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ORIGINAL ARTICLE

Drivers and Predictors of Catastrophic Health Expenditure Associated with Long-Term Medical Conditions for Outpatient Visits at Public Health Facilities in Bayelsa State.

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ABSTRACT

Background: Long-term medical conditions (LTMCs) now dominate global disease burden, requiring lifelong care and frequent hospital visits, which impose significant financial strain on households. This study quantified direct costs, measured the prevalence of catastrophic health expenditure (CHE) and identified the biggest cost drivers among patients with LTMCs using public health facilities in Yenagoa, Bayelsa State.

Methods: A cross-sectional survey of 339 adult patients with LTMCs, namely Hypertension (HTN), Diabetes mellitus (DM), Tuberculosis (TB), and Human Immunodeficiency Virus (HIV). Healthcare costs were calculated to reflect the average monthly costs. Patients whose monthly direct cost as a proportion of monthly household income was more than 10% were classified as having incurred Catastrophic Health Expenditure (CHE).

Results: The median age was 50 years (IQR=40-60). Per clinic visit, the total direct and direct medical costs were ₦3700 and ₦3000 respectively. Patients with non-communicable diseases, multi-morbidity, health insurance coverage, and the elderly incurred higher direct costs. The costs of prescribed drugs were the drivers of direct medical costs. About 33% of respondents experienced CHE. The predictors of CHE were Age (>65 years) and whether the patient received a drug prescription during a clinic visit.

Conclusion: This study highlights the substantial economic burden faced by patients with LTMCs accessing care in a public hospital. Overall, findings underscore critical areas for policy interventions such as age-sensitive financial protection policies, enhanced drug affordability policies and government funding support for NCDs to mitigate financial hardship for the elderly and those with complex conditions.

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INTRODUCTION

Worldwide, long-term medical conditions (LTMCs) are the highest contributors to disease burden and deaths and pose a major concern with their rising incidence and prevalence.^{1,2} Non-communicable LTMCs like hypertension and diabetes are the leading cause of mortality, responsible for 70% of deaths globally.² Meanwhile, communicable LTMCs like HIV and TB have seen a decline in mortality rates, but the number of new cases diagnosed continues to rise, creating a troubling 'double disease' challenge burden.³⁻⁵ Nigeria bears a significant burden, ranking among the top 20 countries worldwide for TB cases, and about 8 million people are currently on anti-retroviral therapy (ART).⁶

LTMCs are often lifelong conditions that require long-term specialized care to optimize overall health status and improve quality of life. Such services involve several appointments, hospitalizations, medications, and visits to various health clinics and specialists.⁷ Direct costs encompass direct medical costs (e.g., consultations, tests, drugs) and direct non-medical costs (e.g., food, transportation). Cost drivers are relevant indicators of the magnitude of patients' expenses and are strong reflectors of the responsiveness of the healthcare system.⁸ The heavy and oftentimes lifelong utilization of healthcare services for LTMCs places a heavy burden on patients and their household economy.^{7,8}

The World Health Organization (WHO) reports that globally, 1 in 4 households face financial catastrophe due to spending on their general healthcare needs.⁹ Catastrophic Health Expenditure (CHE) occurs when over 10% of household income is spent on health. This is used as an indicator to measure progress towards the attainment of Universal Health Coverage (UHC).^{10,11} A 2015 study in Southwest Nigeria

found that households spent 43% of their monthly income on LTMC care.¹² Indeed, the presence of a household member with LTMC is a positive determinant of incurring CHE, and the true economic burden has often been ignored or underestimated.⁸

Existing research examines disease-specific costs, neglecting how comorbid conditions impose financial burdens on families' resources.¹³⁻¹⁶ In this context, there is a very limited amount of research on cost quantification and CHE amongst patients with LTMCs. Therefore, this study aimed to quantify direct costs, measure the prevalence of catastrophic health expenditure, and identify the biggest cost drivers among patients with long-term medical conditions (LTMCs) using public health facilities in Yenagoa, Bayelsa State. These findings will help policymakers protect families from medical poverty. As Nigeria moves toward universal health coverage (UHC), understanding the actual financial impact of LTMCs is crucial for adequate safeguards.

Methodology

Study Area and Setting:

Bayelsa is an oil-rich state situated in the South-South region of Nigeria. It lies at the heart of the Niger Delta region and is bound on the south and west by the Atlantic Ocean, on the north by Delta State and the east by Rivers State. Yenagoa is the state capital, covering an area of 706 km² with a population of 352,285.¹⁷ Three major public health facilities, Federal Medical Centre Yenagoa, Niger-Delta University Teaching Hospital, Amassoma, and Tuberculosis/Leprosy Care Centre Igbogene were selected. These facilities provide specialized care for LTMCs and act as key referral points for patients seeking healthcare in the state.

Study design

This was a healthcare facility-based study with a descriptive cross-sectional design.

Table 1: Socio-Demographic and Clinical Characteristics of the Study Population

Variables	Frequency N=339	Percent (%)
Median age in years	50years (IQR=40-60)	
Age groups		
64 years and below	285	84.1
65years and above	54	15.9
Sex		
Male	128	37.8
Female	211	62.2
Marital Status		
Single	45	13.3
Married/Co-habiting	184	54.3
Separated/Widowed	110	32.4
Highest Educational level		
Below Secondary	105	31.0
Secondary and above	234	69.0
All LTMCs		
Hypertension (HTN)	83	24.5
Diabetes mellitus (DM)	89	26.3
HIV	114	33.6
Tuberculosis (TB)	53	15.6
Category of LTMCs		
NCDs	172	50.7
CDs	167	49.3
Number of LTMCs		
Single	229	67.6
Multiple	110	32.4
Insurance coverage		
Yes	120	35.4
No	219	64.6

Study population

Adult patients receiving care for the following conditions (Hypertension (HTN), Diabetes mellitus (DM), Tuberculosis (TB), and Human Immunodeficiency Virus (HIV) were included in the study. They must have been visiting the facility for at least 6 months at the time of data

collection. However, patients with TB who had received care for at least 3 months were incorporated into the study due to a lack of clients at the time of data collection.

Sample size determination and Sampling

The sample size was calculated using the formula for a descriptive cross-sectional study for estimation of a single proportion at a specified precision.¹⁸ The proportion of CHE among persons with LTMCs, as reported in a similar study conducted in Nigeria, was 79%.¹⁵

$$n = \frac{Z_{\alpha}^2 pq}{d^2}$$

Using the formula where Z_{α} : Standard normal deviate corresponding to the level of significance at 5% i.e., the desired level of significance set at 95% equivalent to 1.96, p: prevalence of CHE among persons with LTMCs = 0.79¹⁵, q: complementary probability = 1-p 0.21, d: level of precision 0.05, the minimum sample size (n) was 255, adjusted with a 10% non-response rate to give 283. The set target was to sample more respondents to enable a

robust analysis of cost-related data and strengthen the study's ability for subgroup analysis. Multistage sampling was utilized. Firstly, Purposive sampling involved the selection of the health facilities and allocation of participants. The facilities, two tertiary facilities and a specialized center for accessing HIV and TB services, used in this study, were purposively selected because they provide healthcare services for patients with LTMCs in the study setting. Respondents were allocated based on the attendance rates at the clinics. Participants were recruited from the specific clinics (HTN, DM, TB, HIV) where they received care by systematic random sampling using the clinic attendance register to create a sampling frame. Clinics were visited until the sample size per facility was reached.

Table 2: Statistical Comparison of Monthly Direct Costs of Accessing Care in the Study Population

Direct medical cost (₦)						Direct non-medical cost (₦)				Total Direct cost (₦)						
Variables	N	Median	IQR		Moods' Test (df)	p value	Median	IQR		Moods' Test (df)	p value	Median	IQR		Moods' Test (df)	p value
			Q1	Q3				Q1	Q3				Q1	Q3		
All LTMCs	339	3000	400	8150			600	250	1600			3700	1067	9400		
HTN	83	5200	2300	9200			800	320	2000			6700	39000	150000		
DM	89	9200	5925	16800	124.96	0.000*	1200	600	2600	57.90	0.000*	11800	6800	187000	158.45	0.000*
HIV	114	200	200	1950	(3)		242	133	500	(3)		700	334	2383	(3)	
TB	53	200	200	1550			700	400	1900			1800	700	3300		
Category of LTMC																
NCDs	172	7500	7500	3700	120.12	0.000*	1000	400	2225	38.02	0.000*	9130	4730	16675	154.06	0.000*
CDs	167	200	200	200	(1)		334	167	834	(1)		1100	437	2561	(1)	
Number of LTMCs																
Single	229	2000	200	6000	17.25	0.000*	500	200	1394	6.78	0.009*	2500	633	6900	26.78	0.000*
Multiple	110	7000	2000	14200	(1)		800	360	2200			7580	2725	17050		
Insurance coverage																
Yes	120	5000	2000	9000	14.96	0.000*	850	400	2000	10.93	0.001*	6200	2675	11775	28.26	0.000*
No	219	1800	200	7250	(1)		460	200	1381	(1)		2483	600	8000	(1)	

*Statistically significant; IQR: Interquartile range; Q: Quartile

Data collection

A semi-structured, adapted tool was administered by trained interviewers, given the technical nature of the questions. The study

instrument was pre-tested to identify any vagueness, enhance administration and minimize errors. It was carried out in a general hospital (Diete Koki-memorial hospital) in Yenagoa, Bayelsa State, which provides care for

LTMCS. Furthermore, the study instrument was face-validated by three (3) consultants of public health practice who are experts in healthcare financing. Considering that certain patients may present with multiple morbidities and consult multiple clinics, prior to conducting interviews, they were asked whether they had participated in any previous interviews at other clinics, thereby avoiding double-counting. The data tool collected information on socio-demographic characteristics, socio-economic characteristics, LTMC morbidity and healthcare costs. Data was collected from January to March 2020

Measurement of variables

Determination of Direct costs

The direct cost was determined by summing the cost subtypes of direct medical and direct non-medical costs obtained per visit. Using the frequency of visits, the amount a respondent

spent in a month was estimated. Direct medical costs comprised consultation fees for registration and doctor visits, laboratory costs for tests (e.g., fasting blood sugar), radiology expenses for imaging (e.g., X-rays), prescribed drugs for the LTMC, and unprescribed drugs such as supplements and alternative treatments. Direct non-medical costs were transport and food costs during health facility visits.

Determination of Catastrophic Health Expenditure (CHE):

The estimated monthly direct cost, as a proportion of the household's monthly income, was calculated to determine the CHE. Household income is combined from all sources of income, such as salary, allowances, pension, business profit, welfare, and per month. Patients whose monthly direct cost as a proportion of monthly household income was more than 10% were classified as having incurred CHE.

Table 3: Sub-categories of Monthly Direct Medical Costs

Monthly Direct medical costs (₦)																
Variables	N	Consultation (₦)				<i>p</i> value	Laboratory (₦)				<i>p</i> value	Radiology (₦)				<i>p</i> value
		Median	IQR		Moods' Test (<i>df</i>)		Median	IQR		Moods' Test (<i>df</i>)		Median	IQR		Moods' Test (<i>df</i>)	
			Q1	Q3				Q1	Q3				Q1	Q3		
All LTMCs	339	200	200	1200		1000	600	2000		4000	2875	4250				
HTN	83	1200	1050	1200		1000	500	1250		4000	3750	5500				
DM	89	1200	1200	1200	142.74	1000	900	2250	6.28	2500	2500	2500	1.67			
HIV	114	200	200	200	(3)	350	200	875	(3)	3000	2500	2500	(3)			
TB	53	200	200	200		1000	300	0		3500	3500	3500				
Category of LTMC																
NCDs	172	1200	1200	1200	141.93	1000	600	2000	4.01	4000	3000	10000	1.07			
CDs	167	200	200	200	(1)	500	200	1000	(1)	3500	2000	0	(1)			
Number of LTMCs																
Single	229	200	200	775	27.46	1000	500	1000	8.16	4000	3250	6000	2.50			
Multiple	110	1200	200	1200	(1)	1000	600	2625	(1)	4000	2250	4000	(1)			
Insurance coverage																
Yes	120	600	200	1200	0.555	1000	900	2375	0.694	3500	2625	4000	1.67			
No	219	200	200	1200	(1)	1000	600	1888	(1)	4000	3125	5500	(1)			

Data analysis

Data entry, cleaning, and analyses were done using the IBM Statistical Package for Social

Science (SPSS) version 25.0.¹⁹ The median and interquartile range were used to summarize quantitative variables in this study, as the cost-related data had a skewed distribution. The

Median test (Moods) was the preferred non-parametric statistical test in this study. Frequencies and proportions were employed to summarize the occurrence of CHE. Odds ratios

and 95% confidence intervals were utilized to assess the strength of association, with a p-value <0.05 regarded as statistically significant.

Table 4: Monthly Drug Costs for Patients with LTMCs

Variables	N	Direct medical costs (₦)									
		Prescribed drugs (₦)					Unprescribed drugs (₦)				
		Median	IQR		Moods' Test	p	Median	IQR		Moods' Test	p
			Q1	Q3	(df)	value		Q1	Q3	(df)	value
All LTMCs	339	4600	2000	8000			1000	500	4000		
HTN	83	4000	2000	7000			2000	300	5900		
DM	89	7000	4000	11000	46.90	0.000*	2250	650	7250	6.99	0.072
HIV	114	2000	1000	3000	(3)		1000	500	7250	(3)	
TB	53	475	225	500			1250	425	2625		
Category of LTMCs											
NCDs	172	5800	3000	10000	33.16	0.000*	2000	500	6000	5.42	0.020*
CDs	167	1250	500	2750	(1)		1000	500	2000	(1)	
Number of LTMCs											
Single	229	4000	2000	7000	5.49	0.019*	1000	300	2625	0.92	0.337
Multiple	103	5550	2000	11250	(1)		1500	775	6000	(1)	
Insurance coverage											
Yes	120	4000	2000	7750	0.60	0.437	2000	500	6000	2.50	0.114
No	219	5000	2000	10000	(1)		1000	500	2500	(1)	

*Statistically significant; IQR: Interquartile range; Q: Quartile

Ethical Statement

The Ethical Review Committee of the Federal Medical Centre, Yenagoa, granted ethical approval for this study (FMCY/REC/ECC/2020/JAN/232).

Participation was voluntary and informed consent was obtained. All the questionnaires were anonymized, and the information obtained was kept confidential.

Results

Three hundred and thirty-nine (339) completed responses were included in this study. The median age was 50 years. Most respondents were females, 211 (62.2%), had post-primary education (69.1%), and about a third were widowed (32.4%). Approximately one in three respondents had LTMC multi-morbidity, and 120 (35.4%) respondents had health insurance

coverage, while 219 (64.6%) did not have any health insurance. (Table 1)

Table 2 presents a statistical comparison of monthly direct costs. Tables 3 & 4 show that overall, the largest cost driver was 'Prescribed drugs', with respondents spending an average of ₦4,600 per month; the lowest amount was spent on 'Consultation' (₦200). 'Radiology costs', although the second largest cost (₦4,000), did not show any statistically significant differences across the study population. Respondents spend an average of ₦400 on transport and ₦200 on food, respectively. CHE was experienced by 112 (33%) (Table 5). Patients with DM had the highest rate of 44 (29.4%), while the lowest was seen with HIV at 22 (37.7%), and this difference was statistically significant, as shown in Table 6. Table 6 presents predictors of CHE as age category >65years (OR=4.88, CI= 1.16–20.56;

p-0.030) and Prescribed drugs cost (OR=2.63, CI= 1.11 to 7.55; *p*-0.030).

Table 5: Occurrence of CHE among Patients with LTMCs

Respondents Characteristics	CHE n (%)		χ^2	df	<i>p</i> -value	Crude OR (95%CI)
	Yes	No				
All Patients	112(33.0)	227(67.0)	-	-	-	-
Gender						
Male	36(28.1)	92(71.9)	2.244	1	0.134 [*]	1.439 (0.89-2.32)
Female	76(36.0)	135(64.0)				
Age category						
64 years and below	85(29.8)	200(70.2)	8.353	1	0.004 [*]	2.35 (1.30-4.25)
65years and above	27(50.0)	27(50.0)				
Marital status						
Single	34(75.6)	34(24.4)	16.924	2	0.000 [*]	-
Married	48(26.1)	136(73.9)				
Separated/Widowed	53(51.8)	57(51.8)				
Highest Education level						
Below Secondary	50(47.6)	55(52.4)	14.618	1	0.000 [*]	0.4 (0.24-0.64)
Secondary and above	62(26.5)	172(73.5)				
LTMCs						
HTN	31(37.3)	52(62.7)	21.783	3	0.000 [*]	-
DM	44(29.4)	45(59.6)				
HIV	22(37.7)	92(76.3)				
TB	15(28.3)	38(71.7)				
Category of LTMCs						
NCDs	75(43.6)	97(56.4)	17.620	1	0.000 [*]	0.37 (0.23-0.59)
CDs	37(22.2)	130(77.8)				
Number of LTMCs						
Single	58(25.3)	171(74.7)	18.967	1	0.000 [*]	2.84 (1.76-4.59)
Multiple	54(49.1)	56(50.9)				
Insurance coverage						
Yes	34(28.3)	86(71.7)	1.859	1	0.173	1.40 (0.86-2.27)
No	78(35.6)	141(64.4)				

^{*}Statistically significant.

DISCUSSION

This research among patients with long-term medical conditions (LTMCs) who accessed care from public health facilities in Yenagoa, Bayelsa State, determined the healthcare costs, cost drivers, and determinants of CHE.

The average total direct cost of a clinic visit in this study was ₦3,700 (\$10.3) using conversion rates (\$1= ₦360 as at January 2020). It was, however, much smaller compared with a similar study in Ile-Ife in 2017, which reported a much higher average total direct cost of \$137.72.¹² This could be explained because the study in Ile-Ife had captured costs incurred on admissions and other treatment modalities, such as rehabilitation, unlike this study, which focused on outpatient clinic costs.

Our study revealed the prevalence of CHE among about a third of our respondents. This was similar to other studies in Southwest and Southeast Nigeria, which reported a range of 20-40% of patients with LTMCs experienced CHE.^{12,20,21} However, a study in Kenya also reported that up to 50% of patients with chronic disease incurred CHE.²² Overall, it is clearly demonstrated that financial hardship and CHE are widespread among patients with LTMCs, especially in LMICs.

Examining the various cost subtypes, laboratory costs were significant contributors to medical expenses for patients with LTMCs, which could be due to the need for frequent monitoring tests required in their management. Similar findings were reported in studies in Nigeria and Kenya.^{16,22} Prescribed medications were a major cost driver in this study. This finding aligns with studies across Nigeria and other African countries.^{16,20,23,24} In addition, being prescribed drugs was a determinant of CHE for patients with LTMCs. The challenge isn't just about having a prescription, which is expected as part of the clinic visit during patient management.

However, financial risks are posed by having a prescription and this is a driver of CHE. It could be because patients with LTMCs are often on multiple medications, which may need to be taken for long periods of time or lifelong in some cases and they therefore ensure they do their best to pay for them. If they are on social health insurance, they will still be required to pay a co-payment for drugs, and if they were not covered by health insurance, they would have to bear that expense fully out of pocket. In another instance, for insured patients, it could be that the drugs were not available, and so they are forced to bear the full costs and may have purchased the drugs from private pharmacies at much higher costs, as was reported in Kenya.^{22,24} The implication is that over time, this expense can drive financial hardship. Furthermore, there can be cost-related non-adherence or treatment discontinuation, which may worsen their health. This study showed that patients aged >65 years had higher direct costs and a higher likelihood of CHE. This was similar to findings in other studies in Nigeria.^{20,21,25} Older patients typically experience a longer duration of disease and increased risks for complications and comorbidities, and so would require more specialized care and possibly more expensive medications.^{7,20} Furthermore, in this age group, patients may be approaching retirement or retired, are unemployed with reduced earning capacity, which further predisposes them to financial hardship.

This study revealed some remarkable variations in out-of-pocket spending and determining financial hardship across the types of LTMCs. Patients with NCDs had disproportionately higher out-of-pocket healthcare expenses than those with CDs. This was similar to findings among chronic disease patients.^{16,20,21,24,26} This high disparity could be explained by existing donor-driven subsidization of healthcare

services with CDs that cover costs such as drugs and investigations at that time. Given recent

events, this observation will change due to reduced donor funding for these programs.

Table 6: Predictors of CHE among Patients with LTMCs

Variables	Coefficient(B)	Odds Ratio (AOR)	95% CI	p value
Age category				
<35years ^R		1		
35 – 44years	0.308	1.361	0.42– 4.39	0.606
45 – 54years	1.189	3.284	0.97 – 11.09	0.056
55 – 64years	1.204	3.334	0.94 – 11.82	0.062
>65years	1.595	4.880	1.16 – 20.56	0.030*
Marital status				
Single	0.436	1.547	0.44 – 3.84	0.640
Married	-0.438	0.646	0.27 – 1.08	0.082
Separated/Widowed ^R		1		
Educational level				
No formal education	0.562	1.755	0.31 – 10.09	0.529
Primary	0.748	2.113	0.44 – 10.27	0.354
Secondary	0.662	1.938	0.42 – 8.89	0.395
Tertiary	0.440	1.553	0.33 – 7.34	0.579
Post-Tertiary ^R		1		
LTMCs				
Hypertension (HTN)	0.966	2.629	0.84–8.27	0.098
Diabetes mellitus (DM)	1.132	3.103	0.77–12.58	0.113
Tuberculosis (TB)	0.708	2.030	0.75–5.47	0.161
HIV ^R		1		
Category of LTMCs				
NCDs (HTN+DM)		1.528	0.34–6.92	0.582
CDs (HIV+TB) ^R	0.424	1		
Number of LTMCs				
Single ^R		1.612		
Multiple	0.478	1	0.78–3.35	0.200
Consultation costs				
Yes	-0.152	0.859	0.43 to 1.72	0.667
No ^R		1		
Prescribed drugs				
Yes	1.062	2.633	1.11 to 7.55	0.030*
No ^R		1		
Laboratory costs				
Yes	0.033	1.034	0.47 to 2.26	0.933
No ^R		1		
Radiology cost				
Yes	0.968	2.631	0.47 to 14.85	0.273
No ^R		1		

*Statistically significant; R: Reference group

This implies an increased likelihood of rising healthcare costs as patients with CDs will now have no choice but to pay for certain services out of pocket. Patients with TB who are fully cured

and without complications may not experience as much financial hardship as those with DM and HTN, who usually require long-term drugs. Respondents with DM incurred the highest out-

of-pocket healthcare costs, although it was not a determinant of financial hardship in our study. Diabetes has been recognized as an LTMC which is associated with very high healthcare expenses and a high predilection for causing financial hardship compared with other LTMCs.^{14,21,22,26–28} This may be because DM is a more debilitating illness compared to the other LTMCs and complications. A study in Kyrgyzstan showed that although TB treatment was subsidized, the co-occurrence with diabetes worsened financial hardship due to dual medication and monitoring costs.²⁶

Multi-morbidity has been established as a key driver of higher out-of-pocket health care expenses^{7,22} and this was similarly observed in our study, where one in three respondents had other morbidities. Multimorbidity could be exacerbated by complications, which often require overlapping specialized treatment and management, which increase costs due to the increased frequency of visits to access care and the need for more medications, tests, and other specialized care.^{21,22,27}

Health insurance has been established as a protection against high healthcare costs.¹¹ This study showed that insured patients with LTMCs spent less across the majority of the cost subtypes. Interestingly, we observe they spent more on consultation and non-prescribed drugs. Consultation cost will require further research to identify what is responsible for this, as it should be covered under health insurance. However, it was similar to study findings that tertiary hospital consultation costs were about 3 times more than primary care facilities.¹⁶ However, it is not uncommon for patients with LTMCs to buy unprescribed medication, and this may be to boost their immunity levels or help manage issues of pain and anxiety that may often

Conclusion

accompany these conditions. It is possible that the expense on unprescribed drugs by patients with LTMCs under health insurance coverage may be because they have made some cost savings from their health insurance coverage that enables them to afford these medications. There was a lower occurrence of CHE amongst respondents enrolled under health insurance and this reflects the relative financial risk protection afforded by health insurance. By having health insurance coverage, certain aspects of expenses may have been excluded thus protecting them from financial hardship.

The study had some limitations, which included reliance on self-reporting and potential recall bias; however, self-reporting is recommended for cost surveys as it offers a patient-centered perspective. As a health facility-based study, the findings only reflect patients who sought healthcare and may not be generalizable to those who did not or defaulted due to costs. The study focuses on LMICs with high out-of-pocket spending and fragmented insurance systems, with similar patterns in Sub-Saharan Africa and South Asia, which enhances contextual relevance but limits broader applicability. The study was conducted around the start of the COVID-19 pandemic, which may have affected healthcare utilization as patients avoided hospitals due to concerns about infection, potentially leading to underreported costs. Data was collected before COVID-19 caused total healthcare disruption due to lockdowns. Notably, post-pandemic economic instability could have influenced healthcare spending. Further research, such as longitudinal cost tracking, could assess how expenditure has changed since then. Undoubtedly, this study offers valuable pre-COVID data on disease costs.

This study demonstrates that people with LTMCs are faced with substantial healthcare

costs that pose a significant economic burden. Cost drivers were identified, and determinants of financial hardship were determined. Overall, findings underscore critical areas for two key policy interventions, such as age-sensitive financial protection policies, enhanced drug affordability policies, and government funding support for NCDs to mitigate financial hardship. More specifically, these interventions should explore age-specific insurance exemptions, co-payment waivers, or pension-linked health subsidies for retirees, and drug subsidization. Financial protection should be expanded and subsidized premiums instituted for patients with LTMCs. Policies on price regulation for essential LTMC medications can also be instituted.

Conflict of interest:

None

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Author contributions

Conceptualization: MUI, ODS, OOO, BS; Formal analysis: MUI, AAD; Writing – original draft: MUI; Writing – review & editing: MUI, ODS, AAD, OOO, BS. All Authors approved the final draft.

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