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Abstract

Purpose: The purpose of the study was to examine the prevalence and economic burden of hypertension in Kenya in relation to patients.

Methodology: The cost of illness approach methodology was applied to determine the study's findings and outcomes. All of the expenses associated with hypertension, both direct and indirect, are identified and quantified using this method.

Findings: Overall, the mean annual direct cost to patients was KSH 39,471.60. Medicines (mean annual cost, KSH 21,872.55, transport (mean annual cost, KSH 16,407.65, and user charges mean annual cost, KSH 7,472.15. Overall mean annual indirect cost was KSH 22,235.15. The incidence of catastrophic health care costs was 43.3% and increased to 59.0% when transport costs were included. The study demonstrates that hypertension places a considerable economic burden on patients in Kenya.

Unique Contribution to Theory, Practice and Policy: The study recommends that as Kenya reforms its health system to prioritize the attainment of UHC, there is need for interventions to provide financial risk protection to individuals with a chronic disease such as hypertension. Given that medicines are a key cost driver for patient out-of-pocket costs, one approach would be to explicitly include hypertension medicines in the universal health care benefit package that Kenyan citizens are entitled to.

Keywords: *Economic Burden, Hypertension, Direct and Indirect Costs*

JEL Codes: *I10, D2*

INTRODUCTION

Hypertension, commonly referred to as high blood pressure, is a chronic medical condition characterized by elevated levels of blood pressure in the arteries. This condition is a major risk factor for cardiovascular diseases (CVDs), including heart attacks, strokes, and heart failure, as well as chronic kidney disease and retinopathy (WHO, 2022). An estimated 7.5 million deaths worldwide are attributed to hypertension each year, making up around 12.8% of all fatalities (World Health Organization, 2021). Both developed and developing countries are affected by the notable increase in the prevalence of hypertension worldwide. About 1.13 billion people worldwide have hypertension, with the majority living in low- and middle-income nations, according to the Global Burden of Disease Study 2017 (NCD Risk Factor Collaboration [NCD, 2023]). Numerous reasons, including as urbanization, aging populations, poor diets, inactivity, and rising alcohol and tobacco use, are to blame for this increase.

In Africa, an estimated 46% of persons aged 25 and older have hypertension, making it a relatively common condition (Adeloye et al., 2015). According to recent data, between 20% to 30% of Kenyan individuals have hypertension, with urban areas having greater rates than rural ones (Ministry of Health Kenya, 2019). Numerous factors, such as socioeconomic circumstances, access to healthcare facilities, and lifestyle differences, affect the prevalence of hypertension in urban and rural areas. Kenya is committed towards attaining UHC by 2026. The Kenyan health sector is funded by different sources including; the government, out-of-pocket payments (OOP) and donors. The high level of OOP payments increases the risk of catastrophic health expenditure where households spend a large proportion of their budget on health care, which consequently have negative implications on living standards as they forego other goods and services. The incidence of catastrophic health care expenditure (at the 40% of annual non-food expenditure threshold) related to direct health care payments to providers in Kenya is estimated to be 4.52%. In addition, it has been shown that households with a member with an NCD are two times more likely to incur catastrophic health expenditure compared with households where no member has an NCD. A minority of individuals (19%) in Kenya have health insurance coverage, and almost all employees in the formal sector, which is less than one-fifth of those employed, are covered through the Social Health Authority (SHA).

LITERATURE REVIEW

A literature review on the cost of hypertension in Kenya reveals that managing hypertension incurs significant direct and indirect costs for patients, with a substantial burden particularly among those with comorbidities and those lacking adequate health insurance. Studies highlight that costs include consultation fees, medication, transportation, and lost income due to illness. Additionally, there are challenges related to limited health literacy, lack of self-management support, and ineffective referral systems, further impacting the cost and effectiveness of hypertension management. The prevalence of high blood pressure is especially According to a study published on ResearchGate, the average yearly cost of hypertension care in public facilities in Kilifi and Bungoma counties ranged from KES 7,458 to KES 13,149. According to a research on a community-based intervention, each patient who had their blood pressure regulated paid $3205 in total intervention costs. Costs varied according to the kind of institution (dispensary, health center, etc.), according to a study on the economic impact of hypertension-diabetes comorbidity in

Kiambu county. The Global Burden of Disease Study (NCD-RisC, 2024) provides a comprehensive analysis of hypertension prevalence worldwide. It highlights the dramatic increase in hypertension cases, particularly in low- and middle-income countries. The study emphasizes that the prevalence of hypertension has nearly doubled in many African countries over the past few decades, driven by factors such as urbanization, dietary changes, and reduced physical activity. Adeloye et al. (2024) conducted a systematic review and meta-analysis on hypertension prevalence in Sub-Saharan Africa, estimating a prevalence rate of 46%. The review points to inadequate healthcare infrastructure and limited public health interventions as significant contributors to the high prevalence in the region. The study underscores the need for targeted health policies to address these gaps. The WHO (2023) report on hypertension provides global statistics and highlights the regional variations in prevalence. It identifies lifestyle changes, aging populations, and health system challenges as key factors influencing the rise in hypertension, particularly in developing countries. The report calls for integrated health strategies to manage and prevent hypertension effectively.

Comprehensive information on the prevalence of hypertension in Kenya's various regions may be found in the KNHDS (Ministry of Health Kenya, 2022). According to the poll, people in urban regions report higher rates of hypertension than people in rural areas. This discrepancy is attributed to lifestyle variations and higher rates of detection in urban areas. The survey specifically revealed that 28.6% of people had hypertension, with differences between age groups (17.7% in 18–29 years and 58.3% in 60–69 years). Significantly, only a tiny percentage of people with hypertension had their blood pressure under control (12.5%), were aware of their disease (29.4%), or were already taking medication (6.5%).

METHODOLOGY

To annuitize sick visit costs, the study summed up costs incurred during current care visit and any reported outpatient visit costs that occurred due to hypertension in a year. On the other hand, to annuitize costs in other care seeking episodes described in Table 1, reported costs were multiplied by the number of visits, ie, weekly, monthly, or quarterly for each episode. Further- more, any inpatient admission costs in the last 1 year was also collected. Overall hypertension care costs for all care seeking episodes were calculated by summing up the annual costs in each care seeking episode.

For each of the care seeking episode, two broad costs categories were estimated: direct OOP costs and indirect (productivity losses) costs for both patients and their caregivers. Direct health care costs included any charges levied for medicines and user fees, ie, registration, consultation, and laboratory services. Direct non–health care costs included transport costs to and from a health provider and any costs associated with food and accommodation while seeking care. For this descriptive analysis, OOP costs were defined as the sum of direct health care and direct non– health care costs. Analysis was restricted to patients who reported any OOP costs for each care seeking episode.

Indirect costs were estimated based on the total hours lost while seeking care as well as the cost of illness- related to lost home productivity for both patients and their caregivers, assuming that these hours would have been used for productive activity in the absence of hypertension. Income lost due to hypertension illness was therefore estimated by multiplying the estimated number of lost

production hours due to hypertension by the official minimum wage. It was assumed an average workday of 8 hours per day and 22 working days per month. Caregivers' lost home productivity was also estimated by multiplying the total number of hours spent by caregivers caring for the patient by the official minimum wage rate.

Income was estimated by asking detailed questions about income categories, including patient income, income for household members, welfare payments, and government assistance. As a measure of financial risk protection, the study compared total direct costs incurred against annual household income and total direct costs excluding transport costs and defined costs as catastrophic if they exceeded 40% of household income.

Table 1: Care Seeking Episodes Included in Patient Cost Analysis

Care Seeking Episode	**Description**	**Recall Period**
Sick visit	Cost of current care seeking and any out-patient visit when the patient fell ill due to hypertension outside the scheduled clinic appointments	1 mo
Inpatient visit	Cost of admission due to hypertension	12 mo
Drug collection visit	Cost of regular medication prescribed to the patient to manage hypertension	Frequency of drug collection, ie, monthly/quarterly
Laboratory/diagnostic visits	Cost of routine lab/diagnostic services done at a health facility	Frequency of lab/diagnostic services, ie, monthly/quarterly
Scheduled clinic check-up visits	Costs due to regular clinic appointments	Frequency of clinic appointments, ie, monthly/quarterly

RESULTS

Patient Costs Associated With Health Care Use

Sick Visit Costs

Of the patients, 36% sought treatment outside of their regular clinic appointments. Out of all the direct OOP costs, transportation expenses during a sick visit accounted for the largest cost category (42.2%). For such outpatient ill visits, patients suffered significant indirect expenditures (mean annual cost, KSH14,698.25; 95% CI) (Table 3).

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Table 3: Mean and Median Annual Hypertension Care Cost in Kenya (2024 KSH)

Care Seeking Episode	Cost Category	Mean KSH	Median KSH	As a % of Total Direct Costs
Sick visit	Direct health care costs			
	User charges	10,230.50	4,040.40	18.2
	Medicines	18,233.60	8,249.15	38.3
	Direct non–health care costs			
	Transport	22,520.05	9,077.95	42.2
	Food	595.70	0	1.3
	Subtotal (direct costs)	51,566.90	27,816.60	
	Indirect costs	14,698.25	11,279.45	
	Direct + indirect costs	66,265.15	42,463.05	
In-patient admission	Direct health care costs			
	User charges	6,578.60	4,156.95	49.8
	Medicines	3,108.00	2,149.70	22.5
	Direct non–health care costs			
	Transport	1,825.95	764.05	15.7
	Food[a]	3,664.85	1,333.85	12.0
	Subtotal (direct costs)	1,693.85	8,352.75	
	Indirect costs	8,702.40	4,040.40	
	Direct + indirect costs	20,396.25	16,174.55	
Medicine collection	Direct health care costs			
	Medicines	4,843.30	2,667.70	75.2
	Direct non–health care costs			
	Transport	4,713.80	3,043.25	20.7
	Food	3,108.00	1,528.10	4.1
	Subtotal (direct costs)	6,008.80	3,043.25	
	Indirect costs	5,024.60	3,768.45	
	Direct + indirect costs	9,142.70	5,827.50	
Diagnostic visit	Direct health care costs			
	Test	1,204.35	841.75	14.4
	Direct non–health care costs			
	Transport	4,674.95	3,043.25	74.2
	Food	3,159.80	3,043.25	11.3
	Subtotal (direct costs)	4,118.10	1,825.95	
	Indirect costs	4,299.40	3,030.30	
	Direct + indirect costs	5,516.70	3,716.65	
Scheduled clinics	Direct health care costs			
	User charges	1,424.50	867.65	17.9
	Medicines	4,649.05	2,136.75	45.8
	Direct non–health care costs			
	Transport	2,590.00	1,528.10	34.0
	Food	2,473.45	1,528.10	2.3
	Subtotal (direct costs)	6,941.20	4,014.50	
	Indirect costs	4,053.35	2,978.50	
	Direct + indirect costs	10,994.55	7,070.70	
Overall costs	Direct health care costs			
	User charges	7,472.15	3,664.85	16.7
	Medicines	21,872.55	10,916.85	42.4
	Direct non–health care costs			
	Transport	16,407.65	7,614.60	38.4
	Food	5,995.85	3,496.50	2.2
	Subtotal (direct costs)	39,471.60	18,298.35	
	Indirect costs	22,235.15	18,311.30	
	Direct + indirect costs	61,706.75	36,609.65	

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Interpretation and Discussion of Results

Inpatient Costs

The median number of hypertension-related admissions the year preceding data collection was one with each inpatient admission lasting a median of four days. Of the total direct costs, user charges especially during an inpatient admission were a substantial cost compared with other care seeking episodes, with respondents spending an average of KSH 6,578.60 per annum. This was followed by food and/or accommodation costs (mean annual cost, KSH 3,664.85). Not surprisingly, indirect costs (mean annual cost, KSH 8,702.40) for an inpatient admission were high compared with direct costs.

Medicine Collection Costs

Most patients incurred costs on monotherapy or two-drug regimens at the time of the study. Enalapril and hydrochlorothiazide was the most expensive combination of all prescribed antihypertensive medicines attracting mean annual cost of KSH 5,659.15. On the other hand, slightly more than half (57.1%) of the patients reported obtaining their routine medicines from a public hospital. Medicines accounted for 75.2% of total OOP costs during a medicine collection visit while transport and food accounted for 20.7% and 4.1%, respectively.

Diagnostic/Laboratory Test Costs

The main routine diagnostic test for hypertensive patients was blood pressure and weight (mean annual cost, KSH155.40). Diagnostic costs were likely low given that blood pressure and weight are checked for free at public health care facilities. Other reported tests were blood pressure (annual mean cost, KSH168.35) and urinalysis and echocardiogram (annual mean cost, KSH 582.75). The mean annual direct cost for seeking diagnostic or laboratory test services was KSH 4,118.10 with transport costs accounting for 74.2% of total OOP costs.

Scheduled Clinic Appointment Costs

Half (52.8%) of the respondents attended their routine clinics monthly. The highest direct cost category during scheduled clinic appointments was medicines accounting for 45.8% of total OOP costs followed by transport (34%), user charges (17.9%), and food (2.3%).

Table 4: Drug Combination Costs

Drug Name	Mean KSH (95% CI)
Enalapril	4,869.20
Hydrochlorothiazide	3,354.05
Nifedipine	4,105.15
Enalapril + hydrochlorothiazide	4,105.15
Nifedipine + enalapril	2,097.90
Nifedipine + hydrochlorothiazide	3,729.60
Nifedipine + hydrochlorothiazide + enalapril	4,739.70
Other combinations*	3,820.25

Abbreviations: CI, confidence interval; IQR, interquartile range.

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Asterisk is used to describe "Other combinations" as indicated: * Aminosaliysilic Acid + Atorvastatin = 1; Aminosaliysilic Acid

+ Losartan = 1; Amlodipine + Aminosaliysilic Acid + Digoxin = 1; Methyldopa = 1; Amlodipine + Amitriptyline = 1; Atenolol= 1; Losartan + Atenolol = 1; Losartan = 1; Unknown = 2

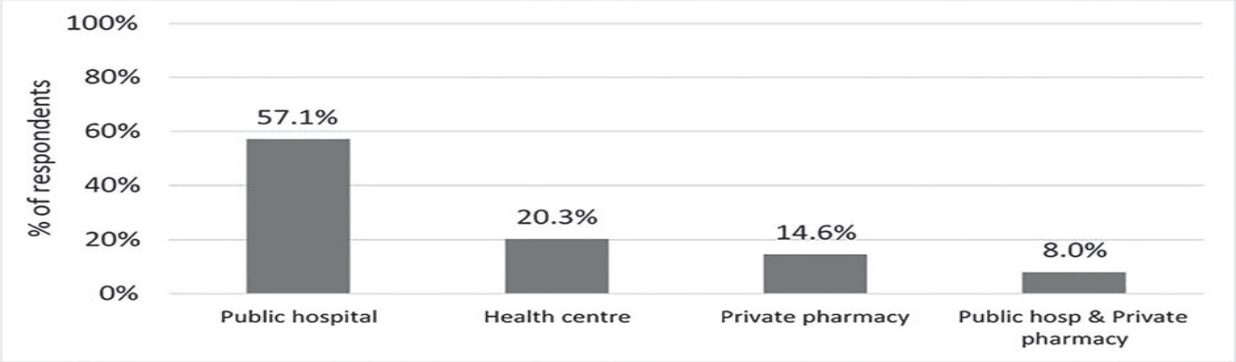

Figure 1: Source of Hypertension Medicines

Overall Hypertension Care Costs

Overall, the average direct annual costs for all hypertension care seeking episodes was KSH 39,471.60. Under direct costs, medicines (mean annual cost, KSH 21,872.55 attracted the largest share of costs (42.4%) followed by transport (mean annual cost, KSH 16,407.65, which represented 38.4% of total patient costs. User charges (mean annual cost, KSH 7,472.15, food (mean annual cost, KSH 5,995.85, and accommodation (mean annual cost, KSH 3,600.10 accounted for 16.7%, 2.2%, and 0.3% of total direct costs, respectively. The overall mean indirect annual costs due to hypertension care seeking was KSH 22,235.15.

Impact on Household Income and Coping Strategies

Costs for hypertension services were catastrophic for more than half (59%) of the households if all direct costs were considered. Alternatively, 43.3% of households experienced catastrophe if transport costs were excluded. Among respondents experiencing catastrophic costs, the poorest group of patients incurred higher direct costs with fewer resources to pay for it. The study found that most of the patients were unable to pay for hypertension treatment from their existing income sources and had to rely on savings (43.9%), borrowing from family/friends (25.1%), or sale of assets (31%), of which 33.3% was livestock. None of the hypertension patients reported receiving reimbursement for OOP costs incurred from either an insurance company or employer when seeking care for hypertension.

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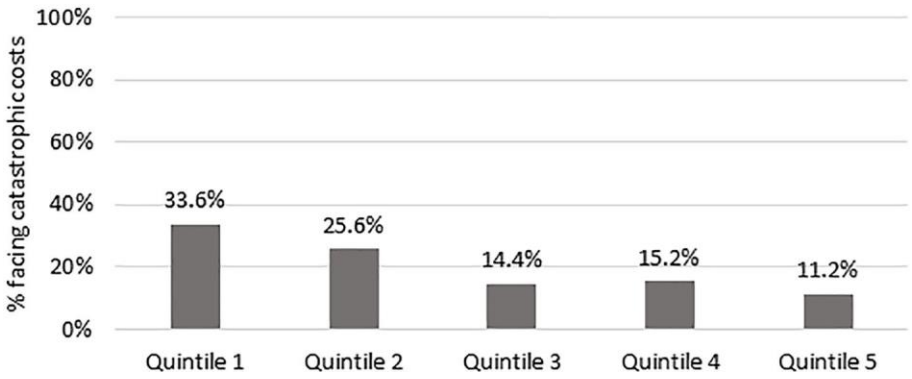

Figure 2: Relationship between Catastrophic Costs and Socio-Economic Status (Social-Economic Status Is Represented By Wealth Quintiles: Quintile 1 Represents the Lowest Socio-Economic Group, While 5 Represents the Highest)

Productivity and Social Impact of Hypertension

Patients were asked to estimate the number of work days they missed in the last 1 year due to hypertension, 30% reported they missed 18-184 working days. Forty-two percent of respondents reported disrupted social life due to hypertension. Hypertension imposes significant productivity costs in East African countries through absenteeism, reduced work efficiency (presenteeism), unemployment, and premature death, impacting individuals, businesses, and national economies by lowering earnings and tax revenues. Policy implications include investing in primary healthcare, improving access to affordable medications, implementing health education for prevention, expanding health insurance coverage to reduce out-of-pocket expenses, leveraging digital health solutions, and integrating comprehensive lifestyle interventions like salt reduction programs to mitigate the productivity loss and economic burden of hypertension.

Limitations of the Study

Limitations of the study includes incomplete or unreliable records where many health facilities in Kenya lack comprehensive and standardized data systems, which can lead to underestimation or overestimation of costs. The study is also limited to whether prevalence-based or incidence-based costing was applied, results may not fully capture lifetime economic burden. The study also excluded intangible costs: Pain, suffering, psychological stress, and reduced quality of life are rarely monetized, leading to an incomplete picture. Further underestimate or misrepresent the true economic burden of hypertension in Kenya due to data gaps, methodological constraints, limited representativeness, and challenges in measuring indirect and intangible costs.

Discussion and Conclusions

This study has documented patient costs for adults with hypertension that sought care in facilities in Kenya. The findings show that patients cost for hypertension are driven by medicines. This is particularly worrisome given that unaffordability of hypertensive medicines is a likely cause of uncontrolled hypertension. Consequently, this is likely to interfere with continuity and comprehensiveness of care as patients only seek care when they have access to funds. About half

(57.7%) of the hypertensive patients reported they obtained their medicines from a public hospital. This suggests the possibility of infrequent antihypertensive drug supply in the facilities. Medicines availability is a major factor influencing health care seeking behaviour. Strategies to strengthen and expand access programmes to improve the availability of medicines for chronic diseases including antihypertensive medicines should be implemented to address such deficiencies. Additionally, health being a devolved function in Kenya, county governments should develop mechanisms to ensure regular supply of antihypertensive medicines in public facilities and more generally improve financial access to these medicines.

Patients reported a median time of 30 minutes to access the clinics either by public means of transport or by walking; the cost of travelling to the medical clinics for different care seeking episodes was found to be a significant driver of patient costs. For instance, while the incidence of catastrophic health care costs was 43.3%, it increased to 59.0% when transport costs were included. This could have negative access effects especially on poor patients as high transport costs and long distance to health facilities have been shown to hinder the poor from benefiting in pro-poor health financing reforms in Kenya.

A high number of patients (36%) reported a sick visit out of their scheduled clinic appointment. This indicates that poor management of hypertension impacts both the health and the economic burden for patients as evidenced by high costs on transport (mean annual cost, KSH 22,520.0) and medication (mean annual cost, KSH18,233.60). In addition, high user charges seen in all care seeking episodes, particularly during an inpatient admission, are potential barriers to care seeking given that the negative impacts of user charges in low resource settings, which have been well documented. There is substantial variation in patient costs between the inpatient and outpatient care seeking episodes. Inpatient admission costs represent a substantial economic burden.

Patients had to sell their property in order to meet associated costs of hypertension management in keeping with other assessment of the impact of health expenditures on households. The fact that about 36.1% of the Kenyan population live below the national poverty line indicates that patients are unable to meet treatment-related expenditure for hypertension and had to adopt negative coping strategies such as borrowing or relying on family or social networks for assistance. One of the interventions for achieving the UHC goal of financial risk protection being pursued in Kenya and other LMICs is expansion of coverage under prepayment schemes such as social health insurance. The results show that three quarters of sampled hypertensive patients were not subscribed to any health insurance scheme reflecting coverage levels at a national level in Kenya where 80% of the population are not covered by any health insurance scheme. This means that hypertensive patients, especially those belonging to the lower rungs of the income ladder, bear a disproportionately higher burden of OOP, hence making them certain candidates to "medical poverty trap" where poor patients have to cope with the effect of reduced disposable income for other consumptions, which in turn increases poverty.

The study demonstrates that hypertension places a considerable economic burden on patients in Kenya. As Kenya reforms its health system to prioritize the attainment of UHC, the results suggest that there is need for interventions to provide financial risk protection to individuals with a chronic disease such as hypertension. Given that medicines are a key cost driver for patient out-of-pocket costs, one approach would be to explicitly include hypertension medicines in the universal health

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