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RESEARCH

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Household economic burden of type-2 diabetes and hypertension comorbidity care in urban-poor Ghana: a mixed methods study

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Abstract

Background Non-communicable diseases (NCDs) predispose households to exorbitant healthcare expenditures in health systems where there is no access to effective financial protection for healthcare. This study assessed the economic burden associated with the rising burden of type-2 diabetes (T2D) and hypertension comorbidity management, and its implications for healthcare seeking in urban Accra.

Methods A convergent parallel mixed-methods study design was used. Quantitative sociodemographic and cost data were collected through survey from a random community-based sample of 120 adults aged 25 years and older and living with comorbid T2D and hypertension in Ga Mashie, Accra, Ghana in November and December 2022. The monthly economic cost of T2D and hypertension comorbidity care was estimated using a descriptive cost-of-illness analysis technique from the perspective of patients. Thirteen focus group discussions (FGDs) were conducted among community members with and without comorbid T2D and hypertension. The FGDs were analysed using deductive and inductive thematic approaches. Findings from the survey and qualitative study were integrated in the discussion.

Results Out of a total of 120 respondents who self-reported comorbid T2D and hypertension, 23 (19.2%) provided complete healthcare cost data. The direct cost of managing T2D and hypertension comorbidity constituted almost 94% of the monthly economic cost of care, and the median direct cost of care was US$19.30 (IQR:10.55–118.88). Almost a quarter of the respondents pay for their healthcare through co-payment and insurance jointly, and 42.9% pay out-of-pocket (OOP). Patients with lower socioeconomic status incurred a higher direct cost burden compared to those in the higher socioeconomic bracket. The implications of the high economic burden resulting from self-funding of healthcare were found from the qualitative study to be: 1) poor access to quality healthcare; (2) poor medication adherence; (3) aggravated direct non-medical and indirect cost; and (4) psychosocial support to help cope with the cost burden.

Conclusion The economic burden associated with healthcare in instances of comorbid T2D and hypertension can significantly impact household budget and cause financial difficulty or impoverishment. Policies targeted

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at effectively managing NCDs should focus on strengthening a comprehensive and reliable National Health Insurance Scheme coverage for care of chronic conditions.

Keywords Non-communicable diseases, Comorbidity, Economic burden, Healthcare, Urban, Ghana

Introduction

Globally, non-communicable diseases (NCDs) lead to about 15 million premature deaths annually [1, 2], and about eight in every ten deaths occur in low-and-middle-income countries (LMICs) [3]. World Health Organization (WHO) has projected that by 2025, NCDs will account for over 70% of all deaths globally, with more than 80% of the death occurring in developing countries [4]. Developing countries will incur NCDs related economic losses of US$21.3 trillion over the next two decades [5]. Existing literature indicates that diabetes, cancer, chronic lung diseases and cardiovascular diseases (CVD), alongside mental health, will cumulatively pose a global economic loss of 47 trillion US$ by 2030. This estimate is about 75% of the global gross domestic product (GDP) [6], which is projected to have disproportionate impacts on LMICs due to their fragile health systems. Approximately 10% of households globally are faced with high healthcare spending, of which the situation is projected to be worse in African countries [7]. In addition to Africa battling the attainment of universal health coverage (UHC) and financial risk protection schemes, over 2 billion people lack efficient, equitable and adequately funded healthcare systems [8]. Compared to high-income countries (HIC), the household financial burden of NCDs care in LMICs is much higher [9, 10].

Evidence suggests that NCDs predispose households to a higher risk of health expenditure [11]. For instance, the mean household total costs per year in LMICs of CVD, cancers and diabetes were US$6055.99, US$3303.81 and US$1017.05 respectively [9]. The mean annual financial cost of managing one diabetic case at the outpatient clinic in Ghana was estimated at US$194.09 [12] and the mean healthcare management cost was US$38.68 [13]. Also, uncontrolled hypertension was found to be independent predictor of a higher cost of treatment in patients who died compared to those who survive in urban Ghana [14]. Excessive out-of-pocket (OOP) spending on healthcare services weakens households financially by wiping out savings and other durable resources, thereby plunging families into poverty [15]. Poor and vulnerable groups are least likely to obtain treatment for NCDs due to the high impact of OOP spending [16, 17]. Meanwhile, there is growing evidence that governments' expenditures on healthcare in SSA rarely focus on NCDs, suggesting that the costs of healthcare are passed on to patients [18, 19]. Also, available evidence suggests there is poor coverage of NCD care by National Health Insurance Schemes [20], including Ghana. These phenomena hamper progress towards the attainment of UHC [11].

Comorbidity (co-existence of two or more conditions within an individual) is a growing public health challenge globally [21], substantially effecting individuals, carers and society [22]. Meanwhile, healthcare models in many LMICs have been designed to manage single health conditions rather than multiple conditions. Comparatively, individuals with comorbid chronic conditions often suffer higher rates of unplanned hospitalizations and frequent use of emergency services than those with single conditions [23]. In healthcare systems similar to Ghana where health insurance is ineffective and out of pocket payment as well as co-payments for healthcare is high, comorbidity exert more catastrophic healthcare expenditure on households [23, 24]. Although the Ghana National Health Insurance Scheme (NHIS) benefit package is supposed to cover essential services like lab diagnosis and medicines, these often are not accessible to patients. The benefit routinely ends at catering for consultation fee. Consequently, most individuals with multiple chronic conditions become economically dependent on their relatives and support networks [23, 24]. Also, the high healthcare cost drive people with NCDs to seek relatively more affordable alternative means of treatment (i.e., herbal and spiritual) to complement or completely replace orthodox medication [25, 26].

There is a dearth of research on the effects of the healthcare-related economic burden of NCDs comorbidity on patients in Africa [27, 28]. Although NCDs multimorbidity cause high financial burdens on households [29, 30], the full extent of the economic burden that patients endure while seeking and receiving care is seldom reported. Costs incurred at each stage of the cascade of care (i.e., screening and diagnosis, treatment, management, and palliative care) include direct medical and non-medical costs, as well as indirect costs. These costs have implications for healthcare for people with NCDs, including comorbid T2D and hypertension [31]. Another major limitation in the literature is that, despite increasing scholarship on the economic burden caused by NCDs globally, most of the existing literature is from high-income countries and is disease specific [32–34].

As part of the 'Contextual Awareness, Response and Evaluation: Diabetes in Ghana' (CARE-Diabetes) project [35] (a mixed-methods study to generate a contextual

understanding of T2D in an urban poor population), this study estimated the economic burden associated with T2D and hypertension multimorbidity in urban Ghana and discussed implications for interventions targeted at improving financial risk protection in vulnerable population in Ghana and other similar LMICs.

Methods

Study design

A convergent parallel mixed-methods study design was used. Quantitative and qualitative data were concurrently collected independently and analysed to assess the burden imposed by T2D and hypertension comorbidity, and its implications for healthcare. A descriptive cost-of-illness (COI) approach was used to estimate the economic burden of managing comorbid T2D and hypertension. The COI is a study method used to evaluate the economic burden imposed by an illness on individuals, institutions and/or society as a whole [36]. We further conducted focus group discussions (FGDs) to explore the cost burden implications for healthcare. Given that the CARE-Diabetes study focused on T2D, only the participants that self-reported an earlier diagnosis of T2D (index case) and co-occurrence of hypertension were used in this study.

Study setting

The study was carried out in Ga Mashie, a densely populated impecunious urban setting comprising two indigenous communities, namely James Town and Ussher Town, located in the Greater Accra Region of Ghana. The mean monthly household income in the study setting is USD78.83, and about three-quarters of the population have attained up to Junior High School (or middle school) education and above [37]. The twin towns, i.e., James Town and Ussher Town, are indigenous communities with fishing, petty trading and other fishing-related activities being the main economic activities and primary sources of livelihood for community members. Health services are provided mainly by government hospitals including Ussher Town Polyclinic and the Korle-Bu Teaching Hospital, a tertiary-level healthcare facility located close by. Also, there are few private hospitals offering healthcare services to the residents. More details of the study settings can be found elsewhere [35].

Sample size and sampling

Quantitative study

This study was part of the CARE-Diabetes project[35], which had a target sample size of 1,242 adults aged ≥ 25 years within 959 households across 80 enumeration areas (EAs) of Ga Mashie. The sample size was determined on the ability to estimate the prevalence of T2D, and the sample was randomly selected from the 2021 population census [38]. The study excluded pregnant women or those who had given birth within the past six months as well as individuals who were unable to provide informed consent or had difficulty completing the survey, including those who were mentally incapacitated. All participants (n = 120) who self-reported T2D and hypertension were included in the present analysis.

Qualitative study

Likewise, the qualitative study used data from the CARE-Diabetes project. This study used 13 focus group discussions (FGDs) with community members. The participants included men and women with T2D and hypertension comorbidity, and people caring for relatives with the comorbid conditions. The respondents were enlisted using three sampling techniques. Firstly, relying on T2D patients scheduled for appointment on NCD clinic day at the Ussher Hospital (the main public health facility serving the people of Ga Mashie), we identified people with T2D and recruited them for FGD on the first day of data collection. Secondly, using the people with T2D identified from the hospital as index, a snowball technique was used to identify and recruit community members with comorbid T2D and hypertension. The snowball process continued until the required number of participants for the 5 FGDs was reached. Thirdly, participant (caregivers) without comorbid T2D and hypertension (n = 8) were recruited using convenient sampling technique, whereby a community liaison guided the research team to select potential participants from across the community.

Data collection

Quantitative

Forty enumerators were recruited and trained to gather survey data on Open Data Kit (ODK) using mobile tablets in November and December 2022 [35]. Prior to data collection, the survey questionnaire was pretested in a different community outside Ga Mashie. Overall, 854 individuals completed the survey for the CARE-Diabetes project. Of this number, 120 (14%) self-reported co-morbid hypertension and T2D, all of whom were included in the present analysis.

Qualitative

Using pretested FGD guides, a total of 13 FGDs among community members with and without T2D and hypertension comorbidity were conducted from November to December, 2022 in the two predominant local dialects (Ga and Twi). The participants were different from those who participated in the survey. The topic guides were developed based on a literature review, and used to gather information on social norms, experiences, and

attitudes regarding prevention, control, and care-seeking for T2D and hypertension comorbidity. Prior to the data collection, the topic guide was pretested in a different community. Copies of the FGD topic guides are attached to this manuscript as Supplementary files. The FGDs were led by trained research assistants. The training focused on the study guides and standard operating procedures (SOPs) for qualitative interviews. The total number of FGDs was considered sufficient for thematic saturation (i.e., no new information could be harnessed from interviews) [39]. The FGDs lasted for approximately one hour and were recorded digitally and detailed notes of the interactions were taken.

Data analyses

Quantitative analysis

We generate a household wealth index using Principal Components Analysis (PCA) [40]. For the PCA, we selected and inputted into the model 15 out of the 23 assets, because they were reported to be owned by ≥ 5% but ≤ 95% of households. We also inputted into the PCA model whether the household had access to improved sources of drinking water, toilet facilities, gas or electricity as cooking fuels, and a separate room for the kitchen and the number of rooms in the household. We categorised the generated household wealth index into tertiles, specifically as 'most poor', 'poor,' and 'least poor.'

Direct and indirect cost analyses were conducted using Microsoft Excel and STATA version 17. We adjusted for cluster and unequal probability survey design in the analysis by weighting. Direct medical cost was estimated by summing total cost incurred by people with comorbid T2D and hypertension on consultation, diagnostics and medication. Non-medical was estimated by summing the total cost of travel to and from hospital for comorbid T2D and hypertension medical care during the past one month. Total direct cost was estimated by summing the total direct medical and non-medical costs. The median and interquartile range were estimated. Indirect cost was estimated using the human capital approach (HCA). The HCA is a method commonly used to estimate lost productivity that results from disease, disability or premature death—which is an important component of the economic burden of chronic conditions [41]. Indirect cost was estimated by multiplying total productive hours lost (i.e., seeking comorbid T2D and hypertension care by patient and their caregiver). The national minimum wage per day of GHS13.53 for Ghana (US$1.00 equivalent to GHS8.58 (Bank of Ghana mean monthly interbank exchange rate, December 2022) was used to estimate value lost to productivity (Ministry of Finance, December 2022). The ratio of direct cost to income, by sex and socioeconomic status, was analysed. The mean economic cost of managing comorbid T2D and hypertension was estimated by dividing the sum of direct and indirect costs by the total participants. The robustness of cost estimates was tested through one-way and multi-way sensitivity analyses. This was done by varying critical cost components of the data which lacked certainty (i.e., medications and wages) by 3%, 8%, and 10% [42].

Qualitative analysis

All FGDs were transcribed and translated into English by trained fieldworkers who also conducted/facilitated the interviews. Transcripts were analysed thematically using the framework approach [43]. By this, a deductive coding framework was developed jointly by three of the authors based on existing literature on the consequences of the direct cost of managing comorbid T2D and hypertension for healthcare [44]. The framework was expanded when new codes or themes emerged through joint deliberation and review of the transcripts by the three authors (inductive approach). All transcripts were loaded into QSR NVIVO Version 11 to facilitate data coding and analysis. The thematic coding was done by the first author (who was part of the joint review and has extensive experience in qualitative thematic analysis). One person did the coding because the involvement of three authors in the development of the coding framework allowed for consensus building on all the codes relative to its alignments with the respective themes. After coding, the three authors jointly reviewed the output, and resolved any discordance between codes and themes. The coding exclusively focused on the consequences of direct OOP cost in the management of T2D and hypertension comorbidity on patients' healthcare. Data are reported following the Consolidated Criteria for Reporting Qualitative Research (COREQ) [45].

The findings from the qualitative and quantitative works were synthesized by categorizing the findings to identify complementary themes that correspond with the research questions about the economic cost burden (direct and indirect cost) and its consequences for healthcare for people with T2D and hypertension co-morbidity [46].

Results

Findings from the quantitative study

Survey data were gathered from 854 individuals in 629 households (household response rate of 66%; individual response rate of 69%). Of the 854 individuals who completed the survey, 120 (14%) self-reported comorbid T2D and hypertension, all of whom were included in the present analysis. However, the cost analysis included 23/120 (19.2%) comorbid T2D and hypertension individuals that provided completed healthcare cost data. Individuals

who could not provide complete set of direct and indirect cost data were excluded in the economic burden analysis. As shown in Table 1, many of the survey respondents were women (81.7%). More than half were ≥ 60 years, and most were unemployed (51.7%). Almost a quarter of the respondents reported that their healthcare was funded by co-payment and insurance jointly. A third reported funding their healthcare by insurance, whereas 42.9% reported funding solely out-of-pocket (OOP). Of the 94 participants of the FGDs, most were females (52.1%), almost two-third were widowed/single, and more than 56% were aged 25–49.

As presented in Table 2, over 80% of the survey participants who provided complete direct and indirect costs information and were actually included in the economic cost analysis were females. The majority of the participants (60.9%) were employed, and most paid directly out-of-pocket for health care (42.9%).

As shown in Table 3., the direct cost of managing T2D and hypertension comorbidity constituted almost 94% of the total economic cost of care, and the median monthly direct household cost of care was US$19.30 (IQR:10.55–118.88).

Further analysis of the proportion of direct cost to income, by patients' socioeconomic status and sex, are presented in Table 4. The absolute value of the mean direct cost for the poorest tertile was higher than the absolute value of the mean direct costs for the other wealth tertiles, although our sample size was too small to assess for statistical differences among groups. Also, men reported spending 122% of their income on healthcare compared to women (76.5%), although our sample size was too small to assess for statistical

Table 1 Socio-demographic characteristics of study participants

Variable	Survey Participants (*n* = 120)		Qualitative Participants (*n* = 94)	
	N	%	N	%
Sex:				
Male	22	18.3	45	47.9
Female	98	81.7	49	52.1
Age (years)[a]:				
25–49	18	15.0	53	56.4
50–59	34	28.3	13	13.8
60–69	35	29.2	23	24.5
70 +	32	26.7	5	5.3
Non-response	1	0.8		
Educational level:				
No education	17	14.2	5	5.3
Primary	27	22.5	67	71.3
Secondary +	76	63.3	22	23.4
Marital status:				
Married/living together	44	36.7	27	28.7
Divorced/Separated	25	20.8	5	5.3
Widowed/never married	51	42.5	62	66.0
Employment status:				
Unemployed	62	51.7	-	-
Employed	58	48.3	-	-
Care payment mode:				
Insurance only	40	33.3	-	-
Insurance + OOP[b]	29	23.8	-	-
OOP only	51	42.9	-	-
Socioeconomic status:				
Most poor	51	42.5	-	-
Poor	34	28.3	-	-
Least poor	35	29.2	-	-
Total	**120**	**100.0**	**94**	**100**

[a] One female survey respondent refused to provide her age; [b]OOP: out-of-pocket

Table 2 Demographic characteristics of cost analysis participants

Variable	N	%
Sex:		
Male	4	17.4
Female	19	82.6
Age (years):		
25–49	2	8.7
50–59	7	30.4
60–69	12	52.2
70 +	2	8.7
Educational level:		
No education	5	21.7
Primary	3	13.0
Secondary +	15	65.2
Marital status:		
Married/living together	5	21.7
Divorced/Separated	6	26.1
Widowed/never married	12	52.2
Employment status:		
Unemployed	9	39.1
Employed	14	60.9
Care payment mode:		
Insurance only	7	33.3
Insurance + OOP[a]	5	23.8
OOP only	9	42.9
Socioeconomic status:		
Most poor	7	30.4
Poor	10	43.5
Least poor	6	26.1
Total	**23**	**100.0**

[a] OOP: out-of-pocket

Table 3 Estimated T2D and hypertension comorbidity management cost per month

Cost type	Cost component (*N*=23)	Median (US$) (IQR[a])	Cost profile (%)
Direct cost	Medical cost		
	Consultation, tests & Medicines	13.99 (8.16-116.55)	86.0
	Non-medical cost		
	Travel	3.26 (1.17-5.24)	7.6
Total direct cost		15.15 (9.32-116.55)	**93.6**
Indirect cost			
Value of patient days lost to hosp.		1.58 (1.58-1.58)	2.2
Value of caregivers' days lost		3.15 (1.58-55.19)	4.2
Total indirect cost		**3.15 (1.58-7.88)**	**6.4**
Total comorbiditymanagement cost		**19.30 (10.55-118.88)**	**100.00**

[a] Interquartile range

National minimum wage per day of GHS13.53 was used to estimate value lost to productivity (Ministry of Finance, December 2022)

1 – US$1.00 equivalent to GHS8.58 (Bank of Ghana mean monthly interbank exchange rate, December 2022)

Table 4 Proportion of mean direct cost to mean income per month, by socioeconomic status and sex

Variable	N(%)	Mean income [US$ (SD)]	Mean direct cost [US$ (95% CI)]	Proportion of cost burden to income
Wealth tertiles:				
Most poor	17(51.5)	33.02 (6.74–59.30)	91.62 (0.00–194.15)	277.5
Poor	10(30.3)	75.76 (21.50–130.01)	59.36 (0.00–136.28)	78.4
Least poor	6(18.2)	83.53 (32.77–134.29)	36.03 (0.00–88.15)	42.3
Sex:				
Men	4(17.4)	72.84 (0–167.62)	89.10 (0.00–167.19)	122.3
women	19(82.6)	68.87 (24.81–112.93)	52.71 (0.00–129.87)	76.5
Care payment mode:				
Insurance only	7(30.4)	109.79 (83.62–135.97)	63.07 (0.00–135.53)	57.4
Insurance + OOP[a]	6(26.1)	43.73 (22.32–65.14)	23.73 (0.00–56.27)	54.3
OOP only	10(3.5)	72.00 (6.12–137.89)	87.88 (0.00–181.01)	122.0
Overall		**73.96 (25.92–122.01)**	**59.82 (0.00–134.67)**	**80.9**

1 – US$1.00 equivalent to GHS8.58 (Bank of Ghana mean monthly interbank exchange rate, December 2022); [a]OOP: out-of-pocket

differences among groups. Furthermore, patients that paid for healthcare directly out of pocket spent over 100% of their income on care.

Findings from the qualitative study

The findings presented above on the proportion of the income expended on the direct cost of healthcare demonstrate the huge cost burden posed on people with comorbid T2D and hypertension. The remaining results sections focus on the implications of this cost burden on healthcare seeking, from the perspectives of patients and their caregivers (those without T2D and hypertension).

Implications of economic burden of managing T2D and hypertension comorbidity on healthcare seeking

The possible implications of the economic burden imposed by comorbid T2D and hypertension are classified into four broad themes and further elucidated in the subsequent sections of the results. These were: 1) poor access to quality healthcare; (2) poor medication adherence; (3) direct non-medical and indirect treatment cost aggravating burden; and (4) psychosocial support helps to cope with economic burden.

High treatment cost impacts access to quality healthcare

The high cost of managing T2D and hypertension comorbidity posed a huge burden for people living with

these conditions. Most of the study respondents emphasized that availability and quality of healthcare were not a problem; however, affordability was a major hindrance to access. Thus, obtaining quality treatment was tied to the patient's ability to pay for health services. Meanwhile, the extent of healthcare services offered depended on the patient's ability to pay OOP at the point of seeking care. Even with the National Health Insurance Scheme (NHIS), patients were denied medication when they could not afford to pay OOP. The cost of healthcare services including labs, diagnostic tests, and certain medications often deter healthcare utilisation. Scheduled appointments were not adhered to due to the cost of health services.

"The healthcare provision is good, but it all depends on money. Treatment is not free, even though the health insurance covers part of the treatments, it does not cover most of the labs done by people living with T2D and hypertension." (Man with comorbid T2D and hypertension)

"The main obstacle to accessing the services is the cost…The cost of the services, including lab, diagnostic tests, and medications, can be prohibitive. It prevents people from getting the care they need, even when they have an appointment scheduled." (Woman with comorbid T2D and hypertension)

The inability to afford quality biomedical care led to plurality of healthcare, further complications and deteriorated conditions of patients. Some respondents shared experiences of the devastating consequences of their inability to meet the financial strains posed by direct and indirect costs of care. Due to the cost barrier to approved biomedical care, comorbid patients resorted to inferior treatment from multiple sources, which often worsen cost burden and health outcomes. That said, some patients noted that the use of complementary alternative medicines was also not cheap.

"They gave me the excuses that the health insurance does not cover the bills of the lab test. I resorted to using herbal medicine and going for prayers at different churches. After two years, I went to checkup on the same issue again at the hospital, and they realized the illness has worsened." (Woman with comorbid T2D and hypertension)

"Using Korle Bu hospital as an example, if you or any member of your family is admitted and you do not have the financial means to cater for the bills, I am sorry you will die. I have had a personal experience with them when my wife was admitted... Meanwhile herbal medicine is also not cheap" (Man with comorbid T2D and hypertension)

Furthermore, the limited and unreliable NHIS coverage contributes to the direct cost burden. This is mainly because of a lack of knowledge on NHIS coverage by people with T2D and hypertension. Whereas some respondents believed that T2D and hypertension services were supposed to be free under the NHIS, others believed just a portion was covered. There was a widely held view among respondents that treatments for NCDs, particularly T2D and hypertension are supposed to be free under the NHIS. However, most medicines and services such as laboratory investigations were paid OOP.

"We were told that T2D and hypertension medicine is supposed to be free. All the health facilities in this community charge us for the service they render to us, none is free." (Woman with comorbid T2D and hypertension)

"…we are told that insurance doesn't cover the labs we do, and so we must pay. But it is through the lab result that diagnosis can be made, so they must review that aspect for us." (Woman with comorbid T2D and hypertension

"The health insurance covers some of the diabetic's drugs such as metformin, and some hypertensive drugs. But if the doctor prescribes specific one for you, you would be told it's not available unless you pay out of pocket." (Woman with comorbid T2D and hypertension)

According to some of the respondents with comorbid T2D and hypertension, the NHIS helped cover part of their hospital bills. However, patients bemoaned the limited and unreliable operations of the NHIS. They observed that medicines which were supposed to be free under the insurance were routinely sold to NHIS subscribers. The consequences were often devastating for those unable to co-pay. About three-quarters of the respondents (both those with and without comorbidity) accentuated the limited coverage of the NHIS and wondered what the relevance of subscribing to the NHIS was if their health needs could not freely or significantly be catered for.

"I heard the medication for T2D and hypertension was not to be sold, but right now if you don't have money and you go to the hospital, you will die." (Man with comorbid T2D and hypertension)

"…We need a lot of medications, and they are expensive. If I don't have money, I wouldn't go to the hospital even though I have insurance… Last week I heard someone also confirm that the national health insur-

ance is not working. (Woman with comorbid T2D and hypertension)

Cost affects adherence to medication

Even with the NHIS, patients with comorbid T2D and hypertension could not always get prescribed medications, even if they are supposedly entitled to them. People with T2D and hypertension comorbidity were compelled to pay a portion of the cost (i.e., co-payment) before being served with medication. Inability to afford healthcare results in patients not being attended to, affecting medication adherence. Thus, the cost of medication affects adherence to treatment regimens, as most patients manage their condition by heavily relying on financial support. The erratic financial support system for people with T2D and hypertension comorbidity led to non-adherence to treatment schedules. All respondents acknowledged that non-adherence to medication due to cost often led to dire complications like foot ulcers and cardiovascular diseases.

"...if you don't have money, they will not sell the medicine to you, but in the health insurance it is supposed to be free, but they tell us it is not free, you must pay something. If you are not able to do so, your prescription will be given back to you." (Woman with comorbid T2D and hypertension)

"...My brother for instance takes injections twice a day; these drugs are very expensive...If he doesn't get financial help, he skips the appointment. When he goes later after the default, he is sacked." (Female without comorbid T2D and hypertension)

"Financial issues worry us a lot... When I run out of insulin, my legs will get swollen within four to five days and I will become very lean, which means the condition is becoming serious. Then my blood pressure will rise" (Man with comorbid T2D and hypertension)

Direct non-medical and indirect care cost adds to the burden

Some caregivers highlighted the additional burden imposed by the indirect cost of managing T2D and hypertension on their relatives. This mainly relates to the special diets recommended by healthcare specialists. Furthermore, the devastating nature of comorbid T2D and hypertension rendered most patients incapacitated for productive ventures. A respondent with T2D and hypertension comorbidity observed that the negative effects of the conditions on work and productivity plunged most people living with the conditions into impoverishment, thereby affecting their livelihood as well as their dependents.

"I also think money is the only solution to their problem because they need to eat certain meals which are different from what everyone else in the family eats. So, they need money to be able to afford that kind of life." (Woman without comorbid T2D and hypertension)

"This disease causes one to spend a lot of money. Lacking financial means when one develops this disease renders the victim's life miserable. Say you are the breadwinner of the family; developing this illness hinders you from working hence bring about hunger in your home." (Man with comorbid T2D and hypertension)

Psychosocial support helps to cope with economic burden

All study respondents emphasized the importance of social support in the management of their T2D and hypertension comorbidity. Specifically, the inability of family and friends to financially and emotionally support healthcare for people with comorbid T2D and hypertension resulted in non-adherence to the treatment regimen, thereby causing significant emotional and psychosocial burden, for example depression, anxiety, frustration, and confusion. The study respondents reiterated that there was no way they could have solely managed their comorbid condition without psychosocial and physical support from family and friends.

"If maybe I need money and family and friends do not have money to help, it makes me overthink, depressed, anxious, worried, unhappy, frustrated and confusion. I am told not to overthink, but it is something that has been disturbing me." (Man with comorbid T2D and hypertension)

"...in fact, if you don't have a strong family support, you would be humiliated because everything about diabetes and hypertension involve money...if you don't have anyone in the family to support and always be close to you, you will deteriorate. Because at a point, if you don't get support financially and physically, you will die from stress and depression." (Man with comorbid T2D and hypertension)

"Sometimes my siblings help me, sometimes too they don't help, so there are times I am not able to afford my medication. The Country's economy is in bad state, so you cannot burden people with your financial challenges because they also have responsibilities." (Woman with comorbid T2D and hypertension)

Discussion

This study sought to understand and add to the limited literature available on the economic cost associated with the rising burden of T2D and hypertension comorbidity in the economically disadvantaged urban setting of Ga Mashie Accra and its implications for seeking healthcare. The study found a significant economic cost burden associated with management of T2D and hypertension comorbidity. Patients spent excessively more than their income on healthcare. Our findings are consistent with those of previous studies conducted in SSA that have reported high direct costs of managing chronic diseases [10, 47], most specifically, T2D [48–51], hypertension [52], and comorbid T2D and hypertension [53].

Like other studies conducted in Ghana [13, 54], evidence from this study emphasizes that the cost of managing T2D and hypertension comorbidity is high. Other studies in Ghana have reported that the cost of managing T2D can lead to catastrophic healthcare spending [49, 55]. Although the estimated mean economic cost of managing comorbid T2D and hypertension [US$63.08 (95% CI:0.00- 145.35)] was analysed from a patient perspective, the cost is comparable to that reported in urban Kenya (US$38) which was analysed from a societal perspective [53]. This implies a higher burden of managing the comorbid condition in Ga Mashie compared to Kenya since the societal perspective estimates economic cost from a broader perspective comprising both patient and institutional costs. Overall, individuals with the comorbid condition spent almost 81% of their income on healthcare. This can be attributed to the poor healthcare seeking behaviour of people with NCDs in poverty-stricken urban communities of Ghana, whereby individuals seek healthcare in a worsened state and thus incur high cost of care [56].

The burden is aggravated by the fact that most comorbid T2D and hypertension patients are unemployed and rely heavily on financial and social support systems within the already impoverished community where income levels are generally low [37]. Hence, the economic cost burden imposed by the condition transcends the individual suffering from the disease. As shown by this study, the economic burden has far-reaching effects on healthcare. From the qualitative study, we found four main possible implications of the high economic burden on individual's healthcare. Firstly, the cost burden affected access to care and treatment quality; secondly, the high cost affected medication adherence; thirdly, direct non-medical and indirect treatment cost add to the economic burden; and finally, lack of psychosocial support aggravates the economic burden. These themes are discussed below.

High economic burden impacts access to care and treatment quality

Firstly, the high healthcare cost impacts access to T2D and hypertension care and treatment quality among the poor urban community of Ga Mashie. In this study, the high-cost burden imposed by approved sources of care (health facilities) coupled with low socioeconomic status are barriers to access to quality comorbid T2D and hypertension care. Other studies conducted in Africa have reported the association between low socioeconomic status and limited access to treatment due to high cost [50, 57], likewise other regions of the world [58, 59].

Similar to available evidence on NCDs care and management across Africa [60], there are three main means through which people with T2D and hypertension in Ga Mashie seek healthcare and manage their condition. These are biomedical, ethnomedical (herbal) and faith/spiritual treatments. Often, biomedical treatment sources like government and private health facilities serve as the first point of call to persons with T2D and hypertension for diagnosis and medical education by health professionals. However, many comorbid T2D and hypertension patients in Ga Mashie consider biomedical treatment very expensive. The expenses incurred include consultation, diagnosis, medication, and other hospital bills. Meanwhile, evidence on biomedical therapy for NCDs globally indicates that most patients must take medication for the rest of their lives and on a regular basis [61, 62]. Hence, borne out of desperation to lessen the economic burden through cheaper sources that promise rapid and permanent cure, patients resort to pluralistic means of combining biomedical, ethnomedical (herbal) and/or spiritual care, thereby compromising treatment quality.

A further possible implication of the high economic cost of biomedical treatment is that, not only does it serve as a barrier to accessing quality care but also to accessing biomedically approved medications, as people seek alternative means (i.e., herbal and spiritual) of treatment to complement or completely replace orthodox medication. Herbal drugs are perceived to be relatively more affordable than pharmaceutical drugs. This confirms the findings of other studies conducted in the African region [25, 26]. Also, it is common in SSA that due to the high economic burden associated with managing T2D and hypertension, some people with T2D in poverty-stricken urban communities like Ga Mashie typically combine biomedical therapy with spiritual therapy, whereas others solely depend on spiritual/faith healing therapy as a cost-effective rapid measure to manage their T2D [63, 64].

The economic burden of managing T2D in Ga Mashie is untenable for most of the patients in need of care. Bekele et al. reported that having health insurance is a

strong predictor of access to screening of T2D and effective biomedical care [65]. In Ghana, the NHIS is the main strategy for delivering social protection. The NHIS Act (Act 850, 2012) exempts children under 18 years, lactating mothers, and the elderly over 70 years from premium payments. The exemptions aim to support the management of various ill-health conditions including NCDs. Although the NHIS targets everybody, principally the vulnerable, there is a plethora of evidence to show that due to the inability to afford premiums because of low socioeconomic status, segments of the population are not covered [66, 67]. Our findings show low confidence in the NHIS due to its erratic and unreliable operations as well as inconsistent information on the insurance coverage. This pushes patients to seek healthcare outside the approved biomedical care system. The consequence of the cost barrier to reliable access to approved biomedical care is the inferiority of treatment sought from multiple sources often leading to an exacerbated cost burden and poor health outcomes.

Cost affects medication adherence

Our findings are consistent with those of other studies that have found that non-adherence to treatment schedule and medication is endemic among people with T2D [68] and hypertension [69] in Ghana. They also corroborate other studies on diabetes in SSA that highlighted the high cost of biomedical medication, the absence of reliable health insurance cover for diabetes care [70], and the inability of patients to afford consultation fees and laboratory services [71] creating health system barriers for medical adherence among T2D patients. The cost barrier is fundamental to the non-adherence to prescribed medications among study participants. Thus, this study found that non-adherence to T2D medication occurs mainly because of patients' inability to afford direct medical and/or non-medical costs of treatment. Affordability is a real problem partly because most comorbid T2D and hypertension patients were found to be elderly and, thus, were not productively engaged for financial income. Hence, the majority of T2D patients rely heavily on social support for their healthcare needs.

Adherence to medication and treatment plans for patients in Ga Mashie critically depends on financial and social support from relatives and friends [72, 73]. Our findings show that comorbid T2D and hypertension patients rely heavily on relatives to pay for direct medical and non-medical costs associated with care. Relatives support direct medical cost expenses like consultation, laboratory diagnosis, medication and other healthcare costs. Likewise, relatives and friends assist with non-medical expenses like transportation to and from the healthcare facilities as well as other subsistence costs. Consequently, erratic financial support from relatives and friends has implications for adherence to the systematic plan for their treatment therapy and, ultimately, health outcomes. Furthermore, adherence to biomedical treatment among T2D and hypertension comorbidity patients in poor urban communities like Ga Mashie depends on the type of treatment and cost [74, 75]. By this, care providers routinely compromise healthcare quality to meet the financial strength of patients. Patients cannot afford the right dosage of medication required for effective management of their condition, hence the need to modify the treatment regimen.

Non-medical and indirect treatment cost adds to the burden

Besides the direct medical cost of comorbid T2D and hypertension treatment, there are other costs which are often not extensively considered in the economic burden of NCD dialogues. These are direct non-medical (e.g., transportation costs to and from healthcare facilities and cost of dietary and nutritional therapy) and indirect costs (i.e., productive workdays lost due to health-seeking or health condition) of care. Akin to a study in south-eastern Tanzania that reported lived experiences of diabetes management among adults [75], this study found that the cost of transportation to and from health facilities imposes an additional cost burden on patients.

Similar to some studies in SSA [65, 76], we found changes in the pattern of diet and nutritional arrangements for persons with T2D and hypertension comorbidity recommended by dieticians. It was widely observed among this study's respondents that adherence to dietary changes is an integral factor in the management of T2D and hypertension comorbidity due to its vital contribution to blood pressure and glycaemic control. However, the cost of purchasing suitable foods regularly is problematic, thereby preventing strict adherence to the recommended dietary patterns. Literature in Africa supports the observation made by this study that comorbid T2D and hypertension patients of low socioeconomic status find it challenging to adhere to recommended dietary plans because of the associated cost burden [77].

Furthermore, although the findings of this study show a minimal contribution of indirect cost to the cost profile, the far-reaching impact on patients' livelihoods is devastating. The health condition of most people with comorbid T2D and hypertension prevented them from engaging in any meaningful productive work, thereby indirectly worsening the cost burden. Consequently, patients mostly rely on the benevolence of family and friends for the management of their illness and general subsistence. Given the low socioeconomic status of the people of Ga Mashie coupled with the catastrophic direct

medical cost of treatment, these direct non-medical and indirect costs exacerbate the burden on patients.

Psychosocial support helps to cope with the economic burden

The significant psychosocial burden imposed on people with NCDs cannot be underestimated [78, 79]. Patients' inability to independently or substantially cater for themselves often poses psychological stress on them and their caregivers [60]. Like findings of a systematic review of experiences of people living with NCDs in Africa [60], the psychological changes T2D and hypertension comorbidity patients in Ga Mashie go through include depression, stress, guilt, anxiety, anger, confusion frustration, and fear of death. These adverse psychosocial experiences intangibly contribute to the cost burden and physical deterioration in underprivileged communities like Ga Mashie. This happens partly because the psychosocial burden imposed by the disease is often overlooked by health professionals notwithstanding its overwhelming consequences [80]. Social support is therefore the most viable option available for people living with the disease in Ga Mashie.

Consistent with prior literature on the experiences of people living with NCDs in Africa, the findings of this study show that primary caregivers and other family members as well as friends play significant roles in the healthcare and management of comorbid T2D and hypertension [65, 81, 82]. Particularly among the aged, there is always active support from partners, children, caregivers, and other family members in the management of the disease. The main psychosocial support provided includes financial, biological, emotional, spiritual, cultural, social, and mental. The support includes accompanying patients to health facilities and ensuring medical and dietary adherence. Respondents have attributed any semblance of good quality of life among people with T2D and hypertension comorbidity in Ga Mashie to the unwavering financial support from their families [83]. However, in the long run, the huge healthcare cost burden, loss of caregivers' productive hours, and disruption in family members' routine socioeconomic activities lead to neglect of patients in a poor urban setting like Ga Mashie [60].

Policy and practice implications

Although the NHIS coverage has greatly expanded in Ghana over the years, the current modalities still offer limited protection against high healthcare expenditure for patients with comorbid T2D and hypertension. To address the high-cost burden of managing T2D and hypertension comorbidity, population-based interventions aimed at eliminating the catastrophic healthcare expenditure and strengthening health systems for the provision of effective biomedical care for those affected are essential. Policies should crucially consider reform of the NHIS benefits packages for NCDs to improve its potency for financial risk protection and reliability of biomedical care, particularly for people with T2D and hypertension comorbidity. These should consider subsidies/exemptions on medication and sensitization on the consequences of medical pluralism and NHIS coverage.

Study strengths and limitations

The major strength of this study is the triangulation of quantitative and qualitative data source that promoted a richer understanding of the findings. However, the small sample of respondents who provided complete cost data for the quantitative analysis is a limitation which may have reduced the precision of our cost estimates, and hinders generalizability of the findings. Future studies intent on measuring the economic cost of comorbid NCDs should consider larger sample sizes. Also, although the CARE-Diabetes project's survey participants were selected using rigorous multi-stage sampling approach, females constituted over 80% of the subset data used for this analysis, suggesting likelihood of a highly biased sampling method. However, this may also be ascribed to women being more conscious of their health status – as cases of comorbid T2D and hypertension were self-reported. For the qualitative study, the thematic coding was done by one person—an approach which may have compromised the analysis. However, we made cautious efforts to maintain the internal validity of the data by having three of the authors check the transcripts to resolve any discordance between codes and global/organizing themes. Furthermore, there may not necessarily be a direct relationship between the qualitative and quantitative results presented due to the different populations (of living with T2D and hypertension) used, and thus possible variations in the degree of disease burden across the two groups.

Conclusion

The economic burden of managing T2D and hypertension comorbidity is significant in deprived urban Ghana. The burden weighs heavily on household budgets, thereby negatively affecting health and healthcare seeking patterns of patients. To alleviate the economic burden of medical care and promote appropriate therapy, the NHIS should prioritize free/affordable medical care for patients with NCDs to facilitate the effective management of T2D and hypertension comorbidity. Future research should consider using a larger sample size for the cost analysis and consider assessing the catastrophic health expenditure associated with healthcare (proportion of healthcare expenditure to household monthly food and non-food spending).

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12913-024-11516-9.

Supplementary Material 1.

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Authors' contributions
S,A., MA and H.H-B conceived the study. S.A., M.A., H.H-B and E.F. contributed to the methodology of the study. S.A., L.B., R.B.A., I.A.K., K.K., V.A-A, S.B.K., H.J., P.A., E.G. and D.K.A. contributed to the implementation of the study. SA and MA led the analyses with support from HHB, SKM and CGE. SA drafted the original manuscript with significant revisions from M.A., H.H-B, L.O., I.A.K., R.B.A., O.A.S., E.F., S.B.K., A.B., C.G-E, D.K.A., S.K.M., H.J., P.A., E.G. and K.K. All authors reviewed the final draft of the manuscript.

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Availability of data and materials
The data and materials that support the findings of this study are available from the authors upon reasonable request.

Declarations

Ethics approval and consent to participate
Ethical approval was obtained from the Ethical Review Committee of the Ghana Health Service (GHS-ERC: 017/02/22), Noguchi Memorial Institute for Medical Research (NMIMR-IRB CPN 060/21-22) and the Research Ethics Committee at University College London (ID:21541/001). Permission from the Metropolitan Assembly was obtained before data collection. Written informed consent was obtained from participants before interviews.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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