ASSESSMENT OF SOCIOECONOMIC STATUS AND CONTROL OF ASTHMA IN ADULTS

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ABSTRACT

Background: Asthma is a chronic disease which places considerable economic, social and public health burdens on the society. Education, occupation and income are the most widely used indicators of socioeconomic status (SES). Studies have shown increased asthma hospital admissions for those who are materially deprived and increased asthma severity in low social class groups. The aim of this study is to determine the impact of socioeconomic status on control of asthma in adults.

Methods: The study was a cross-sectional analytical one, conducted over a year at the Medical Outpatient Clinic of the University College Hospital Ibadan. The study population was composed of 355 randomly selected adults aged between 18years and 55years with an established diagnosis of asthma already on treatment.

Results: Respondents with monthly income of ₦40000 and above had a higher proportion with good asthma control (74.1%) compared to those that earned ₦10000 to ₦39999 (69.0%) and less than ₦10000 (47.8%). This was statistically significant. Respondents in occupational class I/II had a slightly higher proportion with good asthma control (70.9%) compared to those in occupation class III/IV (70.1%) and occupation class V/VI (50.6%). This was statistically significant at p = 0.003.

Conclusion: Respondents in the higher occupational class had better asthma control than respondents in the lower occupational class. Respondents who were earning ₦40000 and above as monthly income had better control of asthma than other respondents. After adjusting for other variables, the predictor of good asthma control was monthly income of the respondents.

Keywords: Education, Occupation, Monthly income, Asthma control

INTRODUCTION

Asthma is a chronic condition that requires long term management, although asthma cannot be cured, but it can be controlled.[1] Asthma is a very common chronic disease which places substantial economic, social and public health burdens on the society.[2, 3]

Appropriate use of asthma medications reduces morbidity and mortality from asthma and improves quality of life. The World Bank defines poverty as a condition in which a person, family, or community lacks the essentials necessary for material well-being.[4] Poverty is usually measured and quantified as an income below the minimum level of income considered necessary to meet the basic necessities of life.[5] The new poverty line of $1.25 a day was recently announced by the World Bank (in 2008).[4] Poverty may contribute to the aetiology, exacerbation, and inadequate treatment of asthma.

Education, occupational status and income are the most widely used indicators of socioeconomic status (SES). Though moderately correlated, each of these measures can capture distinctive aspects of social position and they are not substitutable.[6-8] The trends from the use of beta agonist inhalers to the use of steroid inhalers have introduced another dimension to management of asthma in terms of cost-effectiveness.[4] Studies have shown increased asthma hospital admissions for those who are materially deprived and increased asthma severity in low social class groups.[9] Matthew *et al* in their study found that poverty was associated with illness, disability, and premature death.[10]

Corvalan and colleagues reported a consistent inverse association between number of belongings and asthma symptoms.[11] According to a study conducted in Canada, the cost of drugs, past experience with medications, beliefs about drugs and relationship with

health care providers influence patients hopes of their medications.[12] The results of another study in Canada showed that there was no association between age, gender, or genotype and Short Acting Beta Agonist(SABA) use. However, patients with lower SES and greater severity of asthma used greater amount of SABA than those with higher SES[13]

Vallabh in a South African study reported that peak flow meters were underutilized by Family Practitioners. The cost was an important cause of under-utilization.[14] Poverty and ignorance were identified as possible causes of underutilization of peak flow meters and patients have to be educated on the importance of peak-flow meters in the diagnosis and monitoring of asthma.

The metered dose inhalers (MDI) are aerosols driven by propellants. There is low lung deposition but high oropharyngeal deposition.[15] Dry powder inhalers (DPI) are inhalation driven, easy to use but expensive. Asthma control is defined as a condition in which the patient has minimal to no daytime asthma symptoms, no limitations on activities, no nocturnal symptoms, minimal to no need for reliever therapy, normal lung function (Forced Expiratory Volume per second or Peak Expiratory Flow rate) and no exacerbations.

The aim of this study is to determine the impact of socioeconomic status on control of asthma in adult asthmatics presenting to University College Ibadan Hospital.

MATERIALS AND METHODS

A cross-sectional study was conducted between 1st of April 2010 and 31st of March 2011 at the Medical Outpatient Clinic of the University College Hospital (UCH), Ibadan, Oyo State. Three hundred and fifty five adults between the ages of 18 and 55 years with an established diagnosis of asthma and on inhaler therapy and follow up were recruited for the study.

Inclusion criteria include 1.Consenting patients 18 to 55years old. 2. Patients with established diagnosis of asthma and demonstrated 12-15% reversibility. 3. History of the use of inhalers for more than 12 months. Exclusion criteria include 1.Patients with other lung diseases like tuberculosis, and bronchiectasis and chronic obstructive airway disease. 2. Patients with chronic illness that may affect their functional status (such as ischaemic heart disease or cardiac failure).

Data collection: A structured questionnaire was administered to consenting subjects.

Adult Asthma Therapy Assessment Questionnaire was used. This is a twenty-item questionnaire that measures asthma therapy and control with the response options "yes", "no" and "unsure". It has been validated and used in a previous study in United States of America.[16] The Cronbach alpha is 0.85. A pilot study was carried out to determine if the questionnaire designed was able to address the set objectives and amendments were done.

Socio-economic status was assessed by asking the following questions:
"What is your educational level?", "What is your occupation?", "What is your monthly income?" "How many people are currently living in your household, including yourself?","Does anyone else in the household have an income from any source?"

Occupational status was classified according to the groupings by Borroffka and Olatawura, used by Eze and colleagues in their work: Class I (Doctors, lawyers, scientists, high government officers); Class II(teachers, administrators, supervisory personnel, large-scale farmers, entrepreneur and armed forces officers); Class III (clerks, motor vehicle officers, mechanics, tailors, butchers, soldiers, policeman, small-scale entrepreneurs); Class IV (cooks, barbers, domestic servants, gas station attendants, goldsmiths, palm wine tappers, small-scale farmers); Class V (labourers and petty traders) and class VI (housewives, unemployed educated youths and apprentices).[8]

Asthma control was assessed on a scale of 3-23 by the use of the spirometer readings and asking the patients the following questions. "In the past four weeks, did you feel that your asthma was well controlled?", "In the past four weeks, did you miss any work, school or normal activity because of your asthma?", "In the past four weeks did your asthma wake you up at night?", "In the past twelve months, did you miss any work, school or normal activity because of your asthma?", "In the past twelve months, did your asthma wake you up at night?",. "In the past four weeks, what was the highest number of puffs a day you took of this(SABA) inhaler?", "In the past twelve months, on days you use an inhaler(SABA) for quick relief, how many puffs a day do you usually take?"

FEV1% was used to classify patients into three asthma categories of severity. Patients with FEV1% greater than 80% was classified as having mild asthma, those with FEV1% between 60%-80% were classified as having moderate asthma while those with FEV1% less than 60% were classified as having severe asthma.

Patients with mild asthma (FEV1%>80%) were given a score of three, those with moderate (FEV1% 60%-80%) were given a score of two while those with severe asthma (FEV1%<60%) were given a score of one.

Patients using more than 12 puffs of inhaler a day scored one point, those using 9-12 puffs of inhaler per day were scored two points, 5-8 puffs was scored three points, 1-4 puffs was scored four points and no puffs scored five points.

Scores were totaled and categorized into two groups. Patients with an asthma control score less than 12 points which was the mean score were categorized as having poor asthma control while those with an asthma control score of 12 and above were categorized as having good asthma control.

Measurement of Lung Function

Spirometry was performed with the handheld Spirobank II (MIR Medical International Research USA, Inc) after withholding short acting inhaled bronchodilator therapy for at least 6 hours before the study. With each of the subjects sitting comfortably and after an initial familiarization with the machine, the spirometry was conducted. The best of three efforts of forced expiratory volume in one second (FEV1) and Peaked expiratory flow rate (PEFR) were recorded for each patient. The FEVI% as percentage predicted and PEFR as percentage predicted were calculated for each patient and also entered into the records. The spirometry was done by a trained personnel and the equipment meets ATS standards for accuracy and reproducibility.

Data Analysis

The data was analyzed using Statistical Package for Social Sciences (SPSS) soft-ware version 15. Frequency tables and diagrams in form of charts were used for relevant variables. Chi-square test was used for bivariate analyses to test the significance of the association between categorical variables and asthma control. Logistic regression analysis was performed for the various factors to show the factors affecting asthma control. A p-value < 0.05 was considered to indicate statistical significance.

Ethical approval: The study was approved by the Ethical Review Committee of the University College Hospital, Ibadan, Nigeria.

RESULTS

Socio-economic characteristics of respondents

Socio-economic characteristics of the respondents' is shown in Table 1. Fifty four (15.2%) respondents had

no formal education, 63 (17.7%) had primary education, 65 (18.3%) had secondary education and 173 (48.7%) had tertiary education.

About one quarter of the patients 90 (25.4%) had a monthly income of less than ₦10000 and 126 (35.5%) had monthly income of ₦10000 to ₦39999. Those who earned ₦40000 and above were 139 (39.2%).

About half of the patients 189 (53.2%) belonged to occupation class III, followed by those in class VI 81 (22.8%), class II 53(14.9%) and those in class I and IV 14 (3.9%).

Inhaler characteristics of the respondents

Inhaler characteristics of the respondents is shown in figures 1. Most of the respondents (94.1%) were using "reliever" inhaler. About half of the respondents 183(55.1%) were also using "controller" inhalers.
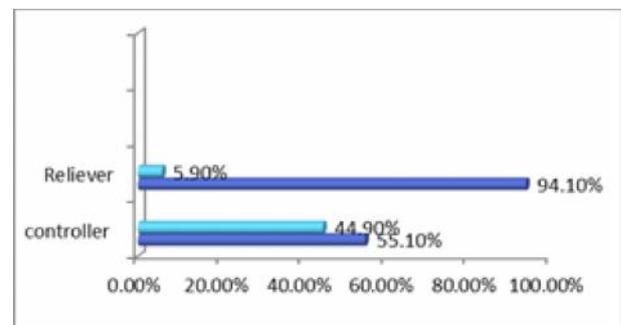

Fig. 1: Characteristics of inhalers used by asthmatics

Distribution of asthma controls: Figure 2 shows about two thirds of respondents had poor asthma control and one third had good asthma control.

Lung function tests

Table 2 shows Lung Function Tests of the respondents. One hundred and thirty one respondents had 0-59% of Forced Expiratory Volume per second as percentage predicted. One hundred and thirty five
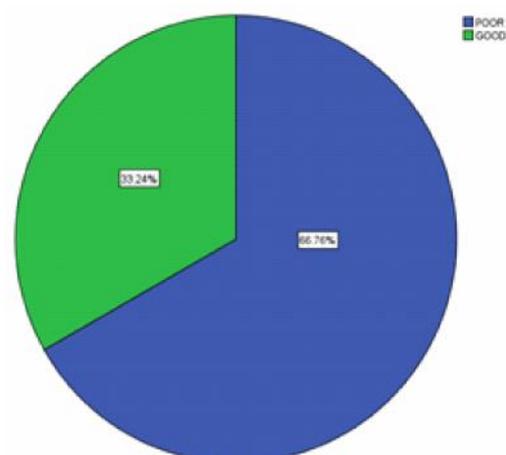

Fig. 2: Distribution of asthma control

Table 1: Socio-economic characteristics of respondents

Variable	Frequency	Percentage
Educational level		
No formal education	54	15.2
Primary education	63	17.7
Secondary education	65	18.3
Tertiary education	173	48.7
Employment status		
Employed	271	80.3
Unemployed	85	19.7
Monthly income (₦)		
Less than ₦10000	90	25.4
₦10000 to ₦39999	126	35.5
>₦40000	139	39.2
Household size		
6 and less individuals	274	77.2
>6	81	22.8
Type of home		
Owned	3	0.8
Rented	152	42.8
Not paying	200	56.3
Another income source		
Yes	229	70.2
No	97	29.8
Occupation		
Class I	14	3.9
Class II	53	14.9
Class III	189	53.2
Class IV	14	3.9
Class V	4	1.1
Class VI	81	22.8

respondents had 60-80% of Forced Expiratory Volume per second as percentage predicted. Eighty respondents had 81% and above of Forced Expiratory Volume per second as percentage predicted. Two hundred and eighteen respondents had 0-59% of Peak Expiratory Flow Rate as percentage predicted. Seventy nine respondents had 60-80% of Peak Expiratory Flow Rate as percentage predicted. Forty two respondents had 81% and above of Peak Expiratory Flow Rate as percentage predicted.

Table 2: Lung Function Tests

Variables	Number of respondents	Percentage
Forced expiratory volume per second expressed as percentage predicted		
0-59%	131	37.9
60-80%	135	39.0
81% and above	80	23.1
Peak expiratory flow rate expressed as percentage predicted		
0-59%	218	64.3
60-80%	79	23.3
81% and above	42	12.4

Table 3: Association of asthma control with socio-economic characteristics of respondents asthma control

Variables	Good n(%)	Poor n (%)	$\chi 2$	P-value
Body Mass Index				
Underweight	8(32.0)	17(68.0)	0.673	0.879
Normal weight	76(32.5)	158(67.5)		
Overweight	26(35.1)	48(64.9)		
Obese	7(41.2)	10(58.8)		
Educational level				
No formal education	34 (63.0)	20 (37.0)	1.978	0.577
Primary education	33 (58.9)	23 (41.1)		
Secondary education	49 (68.1)	23 (31.9)		
Tertiary education	118 (68.2)	55 (31.8)		
Monthly income (₦)				
₦40000 and above	103(74.1)	36(25.9)	12.244	0.002
₦10000 to ₦39999	87(69.0)	39(31.0)		
Less than ₦10000	43(47.8)	47(52.2)		
Household size				
≤ 6 individuals	187 (68.2)	87 (31.8)	2.908	0.088
>6	47 (58.0)	34 (42.0)		
Type of home				
Owned/others	134 (66.0)	69 (34.0)	0.002	0.965
Rented	100 (65.8)	52 (34.2)		
Another income source				
Yes	148 (64.6)	81 (35.4)	0.475	0.491
No	86 (68.3)	40 (31.7)		
Occupation				
Class I/Class II	47 (70.9)	20 (29.1)	11.700	0.003
Class III/Class IV	144 (70.1)	59 (29.9)		
Class V/Class VI	43 (50.6)	42 (49.4)		

Association between asthma controls with socio economic characteristics of respondents

Table 3 shows the bivariate analysis of respondent socio-economic characteristics with asthma control. A slightly higher proportion of respondents with tertiary education had good asthma control (68.2%) compared to those with no formal education (63.0%) and those with primary education (58.9%). (p=0.577).

Respondents with a monthly income of ₦40000 and above had a higher proportion with good asthma control (74.1%) compared to those that earned ₦10000 to ₦39999 (69.0%) and less than ₦10000 (47.8%). This was statistically significant ($\chi^2 = 12.244$, p=0.002).

Respondents in occupational class I/II had a slightly higher proportion with good asthma control (70.9%)

Table 4: Logistic regression analysis of good control of asthma on selected variables

Variables	Odd ratio	95%CI	p-value
Occupation			
Class I/Class II	1.162	0.463 - 2.914	0.749
Class III/Class IV	1.117	0.643 - 1.939	0.695
Class V/Class VI	1.00		
Monthly income			
₦40000 and above	2.377	1.038 – 5.445	0.041
₦10000 to ₦39999	1.240	0.713 – 2.157	0.447
Less than ₦10000	1.00		
Household size			
< 6 individuals	1		
6+	0.876	0.515 – 1.491	0.626

compared to those in occupational class III/IV (70.1%) and occupational class V/VI (50.6%). This was statistically significant (χ^2 = 11.70, p=0.003).

Logistic regression analysis of good control of asthma on selected variables
Table 4 shows Logistic regression analysis of good control of asthma on selected variables. After adjusting for other variables, the predictor of good asthma control was monthly income of the respondents.

Respondents who were earning more than ₦40000 were about two and half times more likely to have good asthma control compared with those who were earning less than ₦10000 monthly. (OR= 2.377; 95%CI= 1.038 – 5.445).

Respondents in occupational class I/II were 1.162 times more likely to have good asthma control compared with respondents in class V/VI. (OR= 1.162; 95%CI= 0.463 - 2.914).

DISCUSSION
This study showed that respondents in the higher occupational class had higher proportion with good asthma control compared with those in the lower occupational class. This might be due to the fact that respondents in the higher occupational class adhere better to their drugs. This was corroborated by the results of a study conducted by Li *et al* who found that men and women with a high occupational level had a slightly lower risk of hospitalization for asthma.[17] This was substantiated by a study conducted in Northern Sweden which showed that increased incidence of asthma was lowest in the socio-economic group consisting of professionals.[18] Ellison-Loschmann and co-researchers were able to identify lower educational level to be associated with an increased risk of asthma prevalence.[19]

This study showed that a very high proportion of the respondents irrespective of socio-economic status used "reliever" inhalers; this could be an indication of poor control of asthma. However, this is contrary to what Larry and colleagues reported that asthmatics with lower socio-economic status significantly used greater amount of "reliever" inhaler compared with asthmatics with higher socio-economic status.[5] It was found in this study that majority of the respondents were not using "controller" inhalers which might be due to high cost of the drugs. This is similar to what was reported in a previous study that non-adherence to inhaled corticosteroids which are "controller" medications is common especially in low income groups which results in poor treatment outcomes.[20] Anis and colleagues also reported a high proportion

of respondents using MDI in their study while a low proportion of the respondents used DPIs.[21] This could be due to the fact that DPI drugs are costlier than MDI drugs, so many asthmatics could not afford DPIs. It was also reported that forty percent of Ontario patients greater than 65years old who had a recent acute exacerbation of asthma did not take inhaled steroid therapy.[22] The results of the above study was corroborated by the findings of this study which also showed that a low proportion of the respondents used "controller" which are inhaled corticosteroids. It was reported in a Canadian study that cost of medications influence patients' use of their drugs.[23] Thus respondents with low income might not be able to afford costly drugs especially the DPIs. This study showed that a higher proportion of respondents with higher income had good control of their asthma compared with those with lower income.

The relationship between asthma control and the weight of respondents was investigated in this study. It was found that a higher proportion of respondents who were obese and those who were not obese had poor control of asthma. The effect of smoking on asthma control was not investigated in this study.

CONCLUSION
Respondents in the higher occupational class had better asthma control than respondents in the lower occupational class. Respondents who were earning ₦40000 and above as monthly income had better control of asthma than other respondents. After adjusting for other variables, the predictor of good asthma control was monthly income of the respondents.

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