) as shown in table 4. Age was also positively correlated with the subjective health self-assessment (Beta = 0.084; $p < 0.001$) whereas ever smoking cigarettes was significantly associated with a decrease in the subjective health self-assessment (Beta = -0.045; $p < 0.001$) (table 3).

Multivariate analysis

Both multivariate logistic and linear regressions were performed for asthma and allergic diseases and subjective health self-assessment score as dependent variables, respectively. The logistic regression results, as shown in table 4, revealed that living close to an electricity generator and exposure to sand and dust increased significantly the odds of having asthma and allergic diseases

by 2 and more than 3 times respectively ($p = 0.01$; $OR_a = 2.062$; CI 1.193-3.566 and $p = 0.001$; $OR_a = 3.558$; CI 1.684-7.517 respectively). Moreover, every additional smoker at home would significantly increase the odds of having asthma by 18.3% ($p = 0.015$; $OR_a = 1.183$; CI 1.033-1.356). Never smoked cigarettes and having an air conditioner inside the transportation means were associated with lower odds of having asthma and allergies by 68% and 56.1% respectively ($p = 0.009$; $OR_a = 0.320$; CI 0.136-0.753 and $p = 0.01$; $OR_a = 0.439$; CI 0.234-0.822 respectively).

On the other hand, the household monthly income had the greatest impact on subjective health self-assessment score (standardized Beta = 0.188) increasing this score significantly by around 0.24 point (unstandardized Beta = 0.239; $p < 0.001$). Similarly, the year of specialty would increase the score significantly by 0.1 point ($p < 0.001$). However, the subjective health self-assessment score was negatively affected by the number of smokers inside the house, living in a house close to a highway, living close to an electricity generator and being exposed to toxic fumes and gases, with a decrease of that score by 0.2, 0.191 and 0.197 and 0.258 points respectively ($p < 0.05$ for all 4 variables) (table 4).

Discussion

In this study, we investigated some of the socio-demographic, socio-economic and environmental factors that might affect the students' asthma and allergic status and tried to determine their health related subjective self-assessment. The number of students with asthma/asthma-like symptoms is small, which may decrease the power of our analysis. The low prevalence of asthma in our low-income population may depend on geographical and climatic variation as well as the low socioeconomic status of our participants. However, we found a

higher prevalence of asthma and allergic diseases among our university students when compared to Turkey [7] but lower than that of Iran [19] and Bangkok [6]. In our study, the prevalence of asthma was higher among female students, but the difference was not statistically significant. Although the exact mechanisms for sex-related differences in asthma have not been fully determined, hormonal influences [20, 21], as well as greater susceptibility to smoking in women [22, 23] have been proposed as potential reasons. Our results are opposed to those of Vichyanond et al. [6].

Similar to other studies, our students with asthma or allergic diseases were less likely to have ever tried cigarette smoking, but not waterpipe; In fact, with cigarette toxicity being notorious, asthmatic students may try it less frequently [13]. However, one study conducted by Kanamori et al. demonstrated that asthmatic students had greater odds of smoking than non-asthmatic students [24].

This is not the case for waterpipes, which do not seem to alarm the population [14], and are being smoked equally between asthmatic and non-asthmatic students. In fact, our results showed that asthma status was not significantly affected by waterpipe smoking, with similar percentages of waterpipe smoking found among both groups. Similar results were found in an American study where asthmatic students had a significantly higher prevalence of waterpipe smoking and a greater perception of waterpipe use being less harmful than cigarette smoking [14]. Students in Lebanon were found to be less cautious with waterpipe versus cigarettes. Nevertheless, smoking waterpipe was associated with a non-significant increase in the subjective health self-assessment score; this finding may be due to the mental and psychological relief given by the high dose of

nicotine present in waterpipes [25]. It could also be explained by the inverse causality concept: those having a better conception about health smoked more than those with lower subjective health self-assessment. However, further studies are needed to explore this concept.

As expected, passive smoking showed a positive relationship with asthma and allergic diseases; the number of smokers at home was also found be associated with a lower health-related self-assessment. The latter correlation was proven previously by Sturm et al. who reported that children of smoking parents were at an increased risk of having active asthma symptoms [26]. In addition, Fedele et al. demonstrated that higher secondhand smoke was associated with a greater asthma-related functional morbidity [27], a higher psychological distress and a lower health self-assessment [28].

Furthermore, we found that exposure to respiratory pollutants was associated with a worse subjective health rating. Many researchers previously reported a higher prevalence of chronic respiratory symptoms secondary to the outdoor traffic pollution [29-32]. High traffic intensity may not only correlate with a high total number of vehicles, but also with a higher proportion of heavy vehicles---an additional factor which could affect the outcome---since diesel exhaust from heavy vehicles might have more adverse respiratory effects [33-35].

Living next to an electricity generator was associated with an increased probability of having asthma/allergic diseases and a decreased health self-assessment. This result was expected since substances present in diesel exhaust (dust and small particulate matters, soot, wood smoke, sulfur dioxide resulting for the burn out of coal and crude oil and nitrogen oxide emitted from tailpipes and power plants) are known triggers for asthma attacks [36]. Moreover, subjective health self-

assessment also decreased from exposure to cars exhausts fumes and generators [37]. This result goes in line with Salameh et al. who demonstrated that traffic density was associated with a lower health self-assessment [38].

Moreover, we found that exposure to sand and dust was associated with a three-fold increase in asthma risk. This could be explained by the inflammatory reaction in the airways following exposure to dust particles [40-42]. Similarly, Kanatani et al. reported that heavy dust events were associated with an increase in children hospitalization rate from asthma exacerbations [39].

Having an air conditioner inside the means of transportation was associated with a lower probability of having asthma or allergic diseases, concomitant with the results of Zuraimi et al [43]. This finding was expected because using an air conditioner dehumidifies and filters the pollen out of the air, and allows windows to be closed in heavy traffic, which may decrease exposure to toxins. The air conditioner in the car could also be a reflection of a higher socioeconomic status. This goes in parallel with our findings that an increased household monthly income was associated with a better global health self-assessment status while a low monthly income was associated with a higher probability of having asthma. Moreover, rich people can easily afford their medical visits, hospital stays and medications compared with lower socioeconomic people. Our results are consistent with those of Choi et al., Ruijsbroek et al. and Corvalan et al. who reported an increased prevalence of asthma among poor people [44-46]. However, Hirshon et al. found that wealthy suburban counties had higher numbers of emergency department visits due to asthma [47].

Finally, in our study, we observed a change of behavior in asthmatic students towards the factors known to exacerbate their disease, such as avoiding active and passive cigarette smoking and

using less toxic heating methods such as central heating. In fact, studies showed that the use of electrical heating is favored over all non-electrical means since the latter may increase the risk of chronic respiratory diseases [48]. We suggest increasing education for asthmatic patients to avoid asthma triggers whenever possible, help them experience fewer days with asthma symptoms, and subsequently fewer hospitalizations [49].

Limitations

However, our study has several limitations: a cross-sectional design has a limited ability to demonstrate causality between environmental exposures and health, due to a temporality problem between exposure and disease. The university student population surveyed in this study may not be representative of general population responses to environmental exposures. Furthermore, the time and extent of exposure to each environmental toxic are subjective and might vary from one student to another. There could also be a possibility of respondent and information bias, since our results are based on a self-administered and completed questionnaire. Despite the fact that we ensured anonymity and confidentiality of all collected data, respondents may have underreported some of their exposures that lead to missing values or to associations' dilution. In addition, the environmental exposures are not objectively quantified, but are subjectively declared; this may lead to a classification bias. However, some assessed exposures in our study like cotinine [50], carbon monoxide [51] and sand and dust [52] were quantified in previous researches and associated with asthma symptoms. The definition of the environmental exposures (e.g. dust, fume etc.) is very subjective and changeable from person to person (ie: low, very low or high). In addition, we do not know the timing and extent of this exposure since

previous exposures are very important causes of respiratory diseases. These university students could have lived in another city/country prior to university education. Despite these limitations, we firmly think that awareness campaigns in schools as a first stage, followed by universities at a later stage should be held in order to raise focus on these preventable risk factors. Furthermore, health care professionals can play an important role in counseling parents and young adolescents about how to prevent exposure to these factors in order to reduce the prevalence of asthma and allergic diseases, and improve their health self-assessment. We also suggest studies with more objective measurement of exposure and disease to confirm our findings.

Conclusion

This study showed that students with asthma and allergic diseases smoked cigarettes and waterpipes at similar percentages compared to their healthy peers, while cigarette smokers had a lower subjective health self-assessment. Although students with asthma or allergic diseases tended to avoid all identified risk factors, less known environmental factors such as living close to an electricity generator, exposure to sand and dust, and exposure to car exhaust fumes were associated with a higher risk of asthma and allergic diseases and a decreased health-related self-assessment score.

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Declaration of interest

The authors have nothing to disclose.

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Table 1: Classification of occupational and exposure associated lung disease

Disease category	Representative causative agent
Upper respiratory tract • Nonspecific irritation • Rhinitis -- allergic and non-allergic • Upper airway dysfunction (vocal cord dysfunction, work associated irritable larynx syndrome)	• Irritant gases, fumes, dust • House dust mite, pollens, animals • Irritants, strong scents, emotional factors
Airway disorders • Occupational asthma ○ sensitizer induced asthma/reactive airways dysfunction syndrome ○ irritant induced asthma • Work exacerbated asthma • Chronic bronchitis/COPD • Bronchiolitis	• Diisocyanates, wood dust, flour, animals • Irritant gases, smoke • Irritants, fumes, exertion, cold air, emotion • Irritants, mineral dust, coal, fumes • Diacetyl ('popcorn worker's lung')
Acute inhalational injuries • Toxic pneumonitis	• Inhalational accident • Metal oxides • Combustion products

Disease category	Representative causative agent
• Metal fume fever • Smoke inhalation	
Hypersensitivity pneumonitis	Bacteria, fungi, animal proteins
Infectious disorders	Bacteria (eg. legionella), tuberculosis, viruses
Pneumoconioses	Asbestos, silica, beryllium, coal
Malignancies • Sinonasal cancer • Lung cancer • Mesothelioma	• Wood dust • Asbestos, radon • Asbestos
Nonspecific building related illness ('Sick building syndrome')	Volatile organic compounds, fungal endotoxin, inadequate air circulation
Adapted from Fishman AP, editor. Fishman's Pulmonary Diseases and Disorders. 4th edn. New York: McGraw Hill, 2008	

Table 2: Bivariate analysis for factors associated with asthma & allergic diseases.

Factor/Asthma	Yes (N = 70)	No (N = 3313)	p-value
Year of specialty			0.054
1st year	12 (18.5%)	761 (24.6%)	
2nd year	17 (26.2%)	816 (26.4%)	
3rd year	27 (41.5%)	789 (25.5%)	
Gender			0.621
Female	39 (55.7%)	1941 (58.7%)	
District			0.072
Beirut	9 (13.2%)	517 (15.8%)	
Mount Lebanon	42 (61.8%)	1564 (47.9%)	
North	11 (16.2%)	494 (15.1%)	
South	4 (5.9%)	470 (14.4%)	
Bekaa	2 (2.9%)	218 (6.7%)	
Monthly income in US Dollars (USD)			0.171
<333 USD	6 (9%)	162 (5.3%)	
333 -- 667 USD	10 (14.9%)	738 (24.1%)	
667 -- 1334 USD	24 (35.8%)	991 (32.4%)	
1334 -- 2667 USD	21 (31.3%)	767 (25.1%)	
> 2667 USD	6 (9%)	403 (13.2%)	
Smokers inside home			0.027
Yes	34 (50%)	1988 (63.1%)	
Living in a house close to the road full of cars			0.169
Yes	41 (57.7%)	1630 (49.5%)	
Living close to an electricity generator			0.004
Yes	29 (41.4%)	856 (26.0%)	
Heating home by central method			0.005
Yes	11 (16.2%)	212 (6.5%)	

Cook on gas			0.075
Yes	66 (97.1%)	2953 (90.8%)	
Exposed to toxic gases and fumes			0.025
Not at all	14 (19.7%)	1096 (33.4%)	
A little exposed	25 (35.2%)	1059 (32.3%)	
Moderately exposed	21 (29.6%)	863 (26.3%)	
A lot exposed	11 (15.5%)	260 (7.9%)	
Lives or works in a region with heavy traffic			0.134
Not at all	10 (14.1%)	781 (23.8%)	
A little exposed	22 (31%)	950 (29%)	
Moderately exposed	21 (29.6%)	984 (30%)	
A lot exposed	18 (25.4%)	563 (17.2%)	
Lives or works in a region with black fog during summer			0.136
Not at all	30 (42.9%)	1623 (49.5%)	
A little exposed	15 (21.4%)	852 (26%)	
Moderately exposed	16 (22.9%)	571 (17.4%)	
A lot exposed	9 (12.9%)	231 (7%)	
Exposed to dust and sand			0.012
Not at all	27 (38%)	1506 (46%)	
A little exposed	16 (22.5%)	974 (29.7%)	
Moderately exposed	15 (21.1%)	514 (15.7%)	
A lot exposed	13 (18.3%)	282 (8.6%)	
Have an air conditioner in the transportation mean			0.026
Yes	23 (33.3%)	1434 (46.8%)	
Ever smoked cigarettes			0.68
No or I have tried	51 (72.9%)	2335 (70.6%)	
Yes and I still smoke	19 (27.1%)	973 (29.4%)	
Ever smoked waterpipe			

No or I have tried	54 (78.3%)	2534 (76.8%)	
Yes and I still smoke	15 (21.7%)	764 (23.2%)	

Table 3: Bivariate analysis for factors associated with subjective health self-assessment.

Factor	p-value	Beta	Confidence Interval	
Gender	< 0.001	-0.335	-0.436	-0.234
Year of specialty	< 0.001	0.126	0.083	0.169
Monthly income	< 0.001	0.219	0.172	0.267
Smokers inside the house	< 0.001	-0.186	-0.291	-0.08
Living in a house close to a road full of cars	< 0.001	-0.22	-0.32	-0.12
Living close to an electricity generator	< 0.001	-0.208	-0.321	-0.094
Heating the house by central method	0.003	0.307	0.107	0.508
Exposed to toxic gases and fumes	< 0.001	-0.521	-0.698	-0.344
Lives or works in a region with heavy traffic	0.003	-0.218	-0.37	-0.066
Exposed to sand and dust	0.009	-0.262	-0.432	-0.091
Have an air conditioner in the transportation mean	0.003	0.157	0.053	0.261
Age	<0.001	0.084	0.039	0.091
Ever smoked a cigarette	0.009	-0.045	-0.296	-0.042
Ever smoked a waterpipe	0.353	-0.016	-0.184	0.066

Table 4. Multivariate analysis

Dependent variable: asthma and allergies					
Factors	p-value	ORa	Confidence	Interval	
Ever lived close to an electricity generator	0.010	2.062	1.193	3.566	
Number of smokers at home	0.015	1.183	1.033	1.356	
Central heating at home	0.068	2.185	0.944	5.056	
Exposed to sand and dust	0.001	3.558	1.684	7.517	
Having an air conditioner in transportation mean	0.010	0.439	0.234	0.822	
Ever smoked cigarettes	0.009	0.320	0.136	0.753	
Dependent variable: Global Health Status					
Factors	Unstandardized β	Standardized β	p-value	Confidence Interval	
Household monthly income	0.239	0.175	< 0.001	0.186	0.291
Year of specialty	0.099	0.078	< 0.001	0.051	0.147
Ever smoked cigarettes	-0.380	-0.101	<0.001	-0.541	-0.220
Living in a house close to a road full of cars	-0.191	-0.064	0.001	-0.305	-0.076
Living in a house close to an electricity generator	-0.197	-0.059	0.003	-0.326	-0.068
Exposed to toxic fumes and gases	-0.258	-0.049	0.014	-0.463	-0.053