

Research Article

Out-of-Pocket Costs of Asthma Follow-Up Care in Adults in a Sub-Saharan African Country

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Asthma care imposes economic burden on affected patients. Patient costs for asthma care have not been documented in Africa. We aimed to determine the out-of-pocket cost of asthma follow-up care incurred by patients in Nigeria. We conducted a cross-sectional study in three tertiary hospitals in southeastern and northwestern Nigeria. Poorly controlled asthma patients attending a follow-up visit in the respiratory clinic of the hospitals were surveyed. Sociodemographic, health-seeking behavior, and cost data were collected using a structured questionnaire. Of the 110 patients who completed the study, 56 (51%) were females. Also, 72 (65%) of the patients had known about their asthma illness for more than four years. Mean annual direct cost of asthma care was US\$368.4 (± 228) per patient. Medication cost accounted for the majority (87%) of this cost. Patient costs of care incurred did not differ significantly across age ($P = 0.15$), education ($P = 0.23$), marital status ($P = 0.49$), residence ($P = 0.47$), or gender ($P = 0.65$) categories. We conclude that direct cost of care was found to be substantial among poorly controlled asthma patients. Further studies to estimate the costs incurred by patients with exacerbation and differing severity of the disease should be conducted.

1. Introduction

Bronchial asthma is a common chronic respiratory disease worldwide [1]. According to the Global Initiative for Asthma (GINA), it affects 5.4% of adults in Nigeria, and its prevalence is increasing [1–3]. A recent study showed a low level of asthma control among adult asthmatics in Nigeria [4]. Poorly controlled asthma imposes a substantial economic impact on the patient and health system, primarily through direct costs from followup, hospitalization, and medications and indirect costs from lost productivity [5, 6].

A previous study showed that the cost of regular treatment of chronic diseases including asthma is unaffordable to families in low-resource settings [7, 8]. This results in a considerable high proportion of uncontrolled asthma, which is associated with greater economic burden to families and

the health system and deterioration in quality of life [7–9]. In high-/middle-income countries, costs of asthma inpatient care [10], hospitalization [10–12], and exacerbations [13] have been previously documented. However, reports on cost of asthma followup among individuals with poorly controlled asthma are lacking worldwide.

Furthermore, no data exists on the economic impact of asthma care on patients in Africa. In a recent systematic review, no single study from the region was found [14]. In Nigeria, 83–92% of asthma patients have poorly controlled asthma, and poor adherence to medications has been identified as one of the factors responsible for it [4, 15]. It is likely that high cost of asthma care may be contributory to the poor adherence observed. Therefore, there is need to evaluate if patient costs of asthma care are a major issue in our setting.

Moreover, understanding patients' cost of asthma follow-up visit may assist with clinical management decisions. This feasibility study aimed to determine the direct cost of adult asthma follow-up care from the patients' perspective in Nigeria.

2. Materials and Methods

2.1. Study Setting. The study was conducted in three tertiary hospitals in Nigeria. The study sites include the University of Nigeria Teaching Hospital (UNTH), Ituku Ozalla, Enugu, Ebonyi State University Teaching Hospital, Abakaliki (EBSUTH), located in southeastern Nigeria, and the University of Ilorin Teaching hospital (UIITH) located in the northwestern part of the country. The hospitals offer primary, secondary, and tertiary health services and have at least two respiratory physicians per institution. Asthma care is provided by a team consisting of physicians, nurses, and pharmacists. During a follow-up visit, patients receive a prescription of their asthma medication. Medications prescribed depend on the asthma control status and included options like powdered or pressurized metered-dose inhaled corticosteroid (budesonide/fluticasone) and beta-2 bronchodilators, long- and short-acting (salmeterol/salbutamol) or their combinations [16].

2.2. Study Design. In a cross-sectional cost-of-illness study, asthma patients attending the outpatients' respiratory clinic of the study hospitals were screened for enrollment in the study. The inclusion criteria were (1) adult (>14 years old) patients with asthma; (2) physician-diagnosed asthma with documented airway reversibility ($\geq 12\%$ and a 200 mL increase in forced expiratory volume in 1 second (FEV₁) after inhaling 200 μ g salbutamol or $\geq 15\%$ increase in FEV₁ after treatment with asthma medication); (3) poorly controlled asthma according to GINA guidelines [16]. Patients with acute exacerbation requiring hospitalization; controlled asthma; comorbidities; and newly diagnosed asthma were excluded.

2.3. Assessment of Economic Costs. Direct costs of asthma follow-up were assessed using a pretested, structured interviewer-administered questionnaire designed by the investigators. All the patients were interviewed in their preferred language. Data collection took place from January to June 2011. The data collected included patient demographic information, health-seeking behavior, and costs of asthma-related care. Direct costs included medical (drugs, laboratory tests, and administrative) costs as well as the nonmedical (transportation) cost. Cost data were collected for all asthma-related care and treatment that had been given to the patient per month or in the last month preceding the study. All costs were recorded in 2011 US dollars (\$) (in 2011 1 US\$ = 160 Nigeria Naira).

2.4. Sample Size. A convenient sample size of 100 was adopted based on the number of adult patients that received treatment in the previous year with poorly controlled asthma at the participating hospitals—which ranged from 70 to 90. In the six-month period of data collection, we anticipated that at

least 150 eligible patients must have consulted the respiratory clinic of the participating hospitals. Also, we estimated a nonparticipation rate of 20% which necessitated increasing the sample size to 120.

2.5. Data Analysis. Data obtained were entered and analysed using SPSS statistical software version 16 (SPSS Inc., Chicago, IL, USA). Sociodemographic characteristics and health-seeking behavior were presented using proportions (%). Cost data were expressed as "mean \pm standard deviation (SD)." The normality of distribution of cost data was assessed using the Kolmogorov-Smirnov tests. Group comparisons of mean costs were done using Student's *t*-test. All *P* values were bidirectional and values <0.05 were statistically significant.

2.6. Ethical Approval. The study was approved by the research and ethics committees of the University of Nigeria Teaching Hospital, Ituku Ozalla, Enugu, the Ebonyi State University Teaching Hospital, Abakaliki, and the University of Ilorin Teaching Hospital, Ilorin, Nigeria. An oral informed consent was obtained from all the included patients before the interview.

3. Results

3.1. Sociodemographic Characteristics of the Patients. The study surveyed 118 eligible patients. Full records were completed for 110 patients. Of this, 30 were from EBSUTH, 46 from UNTH, and 34 from UIITH. The sample consisted of 54 (49%) males and 56 (51%) females; their mean age was 41.6 ± 20.1 years, and 56 (51%) of them were married (Table 1). The majority of them 94 (85%) reside in an urban area, 82 (75%) had at least six years of formal education and 34 (31%) were civil servants (Table 1).

3.2. Asthma-Related Health-Seeking Behavior. About 72 (65%) of the patients had known about their asthma illness for more than four years now, and 68 (62%) claimed that they sought any care within one year of the onset of asthma symptoms (Table 2). The patients were referred to the asthma clinic in the respective hospitals either by a doctor (56 (51%)) or other health workers (18 (16%)). The majority of the patients (88 (80%)) bought their asthma medications/inhaler from the hospital pharmacy where they sought care, and (90) 82% of them reported that their asthma drugs were always available in the hospital where they sought care (Table 2).

3.3. Costs of Asthma Care. The mean monthly direct cost of asthma care was US\$30.7 \pm 19, mainly from drugs \$26.7, transportation \$2.4, and laboratory test \$1.4 (Table 3). Therefore, mean annual direct cost of asthma follow-up care was calculated as US\$368 (± 228) per patient for 1 year. Medication costs (US\$320) accounted for the majority (87%) of the mean annual cost of asthma follow-up care. The mean direct costs of asthma follow-up care incurred by the patients did not differ significantly across age (*P* = 0.15), education (*P* = 0.23), marital status (0.49), residence (*P* = 0.47), or gender (*P* = 0.65) categories (Table 4).

TABLE 1: Sociodemographic characteristics of the respondents ($n = 110$).

Variables	<i>N</i> (%)
Age (years)	
40 or less	58 (53)
More than 40	52 (47)
Gender	
Female	56 (51)
Male	54 (49)
Residence	
Rural	16 (15)
Urban	94 (85)
Formally educated (≥ 6 years of education)	
Yes	82 (75)
No	28 (25)
Marital status	
Married	62 (56)
Single	48 (44)
Patient/head of household occupation	
Farmer	10 (9)
Petty trading	10 (9)
Government worker	34 (31)
Employed in private sector	12 (11)
Big business	8 (7)
Self-employed professional	10 (9)
Other	26 (24)

Furthermore, 70 (63%) of the patients paid for their asthma follow-up care from their income while others reportedly paid for their asthma care through financial support received from their friends/relatives (24 (22%)), through loans (10 (9%)), or through community support (2 (2%)). None of the patients' asthma follow-up care was covered by any form of health insurance scheme.

4. Discussion

In this study we have shown that irrespective of patients' sociodemographic characteristics, the mean annual direct cost of asthma follow-up care was US\$368 (± 228) per patient and prescription costs accounted for 87% of this cost. The average asthma-related direct costs of care in developed countries ranged between \$273 in Australia, \$1779 in Switzerland, and up to \$4101 in the United States of America per patient annually [5, 17, 18]. In developing countries, average direct costs of asthma care per patient annually ranged between US\$135 in Thailand, US\$276 in Malaysia, and US\$1,466 in Turkey [10, 12, 19]. In the USA and Turkey, the total cost of asthma was estimated as US\$12.7 billion and US\$1.9 billion, in 1998 and 2004, respectively [10, 14]. Considering the midyear population count of 160 million [20] and the proportion of the population with clinical asthma in Nigeria (5.4%) [1], our study suggests that, for Nigeria, the total cost of asthma care may also be substantial.

TABLE 2: Respondents' awareness of their asthma illness and care-seeking behavior ($n = 110$).

Variables	<i>N</i> (%)
Duration of asthma illness (months)	
<12	6 (6)
13–24	6 (5)
25–36	12 (11)
37–48	14 (13)
>48	72 (65)
Duration of asthma symptoms before seeking care (months)	
<12	68 (62)
13–24	18 (16)
25–36	10 (5)
37–48	2 (2)
>48	22 (20)
Source of information/referral to the asthma clinic	
Hospital staff	14 (12)
Medical doctor referral	56 (51)
Other health staff	4 (4)
Friend	4 (4)
Media	12 (11)
Other	12 (11)
Not aware of asthma clinic	8 (7)
Duration of receiving asthma treatment at the clinic (months)	
<12	32 (29)
13–24	10 (9)
25–36	14 (13)
37–48	6 (5.5)
>48	48 (44)
Where do you normally buy your asthma medications/inhaler?	
Hospital pharmacy	88 (80)
Open market/drug shops	22 (20)
Are the medications always available in your hospital?	
Yes	90 (82)
No	20 (18)

The differences in the findings may be in part due to the socioeconomic environment where the study was conducted. For example, Nigeria has a gross national income of US\$1,200 per capita compared with the United States where it is US\$41,400 per capita [21]. Additional reasons may be due to differences in healthcare delivery system; for example, patients in Malaysia and Thailand [12, 19] receive financial protection through government health insurance schemes which are currently at an early stage in Nigeria.

Medication cost accounted for the majority (87%) of total direct expenditures in our study. This figure is similar

TABLE 3: Patient monthly out-of-pocket expenditures for asthma care ($n = 110$).

Variable	Patients reporting expenditure N (%)	Total costs incurred by all patients (US\$)	Mean (\pm SD) cost (US\$)
Medical			
Asthma drugs (inhalers)	110 (100%)	1771	16.1 (\pm 3.7)
Other drugs	110 (100%)	1166	10.6 (\pm 2.2)
Laboratory tests including X-ray	110 (100%)	176	1.6 (\pm 1.2)
Nonmedical			
Transportation (to and fro)	110 (100%)	264	2.4 (\pm 1.4)
Average monthly cost per patient			30.7 (\pm 19)

All costs in 2011 US dollars: US\$, SD: standard deviation.

TABLE 4: Sociodemographic determinants of direct monthly patient cost of asthma care ($n = 110$).

Variables	Mean (\pm SD) cost	t -test	P value
Age (years)			
40 or less	27.3 \pm 20.1	2.10	0.15
More than 40	34.7 \pm 17.1		
Gender			
Female	29.6 \pm 18	0.21	0.65
Male	31.9 \pm 20.2		
Residence			
Rural	35.2 \pm 28.3	0.52	0.47
Urban	29.9 \pm 17.2		
Formally educated			
Yes	29 \pm 24.2	1.35	0.23
No	36.3 \pm 21.9		
Marital status			
Married	28.8 \pm 19.2	0.48	0.49
Single	32.5 \pm 52.5		

SD: standard deviation.

to the 81%, 84%, and 89% found in Turkey, Germany, and Australia, respectively [10, 16, 22], but higher than other studies which reported that medication costs corresponded to a range between 30 and 47% direct costs of asthma care [12–14]. The differences in prescription costs noted may be due to differences in the types of medication given to the patients, doses of medication required by each patient, and the severity of their asthma. Furthermore, lower cost of laboratory tests and consultations in developing countries compared with developed countries might have accounted for the lower treatment costs observed in our setting [8–14].

Also, we have shown that costs of follow-up care for asthma patients did not differ significantly across age, education, marital status, residence, or gender categories. This suggests that these sociodemographic characteristics of the patients did not affect the costs incurred by the patients for asthma follow-up care.

There are limitations in this study. The direct costs estimated in this study are an underestimate of the patient economic burden of asthma in Nigeria because indirect costs of asthma were not evaluated. Indirect costs have been shown to account for up to 50% of total costs of asthma-related

treatment in some studies [14]. Also, cost data were obtained from the patients; this is subject to a potential recall bias. Despite these limitations, this feasibility study has shown that the direct cost of asthma followup is substantial and may be a contributor to the poor adherence to medication among asthma patients leading to poor adult asthma control in Nigeria. There is a need for a nationwide detailed assessment of the cost of treatment for asthmatics including those with poor/good control, complications, and exacerbation in Nigeria and other African countries. The findings of these assessments will determine the financial resources required and ensure that households of asthmatic patients are relieved from the potentially catastrophic costs of this illness. Furthermore, because prescription costs accounted for the majority of direct costs in this study, a cost-effectiveness analysis is needed to ensure effective treatment of asthma with optimal costs.

Conflict of Interests

The authors confirm that they have no conflict of interests to declare.

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