Cost of care among older people with chronic medical conditions in a healthcare facility in southwestern Nigeria

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Abstract

The global population of older individuals is rapidly increasing, a trend attributed to medical advances and increased life expectancy. This demographic shift has led to a higher prevalence of chronic conditions, placing significant pressure on healthcare systems and escalating costs. Our research aims to shed light on this pressing issue, providing crucial insights into the economic implications of geriatric care. Specifically, this study aimed to determine the cost of care and its factors among older adults with chronic diseases in a secondary health facility in southwestern Nigeria, providing crucial insights into the economic implications of geriatric care.

A rigorous, simple random sampling technique was employed to recruit 300 older people diagnosed with chronic disease who have been on follow-up care for more than 6 months. A structured questionnaire was meticulously administered to the participants between July and December 2020. SPSS version 26 was used for data analysis, ensuring the robustness of our findings. To determine the difference in the average cost, *t*-tests and analysis of variance were employed, and $p<0.05$ was considered to indicate statistical significance.

The mean age (standard deviation) in this study was 68.26 (7.01) years; 58.3% of participants were female. The total cost of care ranges from 2296 Nigerian Naira (₦) [6.4 U.S. dollars ($)] to 100,651 ₦ (280 $), with an average of 22,589.06 ₦ (63 $). Participants receiving pensions and those receiving very low income had higher costs. Compared with those without diabetes and those with one condition, diabetic participants and those with multimorbidity had twice as high a cost of care.

Our findings underscore the importance of economic support, such as pensions and stipends, for older people in improving access to timely care, preventing complications, and ultimately lowering healthcare costs. The recommendation for regular screening for diabetes and other chronic conditions provides a practical strategy for improving diagnosis and timely interventions, empowering healthcare professionals and policymakers to make a tangible difference in geriatric care.

Introduction

Population aging is an essential component of the demographic megatrends occurring worldwide, with increasing population growth, migration, and urbanization impacting the world's population characteristics.[1,2] This trend of aging is occurring in all parts of the world, including low- and medium-income countries such as Africa.[3]

In 2015, among 617 million people, it was estimated that 8.5%

of the world's population was aged 65 years and above, whereas in the year 2030, the aged proportion would have grown to 12%, with an estimation of 1 billion. By the year 2020, the number of older people in the world is projected to be greater than the number of under-5 children; this trend will continue in this direction until 2050 when the number of older individuals will double the number of under-5 individuals.[3]

The growing population of the world's older adults portends significant social and economic importance that will continue to influence sustainable development. This was highlighted by the report of the National Research Council of the National Academy of Science in the U.S. in 1988, which put forward recommendations on sources for funding and proper policy on the care of older adults in the twenty-first century, and by the reports of the Institute of Medicine on the future healthcare workforce requirements for the care of older Americans released in 2008.[4,5]

Old age is closely related to the presence of chronic medical conditions, impairments, and disability that require long-term care and significant financial commitments.[6-8] While this has already been recognized as a major cause for concern even in developed nations with well-established social infrastructure for older individuals,[4,5,9] the financial burden of caring for older individuals poses a more significant challenge in developing countries.

Multimorbidity, common among older adults, has also been shown to increase healthcare utilization and cost, thereby adding to the strain on healthcare delivery to older adults. Studies have associated increased healthcare expenditures with advanced age. However, some studies have noted that not calendar age but the presence of morbidity and nearness to death is responsible for the high cost in this population.[6,10]

Identifying the factors contributing to healthcare costs is very important in planning for the growing population of older adults. Surveys have been conducted in the community and among selected populations of older people in Nigeria, with the potential for recall bias in expenditures on healthcare. While previous research work has been done on describing the pattern of chronic diseases and care among the older people in the community, studies on the cost of utilization of services among those already diagnosed with chronic medical conditions are inadequate, hence the need to objectively determine the cost of care among older adults with chronic medical conditions receiving follow-up care in a healthcare care setting.

Materials and Methods

Study design and setting

This cross-sectional, hospital-based study was conducted at the General Medical Practice Unit of the Neuropsychiatric Hospital, Aro, Abeokuta. The clinic is a 30-bed general practice facility located at the main site of the Neuropsychiatric Hospital, Aro, Abeokuta. The clinic provides care for clients registered under the National Health Insurance Act. However, most of the patients registered in the clinic are out-of-pocket payment members of the community. The clinic also provides medical and primary surgical care for psychiatric patients on admission to the hospital, as well as those with comorbid medical conditions attending the psychiatric outpatient clinic for follow-up.

The clinic runs a non-communicable disease clinic 2 days a week, namely, for cardiovascular disease on Monday and diabetes on Friday, from which participants were drawn for this study. This clinic is run by cardiologists, endocrinologists, and family physicians. The diagnoses are made by the managing consultants running this clinic.

Study criteria

Older adults 60 years and above with an established diagnosis of a chronic medical condition who have attended the general outpatient clinic for more than 6 months or who have attended any of the non-communicable disease clinics were included in this study. Exclusion criteria include those who do not consent and those with a severe level of cognitive impairment that may impair participation.

Sample size

The sample size will be calculated with the formula: $n= Z^2pq/d^2$ where Z is the standard deviation (SD) of 1.96 at the 95% confidence interval, p (0.42) is the prevalence of older adults with a chronic medical condition from a previous descriptive study of the morbidity pattern of older people who presented at a geriatric center in southwestern Nigeria,[11] q=1-p, and d is 5% precision, the maximum allowable error. Therefore, $n=1.96^2\times0.42(1-0.42)/0.05^2=374$.

According to the Medical Record Department of the Unit, the total number of older adults registered in the unit is 1240. Modifying the sample size for smaller populations *via* Eq. 1.

$$n = \frac{n_o}{1 + \frac{n_o - 1}{N}}$$

$$n = \frac{374}{1 + \frac{374 - 1}{1240}}$$

[Eq. 1]

$$n = 288$$

The calculated sample size was 288, but 5% attrition was added to yield a total sample size of 300.

Sampling method

The participants were recruited through a simple random sampling method. The sampling frame was all the older adults attending the clinic on a given day. Participants were approached at the clinic, and those who consented to the study were recruited to participate.

A structured questionnaire adapted by the authors from the validated Client Service Receipt Inventory was administered by research assistants to collect information on the participants' sociodemographic characteristics and other health services.[12] These research assistants are medical officers in these clinics who have been trained to be proficient in administering instruments to prevent discrepancies by the principal investigator. The training involved inter-rater reliability exercises through a pilot pre-test. Using kappa statistics, an inter-rater reliability score of 0.81 was determined, which fell within the acceptable range. A review of the medical case records over 6 months before recruitment was conducted to collect information on the utilization of health services, including the number of visits to the clinic and the mode of presentation, either for a scheduled appointment, emergency visit, or hospital admission.

The cost was calculated based on the official price list for services and drugs used in the health facility during enrolment. At the time of data collection, the official exchange rate was 1 U.S. dollar ($) to 360 Nigerian Naira (₦).

Ethical consideration and permission

Ethical clearance was obtained from the Research Ethics Committee of the Neuropsychiatric Hospital, Aro, Abeokuta. The approval number was PR005/20. Each participant signed an informed

consent form after the study was explained in their understood language. The questionnaire was identified with a unique number stored with the researcher, and all the information was kept confidential.

Data analysis

Data from the questionnaire were transferred to IBM SPSS version 26 (SPSS Inc., IBM, Chicago IL, USA) for analysis. The values for numerical variables are expressed as the means ± SD, and those for categorical variables are expressed as frequencies and percentages. Differences in the means among the groups were tested with an independent *t*-test or analysis of variance when the variables had more than 2 groups. A two-tailed $p<0.05$ was considered statistically significant.

Results

A total of 300 participants were recruited for the study. There were 175 females, representing 58.3% of all the participants. The age range was 60-89 years, with a mean age of 68.26±7.01. Among the participants, 233 (77.7%) were married, but only 118 (30.3%) were living with their spouse only. All the participants had a direct living descendant whose children ranged from 1 to 15, with a mean of 4.9. 131 participants (43.7%) were still working, with the majority (94) of whom were engaged in business. Details of the sociodemographic characteristics are presented in Table 1.

65% of the participants were financing their care with out-of-pocket payments, 29% were still in paid employment earning salaries, and most earned between 50,000 ₦ (100 $) and 100,000 ₦ (200 $) monthly. Only 2 participants reported not being able to meet their daily needs.

Hypertension was the most common chronic medical condition in this study; 98.7% of all the participants had hypertension either alone or with other conditions, whereas 18% had multiple comorbidities of 2 chronic medical conditions.

The study participants' average number of routine clinic visits within the last 6 months was 4.12, ranging from 0 to 9. Clinic visits were classified into none, low, moderate, and high utilization, with 0, 1-3, 4-6, and 7-9 visits, respectively, with 39% with low utilization. A total of 62 participants had emergency visits within the last 6 months before enrolment. There were 20 referrals to various specialists during the study period. There were only 4 hospital admissions among the study participants. 100 participants had laboratory investigations carried out 6 months before the study. The number of times they visited for investigations ranged from 1-9, with an average of 3.19±1.89 visits. All the participants had their medications prescribed during the study period, with the number of drugs ranging from 1 to 10.

Cost of care among the participants

The participants living within towns spent an average of 2009.34 ₦ (5.57 $) on transportation, whereas participants from outside the clinic spent 13,764.65 ₦ (38.18 $).

The average cost of investigation by the participants was 4126.02 ₦ (11.45 $), whereas the average price of drugs was 15837.56 ₦ (43.93 $). The average total cost in this study was 22589.06 ₦ (62.66 $). Details of the cost of treatment are given in Table 2.

Determinants of total cost of care

The Andersen model of healthcare utilization, which describes the factors for healthcare utilization into predisposing, enabling, and need factors, was used to analyze the determinants of total cost in this study.

Table 1. Sociodemographic characteristics of the respondents (n=300).

Variable	Frequency	Percentage (%)
Age group (years)		
60-69	183	61.0
70-79	97	32.3
80 and above	20	6.7
Sex		
Male	125	41.7
Female	175	58.3
Marital status		
Single	0	0
Married	233	77.7
Separated	4	1.3
Widowed	63	21.0
No children alive		
1-5	215	71.7
6-10	81	27.0
11-15	4	1.3
Living condition		
Living alone	26	8.7
Living with spouse only	118	39.3
Living with child(ren) only	65	21.7
Living with spouse and child(ren)	91	30.3
Currently working		
Yes	131	43.7
No	28	9.3
Pensioner	141	47.0
Occupational status		
Professional	34	26.0
Trading/business	94	71.8
Artisan/technician	3	2.2

Table 2. Cost of care analysis of the participants in Nigerian Naira (₦).

Description	Location	N	Minimum (₦)	Maximum (₦)	Mean (₦)	SD (₦)
Indirect cost						
Cost of transport	Within Abeokuta	266	0	8100	2009.34	1633.26
	Outside Abeokuta	34	2640	60,440	13,764.65	16,097.822
Direct cost						
Cost of investigation		100	600	10,700	4126.02	2955.396
Cost of drugs		300	1700	81,450	15,837.56	11,946.855
Total cost	300	2296	100,651	22,589.06	16,809.513	

₦, Nigerian Naira; SD, standard deviation.

Among the predisposing factors for the total cost of care, occupational status was the only significant factor, with participants with no regular income having to spend more on their care, with an average of 31,156.00 ₦ (SD 25,200), F=7.578; p=0.001. Details are provided in Table 3.

Among the enabling factors, the sources of funding (p=0.003) and average monthly income (p=0.000) were statistically significant, with those on pensions having an average of 26,176.92 ₦ (SD 19,246.566), equivalent to 72.71 $. Those who earn above 100,000 ₦ monthly spent an average of 32,902.88 ₦ (SD 17,405.110), equivalent to 91.4 $, followed by those who had no regular income of 31,156 ₦ (SD 25,250.449), which is 86.5 $. Details are provided in Table 4.

For the need factor for total cost of care, both the presence of diabetes and multimorbidity were significant, with the mean price for people with diabetes nearly double that of those without diabetes at 38,445.989 ₦ (SD 24,725.981), t=-4.792, p=0.000. Similarly, the mean cost of care for those with multiple morbidities was 35,406.62 ₦ (SD 23,523.111) compared with 19,711.65 ₦ (SD 13,358.359), t=-4.778, p=0.000. Further details are provided in Table 5.

Discussion

This study aimed to estimate the average cost of care incurred by older adults with chronic medical conditions and determine the factors influencing the price. This study assessed the cost of care over 6 months among patients receiving follow-up care for chronic conditions.

Socioeconomic factors and medical factors were significant in determining cost in this study, as opposed to several other demographic factors identified by different authors.

Occupational status was a significant determinant of this study's total cost of care. Occupation is an important social determinant of health with a substantial impact on the price of healthcare.[13,14] Older adults who were not employed had a higher cost than those currently working or retired. This finding was unexpected, as individuals with higher incomes and upper classes of society with regular sources of income are expected to have a greater capacity for financing healthcare and should, therefore, spend more on their care.[15,16] However,

Table 3. Mean total cost of care and predisposing factors among the participants.

Variables	N	Mean (₦)	SD (₦)	t/F	p
Age (years)				0.437	0.646
60-69	183	21,868.00	16,442.212		
70-79	97	23,797.55	18,467.516		
80 and above	20	23,300.84	10,415.439		
Sex				0.602	0.548
Male	125	23,300.06	15,218.736		
Female	175	22,108.44	17,830.294		
Marital status	0.999	0.319			
Unmarried	67	20,764.28	13,234.831		
Married	233	23,103.75	17,678.356		
Living condition				0.804	0.492
Living alone	26	19,282.51	11,596.798		
Living with spouse only	118	23,035.73	16,870.259		
Living with child(ren) only	65	24,620.26	15,315.868		
Living with spouse and child(ren)	91	21,503.75	18,893.953		
Currently working				7.578	0.001*
Yes	131	19,070.92	14,567.121		
No	28	31,156.00	25,250.449		
Pensioner	141	24,267.01	15,971.173		

₦, Nigerian Naira; SD, standard deviation; *significant.

Table 4. The mean total cost and enabling factors for the participants.

Variable	N	Mean (₦)	SD (₦)	t/F	p
Mode of payment				1.343	0.18
Insurance	105	24,350.09	18,218.711		
Out of pocket	195	21,626.85	15,954.155		
Source of funds				4.855	0.003*
Salary	29	13,931.07	7042.802		
Pension	117	26,176.92	19,246.566		
Earning from trade/business	86	20,522.75	16,618.870		
Funds from children and family	68	22,790.86	13,740.993		
Average monthly income				5.878	0.000*
No regular income	28	31,156.00	25,250.449		
<20,000 ₦	16	24,716.63	8169.545		
20,000-50,000 ₦	94	21,408.82	17,155.444		
50,000-100,000 ₦	137	19,415.56	13,448.519		
>100,000 ₦	25	32,902.88	25,250.449		

₦, Nigerian Naira; SD, standard deviation; *significant.

Table 5. Mean total cost of care and need factors for the participants.

Variable	N	Mean (₦)	SD (₦)	T	p
Hypertension				0.379	0.705
Yes	296	22546.24	16902.149		
No	4	25758.00	7489.355		
Diabetes				-4.792	**0.000***
Yes	42	38445.989	24725.981		
No	258	19935.97	13431.907		
Cardiovascular disease				-0.547	0.585
Yes	16	24826.25	13050.643		
No	284	22463.03	17006.128		
No of morbidity				-4.778	**0.000***
1	246	19711.65	13358.359		
2	54	35406.62	23523.111		

₦, Nigerian Naira; SD, standard deviation; *significant.

studies have shown that poor people carry a more significant financial burden for healthcare expenditures, sometimes resulting in catastrophic spending.[17-19] The poor are likely to underutilize preventive care and outpatient services and may delay presentation for care in the early stages of their illness, resulting in poorer health outcomes requiring more significant expenditures for treatment when they are forced to seek services.[17,20]

Other economic factors, such as sources of funds and average monthly income, were also strongly associated with this study's total cost of care. Participants receiving pensions had the highest total cost compared with those currently employed, who spent the least on healthcare. While it may be expected that working participants should spend more on healthcare, this study showed the opposite, as their total cost of care was half the cost for those receiving pensions. An older person currently engaged in paid jobs is most likely in the economy's informal sector and underemployed and underpaid. These findings showed that they were very disadvantaged.

Monthly income was significantly associated with the total cost of care, with participants earning a monthly income of more than 100,000 ₦ spending the most on care. In contrast, those with no regular income also had a high cost of care. Households and individuals with a meager income, especially in Nigeria and other developing nations, have been shown to seek more of the informal path to healthcare and are more likely to use private health facilities. They were also likely to face catastrophic health spending (spending more than 40% of a household's annual capacity to pay) when they eventually access care. In their study of catastrophic health spending, Janssens et al. reported rates of 10.8% and 13.5%, respectively, for the lowest two groups of asset-based wealth.[17]

Among the medical factors examined in this study, only diabetes and multimorbidity were associated with the total cost of care. Diabetes is a significant factor in the increased utilization of healthcare services.[21-25] Okoronkwo *et al.* reported that in Nigeria, the average monthly direct cost of diabetes care was 56,245 ₦ (356 $), with 45% of the participants in their study spending catastrophically at a 30% threshold of non-food consumption.[26] In Ethiopia, the total cost of care for diabetes was 14,996 $ for all participants, with a direct cost of 11,435 $ and an indirect cost of 3561 $.[1] The increased cost of care among people living with diabetes takes a considerable toll on individuals and households in resource-constrained societies.[21,26-28]

In the U.S., diabetes care accounts for 1 in every 4 $ spent on healthcare annually. An average of 16,750 $ is spent per person with diabetes per year, with 9600 $ directly attributed to the disease, and people diagnosed with diabetes spend 2.3 times more medical expenditures than those without diabetes.[29] The out-of-pocket expenses for individuals with diabetes were also found to be significant, ranging from 14-15.2% higher than those for individuals without diabetes, even in countries with high health insurance coverage of more than 92%.[30] The high use of out-of-pocket payment showed that diabetes is still a significant driver of the cost of care worldwide, irrespective of the nation's development.

Finally, multimorbidity was a significant factor in this study's total cost of care. The cost of care for participants with two medical conditions was nearly twice that for those with one condition.

Multimorbidity, a prevalent condition among older adults, significantly contributes to the escalating healthcare costs globally. In this study, the prevalence of multimorbidity was 18%, a figure that aligns with other studies in Nigeria reporting 49% of admissions to a tertiary hospital and 58% to an older adult facility.[11,31] In the U.S., an average of 81% of older individuals have multiple morbidities.[32] This data underscores the substantial impact of multimorbidity on healthcare costs, a crucial insight for healthcare professionals, policymakers, and researchers.

The impact of multimorbidity on healthcare costs has been demonstrated in several studies.[4,6,12,33-35] For example, Picco *et al.* reported that the total societal cost (including total healthcare cost and cost of social care) per person was 2806 S$, 5610 S$, and 15,148 S$ for those without chronic morbidity, for those with one morbidity and for those with two or more morbidities, respectively, in Singapore.[12] Their findings revealed that multimorbidity accounts for a sevenfold increase in the cost of care among the older adult population. The impact of multimorbidity on healthcare costs confirmed the assertion of Hazra and Zweifiel that it is not chronological age (especially among older adults) that determines the cost of care but the presence of comorbidities, impairments, and nearness to death.[6,10]

Conclusions

Providing social safety nets through pensions and regular stipends for older adults will help ensure they utilize health services promptly, especially preventive care. This will thereby limit the overall burden of healthcare costs and prevent complications. It will also prevent catastrophic healthcare spending and alleviate suffering among the older population.

Regular screening for diabetes and other comorbidities will ensure these conditions are detected early and managed, thereby preventing complications. This will significantly limit the rising cost of care among older adults and society.

Health promotion among adults ensures that they lead a healthy lifestyle, which prevents the development of chronic conditions later in life.

Strengths and limitations

This study sought to quantify the cost of care for chronic medical conditions among older adults in developing nations such as Nigeria. It also analyzed the cost over 6 months, not just a snapshot. This may help estimate the cost of care among these vulnerable groups and assist policymakers in planning and projecting quality care for this growing population.

However, it is limited by the cross-sectional design; hence, it could not allow for the determination of the direction of causality between the outcome and explanatory variables. So, longitudinal studies are needed to examine the causal links and more predictive value of the factors investigated. Also, a bias could result from the failure of patients to recall long-term events accurately. Furthermore, logistic regression was not performed to evaluate the odds ratios between the independent variable and each evaluated outcome, which could have further strengthened the association discovered. Finally, it was a hospital-based study, limiting its generalizability. Hence, community-based research will provide a wider reach and more information that can be generalized to the population of older people.

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