

Original Article

Physical and Socioeconomic Impact of Asthma in Nigeria: Experience of Patients Attending Three Tertiary Hospitals

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ABSTRACT

Background: Understanding the impact of asthma is the key to optimal care. **Objective:** To determine the physical, economic, and social impact of asthma from the perspectives of individual patients in Nigeria. **Methods:** This was a multicenter study of 172 adult asthma patients attending tertiary hospitals. We assessed the different impact of asthma in the preceding 12 months using a questionnaire. Physical impact (such as daily activity/chores, sport/exercise, and sleep quality), social impact (such as job loss, mental anguish, employer, and peers discrimination) and economic impact (like savings, indebtedness, mortgage/asset, and school or work absence). **Results:** The physical, social and economic impacts were perceived by 59.3%, 47.7%, and 51.2% of patients, respectively. The physical impacts were poor sleep (44.2%), limitation of daily activity/chores (38.4%), and sporting/exercise (39.5%). The economic impacts were reduced savings (38.4%) and indebtedness (17.4%). Absence from school and work were respectively reported by 75% of students and 38.3% of workers. Socially, 34.9% reported mental torture, 10.5% changed job, 4.7% experienced discrimination and 3.5% lost their jobs due to asthma. Asthma-related emergency department visit was 42% and hospitalization was 32.6%. The physical impact was associated with non-adherence to ICS and persistent asthma symptoms. Economic impact was associated with asthma hospitalization, work absenteeism, comorbidity, and National Health Insurance (NHIS) coverage. Male sex and lack of post-secondary education were associated with social impact. **Conclusion:** Asthma causes broad and substantial physical and socioeconomic impacts in our sample of patients. Exploring these impacts and engaging the patient is imperative for holistic management and good health outcomes.

KEYWORDS: Asthma, burden, impact, patients, Nigeria

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INTRODUCTION

Asthma is a chronic airway inflammatory disease that has significantly increased in incidence over the past two decades worldwide, due to changing environmental factors, awareness, and diagnostic practice.^[1] In the Global Asthma Report of 2014, it is estimated to affect about 334 million people worldwide.^[1] The global prevalence of asthma ranges from 1% to 18%. It is estimated that asthma accounts for about 1 in every 250 deaths worldwide.^[2] Many of the deaths are preventable, and are often due to poor medical care and delayed

presentation during the attack.^[1-3] In Nigeria, about 50 years ago asthma was uncommon; however, recent reports from different parts of Nigeria have shown a prevalence of adolescent and adult asthma in excess of 10% and a rising trend.^[4] The mean annual direct cost of asthma care is US\$368.4 (±228) per patient

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and medications accounted for the 87% of this cost in Nigeria.^[5] The impact of asthma is all-encompassing, affecting not only physical health but also social, economic, and psychological well-being.^[2] The economic cost of asthma is in terms of direct medical costs (such as hospital admissions and the cost of pharmaceuticals) and indirect medical costs (such as time lost from work and premature death). Similar to TB, which is endemic in the country, the economic costs can be in form of reducing money savings, indebtedness and mortgage of assets.^[1,2] Asthma also affects the social life of patients in many different ways: in employment, schooling, social interaction, personal relationships, and emotional well-being.^[6] These factors are substantial, and imperative to understanding asthma and its care, whether viewed from the angle of the individual sufferer, the health care professional, or entities that pay for health care.^[2] The goal of asthma therapy according to treatment guideline is to achieve disease control and this can only be accomplished if the physicians also inquire about the impact of asthma on the patient and the family.^[2,7] There are previous studies in the country that have investigated the prevalence, humanistic aspect of asthma burden, and out of pocket cost in some hospitals.^[4,5,8,9] However, such studies do not reveal the personal perspectives of asthma burden. Oni *et al.* in a survey to determine the management, and burden of asthma found a high burden of asthma in their sample of patients in Benin City, Nigeria.^[8] There is still a relative paucity of studies describing the various impact of the condition from a personal perspective, thereby creating a significant knowledge gap in our setting. The knowledge of asthma burden would enable us to provide a better understanding of the disease, treatment and may be useful for generating hypothesis in future. Therefore, the objective of this study was to assess and characterize how the physical, social, and economic lives of people living with asthma are impacted by the disease in different ways from the view of the patients.

METHODS

Study design

This was a multicentre and descriptive study carried out in three tertiary hospitals from January to December 2015.

Study setting

Nigeria is located in West Africa and is divided into six geopolitical zones. The total population is estimated at 182.2 million people in 2015 using an annual growth rate of 3.5 per cent; more than half of its population is under 30 years of age.^[10] This survey was conducted in three teaching hospitals in the northwest, southeast, and

north-central geopolitical zones. These hospitals serve as referral centres that provide tertiary health-care services and also have family medicine departments that provide primary and secondary health-care services. These hospitals have an internship and postgraduate training programs in all specialties. Asthma care is provided by a team consisting of physicians, nurses, and pharmacists.

Study participants

All adult patients with physician-diagnosed asthma according to Global Initiative for Asthma (GINA) guideline,^[2] who were attending the hospitals for medical treatment, were invited to participate in the study. The eligible patients gave verbal and written consent and were in stable clinical condition (no history of exacerbation or life-threatening condition requiring medical treatment during the previous 48 hours) at the time of the survey.

Sample size calculation

The estimated sample size was 90 from a population of 250 asthma patients from the three hospitals, using 10% as response distribution,^[4] which gives the largest sample size. Twenty per cent of the calculated sample size was added to cater for possible non-responders and poorly completed questionnaires, making a total of 108. The sample size was calculated using the online statistical software from Raosoft Incorporated.^[11] The sample size was proportionally divided proportionally according to the number of patients in the asthma or clinic register in the three hospitals.

Survey instrument

Functional impact of asthma comprised three components: physical, social, and nocturnal impact.^[12] A semi-structured questionnaire was developed based on information from previous studies and the literature.^[2,4,6,12,13] The following data were collected from asthma patients: socio-demographic profile, relevant clinical information: average weekly symptoms over a 12 months period, healthcare resource utilization over 12 months, duration of asthma, comorbidities, and medications. Thereafter, the physical and socio-economic impacts were evaluated as perceived by the patients in the last 12 months. The responses to the questions were in a dichotomous answer of yes or no. Four of the questions were open-ended.

Data collection

The eligible patients that met the inclusion criteria were informed about the purpose of the study and after their consent; they were interviewed by trained residents in the pulmonary clinic before the consultation or in the cardiopulmonary laboratory. The patients' chart records were also reviewed at this time to gather any information on comorbidity not recalled by the patients.

Outcome measures

The physical Impact – This impact was assessed by the asking the question “Has asthma affected your physical health in any way in the last 12 months”? If respondent answer yes, then in what ways has it physically affects in the night and daytime. “Has asthma limited your ability to do daily activities or household work, sport/exercise and your sleep quality”?

Social Impact – Social impact was also measured in terms of job loss, mental anguish, discontinuation of school/work or employer/peer discrimination. This impact was assessed by asking the question “Has asthma affected your social life in any way in the last 12 months”. If respondent answer yes, then how has it socially affects you. “Has asthma caused friends/family rejection and discrimination, caused you job loss, mental torture/worries, to discontinue school/work or make employer/peers to look down on you”?

The economic Impact – The indirect economic impact was assessed by the question “Has asthma affected your economic life and finances in the last 12 months”? If respondent answer yes, then how has it affected you economically and financially? “Has asthma reduced your savings/stop your savings, made you incur more debt/take a loan, mortgage property/asset or in other specific ways”? Indirect costs were also measured in terms of loss of work days was also obtained and finally, we ask about what percentage of their income that goes to treatment of asthma if they are employed.

Health Resources Utilization – This was defined as a reported unscheduled appointment, an urgent telephone call to your doctor, visits the emergency department, and hospitalization during the past 12 months.

Operational definitions

Social classes

The respondents were grouped into different social classes using Oyedepi's classification,^[14] as follow:

- I: Senior public servants, professionals, managers, large-scale traders, businessmen and contractor, senior military officers.
- II: Intermediate grade public servants, and senior school teachers, non-academic professionals e.g. Nurses, owners of a medium-sized business, secretaries.
- III: Non-manual skilled workers including clerks, typists, telephone operators, junior school teachers, drivers, artisans.
- IV: Petty traders, labourers, messengers, lower cadre civil servants.
- V: Unemployed, full-time housewives, students, subsistence farmers.

Adherence to ICS- this was defined by the self-report of inhaled corticosteroid use which is available only in LABA/ICS combination in Nigeria. The patients were asked non-judgmentally how often they missed their doses of ICS in the last 7 days. Adherence to ICS was defined as adherence rates $\geq 80\%$ of prescribed ICS.^[15]

Statistical analysis

The obtained data were entered and analyzed by using IBM SPSS statistical software (version 21) (SPSS Inc., Chicago, IL, USA). The data were reviewed manually for missing data and appropriate coding before data entry. They were also checked for outliers and for the normality of distributions of the continuous variables. The outlier due to a data entry mistake was corrected from the questionnaire input and for those not due to data entry errors; the values were transformed by changing to the next highest/lowest (non-outlier) number. Descriptive statistics were used to summarize the general demographic, clinical characteristics of the sample and the impacts of asthma. The association between relevant socio-demographic, clinical variables and various impacts was determined by the χ^2 -test and the Fisher's exact test. Spearman correlation coefficients were calculated to test for associations between various physical, economic and social impact and potential causes, and for confounding variables. A 2×2 crosstab was used to determine the crude odds ratio. Stratification was done to detect the effect of these confounding variables. The physical, economic, and social impacts of asthma were separately analyzed. The variables and confounders were entered into a multiple logistic regression analysis using the enter method and reported as an adjusted odd ratio (OR). Finally, P values < 0.05 were considered significant.

Ethics approval and informed consent

The ethics and research committees of the study sites approved the study. Informed verbal and written consent were obtained from each participating patient. We ensured the anonymity of each participant by randomly assigned a numerical code to each questionnaire and any information that could identify an individual was removed.

RESULTS

General characteristics of study participants

One hundred and seventy-two asthma patients participated in the study. The mean age of the participants was 37 ± 15 years and the median duration of asthma was 7 (IQR: 3–17) years. Of the 172 patients, 116 (67.4%) were females, and just above half (55.8%) were married, (52.3%) earn a monthly income less than 50,000 Naira (=200USD) and practice Christianity. Eighty-eight (51.2%) had post-secondary

Table 1: General characteristics of the participants

Characteristics	n	Percentage
Age Range (yrs)		37±15
Duration of asthma (yrs)		7 (IQR: 3-17)
Sex		
Male	56	32.6
Female	116	67.4
Tribe		
Yoruba	66	38.4
Others	106	61.6
Religion		
Christians	90	52.3
Islam	82	47.7
Education		
None/Primary	34	29.7
Secondary	50	29.1
Postsecondary	88	51.2
Family Income (Naira)		
<50,000	90	52.3
50-99000	34	19.8
100-19900	30	17.4
≥200000	18	10.5
Marital status		
Married	96	55.8
Unmarried	66	38.4
Widowed/Separated	10	6.8
Employment Status		
Yes	82	47.7
No	90	52.3
Asthma Medications		
SABA	172	100
ICS/LABA	58	33.7
OCS	64	37.2
Theophylline	4	2.3
Comorbidity		
0	38	22.1
≥1	134	77.9
Self reported asthma symptoms		
Intermittent symptoms	66	38.4
Persistent symptoms	106	61.6
Ever Smoked	8	4.6
Health Insurance Coverage		
Yes	32	18.6
No	140	81.4

LABA: Long-lasting β 2-agonist; SABA: Short-acting β 2-agonist; OCS/ICS: Oral Corticosteroid/inhaled corticosteroid. A Patient may be on more than one medication

education. One hundred and thirty-four (77.9%) reported one or more comorbidities, 40 (23.3%) of them had chronic rhino-sinusitis, 28 (16.3%) had an acid peptic disease and systemic hypertension respectively.

Table 2: Determinants of Physical Impact

Characteristics	OR	aOR	P
Age	0.99 (0.97-1.01)	0.99 (0.97-1.02)	0.993
Sex			
Male	1	1	0.395
Female	1.72 (0.88-3.35)	1.38 (0.66-2.89)	
Adherence to ICS			0.040
Yes	1	1	
No	2.45 (1.29-4.70)	2.20 (1.03-4.74)	
Self reported symptoms			< 0.001
Intermittent	1	1	
Persistent	4.88 (2.52-9.45)	4.80 (2.40-9.62)	
Comorbidities			
0	1	1	0.450
≥1	2.14 (1.04-4.38)	1.38 (0.61-3.07)	

aOR-adjusted odd ratio with 95% confidence interval in parentheses

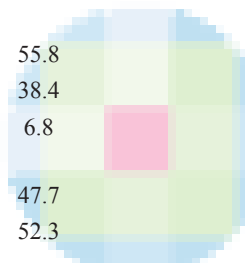


Figure 1: Absenteeism among students and workers

Fifty-eight (33.7%) were using inhaled corticosteroids in combination with long-acting beta 2 agonists while 50 (29.1%) self-reported adherence to this medication. Thirty-two (18.6%) patients had National Health Insurance coverage [Table 1].

Impacts of asthma

Of the 172 patients, 132 (76.7%) experienced one form of the impact as a result of asthma. One hundred and two (59.3%) had a physical impact, 82 (47.7%) suffered social impact while 88 (51.2%) experienced an economic impact.

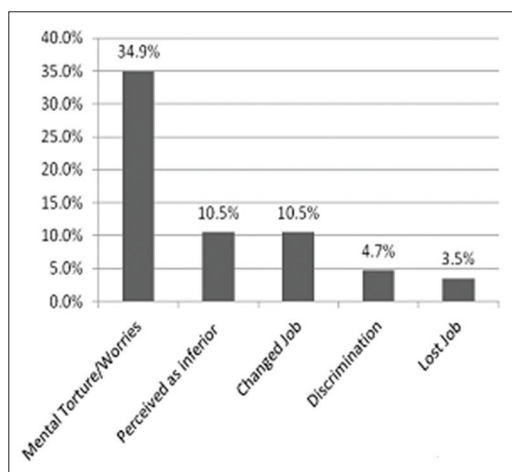
The physical impacts experienced were poor sleep (44.2%), limitation of daily activity/chores (38.4%), and sporting/exercise (39.5%). Non-adherence to ICS and persistent asthma symptoms were independently associated with the physical impact on asthma patients [Table 2].

Seventy-two (41.9%) made visits to the hospital/emergency room and 56 (32.6%) were admitted to the

Table 3: Determinants of Economic Impact

Characteristics	OR	aOR	P
Age	0.99 (0.98-1.02)	1.01 (0.97-1.04)	0.362
Sex			
Male	1	1	0.343
Female	0.87 (0.45-1.64)	0.68 (0.31-1.51)	
Education			
No Postsecondary	1	1	0.527
Post secondary	0.63 (0.34-1.14)	0.77 (0.34-1.73)	
Occupational Class	1		
Lower	0.59 (0.23-1.53)	1	0.071
Higher		0.27 (0.07-1.12)	
Health Insurance			
No	1	1	0.008
Yes	2.41 (1.09-5.55)	3.66 (1.39-9.622)	
Hospitalization in 12 months	1	1	0.018
No	3.70 (1.96-6.67)	3.16 (1.22-8.23)	
Yes			
Emergency Dept. visit in 12 months	1	1	0.355
No	2.44 (1.31-4.57)	1.51 (0.63-3.64)	
Yes			
Absent from work			
No	1	1	<0.001
Yes	4.57 (2.24-9.26)	8.46 (2.60-27.49)	
Comorbidities			
0	1	1	0.006
≥1	3.17 (1.48-6.76)	3.54 (1.44-8.68)	

aOR-adjusted odd ratio with 95% confidence interval in parentheses
n-no perceiving economic impact in the previous 12 months

**Figure 2: Different types of social impact of asthma**

hospital in the preceding 12 months. The economic impacts include reduced savings (38.4%) and work absenteeism (22.1%), and increased debt/loan (17.4%), and mortgage of property/asset (1.2%). Out of the 48 patients that were students, 36 (75%) were absent

Table 4: Determinants of Social Impact

Characteristics	OR	aOR	P
Age	0.99 (0.98-1.02)	1.00 (0.97-1.03)	0.849
Sex			
Male	1	1	0.030
Female	0.57 (0.30-1.08)	0.47 (0.23-0.93)	
Marital status			
Married	1	1	0.404
Others	1.18 (0.65-2.16)	1.37 (0.65-2.90)	
Education			
No Postsecondary	1	1	0.040
Postsecondary	0.57 (0.31-1.05)	0.48 (0.97-1.25)	
Occupational Class			
Lower	1	1	0.566
Higher	0.70 (0.21-1.81)	0.73 (0.25-2.15)	
Tribe			
Yoruba	1	1	0.740
Others	0.95 (0.51-1.76)	1.13 (0.55-2.33)	

aOR-adjusted odd ratio with 95% confidence interval in parentheses
n-no perceiving social impact in the previous 12 months

from school, and of 94 that were employed, 36 of them (38.3%) were absent work during the past 12 months because of asthma [Figure 1].

Eighty-eight patients (51.2%) made an unscheduled appointment to their doctors, 48 (27.9%) put an urgent telephone call to their doctors, 72 (41.9%) visited the emergency department and 56 (32.6%) were admitted to the hospital due to asthma.

The independent predictors of economic impact were work absenteeism, asthma hospitalization in the preceding 12 months, the presence of comorbidity and having a National Health Insurance [Table 3]. Socially, a total of 60 (34.9%) had worries, 18 (10.5%) to change Job/discontinued schooling and perceived as inferior, respectively, 4.7% experienced discrimination, while 6 (3.5%) lost their Jobs as a result of asthma [Figure 2]. Males and those without post-secondary education were more likely to suffer from social impact [Table 4].

DISCUSSION

The results of our study show that asthma has a significant physical, economic, and social impact on patients in Nigeria. These results suggest that the majority of asthma patients have a substantial degree of impact. These findings are important because they point to the fact that the goal of therapy has not been met in most patients, and hence, the need to review various management approaches.

Approximately 4 in 10 patients suffered poor sleep, limitation of daily activity/chores, and limitation of sporting activity/exercise. These findings are lower

than 53% reported for sleep and 84% for impaired daily activities in a previous study.^[8] A similar study in the USA reported that more than one-third of subjects complained of a lot of activity limitation and two-thirds reported at least "some" limitation in activity secondary to asthma.^[12] Our finding may differ slightly from other studies because we reported impact over a period of 12 months instead of prior 4 weeks which is a measure of short-term burden. The high level of physical limitation can impact asthma patients negatively because they may struggle with participation in activities that they enjoy, and sometimes isolating them from their friends. We also observed that patients who had persistent asthma symptoms and were nonadherent to ICS were five times and two times respectively more likely to have a physical impact. This finding is in tandem with previous studies where patient reported that nonadherence to ICS; an anti-inflammatory medication resulted in frequent symptoms and poor control.^[4,8,16]

These results stress the importance of early recognition of poorly controlled asthma and institution of controller medication to curtail the progression and impact of the disease.

Our study also found that 51% of patients experienced one form of economic impact in their lives due to asthma and the most common economic effect was reduced savings in 40% of the sample due to the high cost of asthma care. The reduced saving and high-cost care can lead to cutting back on taking their prescription medications, poor medication adherence, and triggering emergency room visit.

Almost two out of every five visited the emergency department and about one-third of patients were hospitalized due to asthma in the previous 12 months. These findings are similar to 42.7% and 32% in a previous study in Nigeria and 43.6% hospitalization in the Asia Pacific.^[4,17] Previous studies in the Gulf and Near East and Latin America reported 50% hospitalization.^[18,19]

The indirect economic impact revealed that one in every five patients missed school and were absent from work in the previous 12 months due to asthma. A further sub-analysis of the students and workers revealed that 3 out every 4 students missed school in the last 12 months and 38% of those employed absented themselves from work in last 1 year. The high rate of school absenteeism is similar to the observation in Jordan and Lebanon.^[18] Other studies reported 36.5% in Asia-Pacific and 58% in Latin America.^[17-19] The high economic impact observed in this study may be because only about 20% of the patients have health insurance, which in Nigeria

covers only essential medications, surgery, and hospital admission excluding inhaled corticosteroids which is the bedrock of asthma therapy. Thus, the majority have to finance their treatment out of pocket.^[5,20] Medical debt can arise when people must pay out-of-pocket for care not covered by health insurance like in our setting. This debt can be devastating, it can lead loss of savings, lost homes to foreclosure and further reduction in the standard of living and further barriers to care.^[21] This study is in support of previous studies that highlighted the economic impact experienced by asthma patients resulting from direct and indirect cost.^[6,22]

Patients who were absent from work in the past 12 months were eight times more likely to suffer from economic impact (Odd ratio = 8.46, 95% C.I; 2.60-27.49). This is due to the loss of paid work days. From a systematic review, work/school absenteeism has been observed to account for the greatest percentage of indirect costs.^[23] We also observed that patients who had comorbidities and national health insurance were four times more likely to perceive economic impact. Similarly, previous studies have found an association between asthma patients with comorbidities and higher costs.^[23,24] The presence of one or more comorbidities which are needed to be treated concurrently for asthma to be control might be associated with significant resource use in general and increased economic burden.^[1-3] Ironically, the observation on national health insurance is surprising; this may be due to double expenses as these patients had procured medical health insurance which unfortunately did not cover some of their medical expenses forcing them further to spend out of their pockets in order to purchase their medications. In contrast to our study, Szucs *et al.* in Switzerland reported that patients with supplementary insurance cover had a lower overall resource utilization rate and costs when compared to patients without insurance coverage because the asthma management is fully covered by the insurance.^[25] In addition, those who were admitted as a result of asthma were three times more likely to experience economic impact. During an asthma emergency, the costs of medication, bed space, hospital admission, and subsequent follow-up are mostly borne by the patients in our settings when compared other countries.^[25]

Socially, about one in three people living with asthma suffered mental torture/worries and 10% changed their jobs due to asthma. In an Australian study, 23% of the sample either lost or changed their jobs or lost income as a consequence of asthma.^[22] This implies that asthma contributed to immensely to the poor quality of life and reduced job opportunities. The independent predictors

for social impact were no post-secondary education and male gender.

This study was able to explore the impact of asthma on the lives of people presenting to three tertiary hospitals in the country from broad perspectives that reflect the range of opinions and experiences of the patients that might influence asthma care in our settings. The strength of this study is that the participants were mostly recruited from the three major tribes in the country rather than from a section of the country. The limitation of the study is the recall bias because of the assessment of disease burden over 12 months. This study was carried out in public hospitals and this may affect the generalizability of the results to patients in private settings.

CONCLUSION

The study shows that asthma causes broad and substantial physical and socioeconomic impacts in our sample of patients. The various degrees of impact might serve as potential factors affecting the optimal treatment of patients; therefore, it is imperative to consider these impacts and engage the patients in the holistic management of asthma in order to achieve better outcomes.

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Conflicts of interest

There are no conflicts of interest.

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