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Economic cost of oral conditions to patients attending the dental department of the Korle Bu Teaching Hospital, Ghana

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Abstract

Background: Providing and utilising oral health care services are essential to achieving a high quality of life. However, oral conditions present both physical and economic burdens to individuals, households, and governments.

Objective: This study sought to estimate the economic costs incurred by patients accessing oral health services at the Korle-Bu Teaching Hospital in Ghana.

Methods: A cross-sectional cost-of-illness study was conducted at the Korle Bu Teaching Hospital, involving 224 participants. A structured questionnaire was used to collect data on direct and indirect costs. Intangible costs were assessed using a 5-point Likert scale. Descriptive statistics were employed in summarising the costs. Sensitivity analysis was performed with 3%, 5%, and 7% variations in medication costs and wage rates. Differences in mean costs across socioeconomic statuses were analysed using independent t-tests and one-way ANOVA. $P < 0.05$ was considered statistically significant.

Results: The estimated total economic cost was GHS 532,154.06 (US$ 44,346.17). The estimated annual average direct and indirect cost of oral health services were approximately GHS 2,129.98 (US$ 177.50) and GHS 245.70 (US$ 20.48), representing 89.7% and 10.3% of the total economic cost, respectively. Sensitivity analysis revealed a varied increase in total costs, with variations in medication costs and wage rates. Intangible cost was found to be low, with many patients experiencing no to mild burden.

Conclusion: The economic burden of oral health on patients is significant, particularly in terms of direct costs. There is a need for policymakers to develop policies and interventions to mitigate the costs of oral health care. The National Health Insurance Authority should consider expanding insurance coverage for more oral conditions to alleviate the economic burden and improve access to care.

Keywords: Oral health, cost of illness, Intangible cost, Quality of life

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INTRODUCTION

Oral health is a critical aspect of an individual's physical health and a determinant of overall well-being, and quality of life [1,2]. According to the World Health Organisation (WHO), oral health is defined as the condition of the mouth, teeth, and orofacial structures that enables an individual to carry out essential functions, including eating, breathing, speaking, and maintaining psychosocial well-being [3].

Oral disorders are a significant public health concern globally, as they frequently heighten susceptibility to non-communicable diseases such as cardiovascular diseases and

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diabetes [3]. The 2022 Oral Health Status Report estimated that 3.5 billion people worldwide are impacted by oral health issues [3,4]. They are a major cause of pain and discomfort and have a significant socioeconomic impact, leading to diminished productivity, lower academic performance, and disruption of social interactions [4,5]. It also substantially influences the physical and mental health, social relationships, and economic standing of individuals across various age groups and socioeconomic status [6,7]. These conditions have substantial financial consequences for health systems, patients and families [8].

The Global Burden of Disease study has highlighted the substantial economic burden of oral health problems, with an estimated annual expenditure on dental care of US$ 442 billion [9]. Out of this, approximately US$298 billion (about 4.6% of global health spending) is attributed to direct treatment expenses, with the remaining US$ 144 billion ascribed to indirect expenditures, including productivity loss [9]. In many countries, including Ghana, oral healthcare remains an under-prioritised area of healthcare, despite its fundamental impact on the health and well-being of the population. Despite being fundamentally preventable, oral health conditions in Ghana are highly prevalent and characterised by limited public investment in preventive and therapeutic interventions, socioeconomic disparities and high patient expenditures [10,11].

In 2019, the WHO reported that approximately 70% of sub-Saharan African countries spent less than US$ 1 per person annually on treatment costs for oral healthcare [12]. This limited investment and financial burden associated with treating dental ailments is a significant obstacle to the utilisation of oral care services [13,14]. According to Deh et al. [15], patients in Ghana are responsible for covering the expenses associated with treating dental problems. An economic cost study in Ghana estimated the total cost of oral care to be US $6,248.59, with an average cost of US $35.75, a significant amount for many Ghanaians, especially those categorised under lower socioeconomic status [15]. The financial burden of oral health care often leads to delayed or avoided treatment, exacerbating the progression of oral diseases and resulting in negative consequences for individuals and the health system. While multiple studies have highlighted the substantial economic burden associated with oral health services [15,16], a gap remains in comprehensively assessing indirect costs, including productivity loss and intangible costs such as pain and suffering.

This study aimed to investigate this gap by capturing the broader cost implications of oral healthcare, including direct and indirect costs borne by patients and the Korle Bu Teaching Hospital (KBTH), as well as intangible costs experienced by patients. By providing a comprehensive understanding of the economic burden, this study aimed to inform effective health policies that improve access to affordable oral healthcare and reduce disparities in treatment across Ghana.

MATERIALS AND METHODS

Study design and sites

A cross-sectional cost-of-illness study to estimate the economic costs of oral healthcare among patients at the Maxillofacial Department of the Korle-Bu Teaching Hospital in Accra. The study was conducted from March to April 2023. Korle Bu Teaching Hospital is a premier tertiary healthcare facility in Ghana with an approximate 2000-bed capacity, 21 clinical and diagnostic departments, and three centres of excellence. The Maxillofacial unit is a subsidiary of the Dental department. The department handles an average of 20-30 new cases daily, encompassing a range of dental diseases.

Study population and sample size

The study population consisted of individuals aged 18 years or above who presented with dental conditions to the dental department of the KBTH. The sample size for this study was determined using the Cochran (1977) formula for estimating sample sizes for finite populations. Using a finite population of 500 patients per month at the dental department. A final sample size of 224 patients was determined, including an additional 10% to account for potential non-responses.

Inclusion criteria and exclusion criteria

All patients aged 18 years and above who presented to the Maxillofacial Department of Korle-Bu Teaching Hospital (KBTH) for oral health services and provided written informed consent were included in the study. Patients were excluded if they were acutely ill during the data collection period (e.g., hemodynamically unstable, critically unwell, or requiring emergency resuscitation) or if they had not accessed dental care at the Maxillofacial Unit within the past 12 months.

Sampling technique

A simple random sampling technique was used to select participants receiving care at the dental department. This approach was employed to ensure equal chances of selection for all members of the study population. Using the balloting method, ‘yes’ and ‘no’ were written on paper, then folded and placed into a box. Patients at the department were asked to pick one piece of paper each. Those who picked ‘yes’ were included in the study after providing written informed consent. This process was repeated on each clinic day.

Data Collection

The data collection period for this study was from March to April 2023. This timeframe was selected to ensure adequate time to recruit the required sample size of 224 participants, considering the daily patient flow at the KBTH Dental Department. The department handles approximately 20-30 new cases daily, and over the two months, this enabled the inclusion of a diverse and representative sample of patients. The questionnaire, which included both closed-ended and open-ended questions, covered five sections; the first section collected the socio-demographic characteristics.

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The second section on oral health conditions collected data on the type of dental condition, its duration, treatment modality, and payment method. The third section recorded the direct medical and non-medical costs associated with seeking care for the oral condition. The fourth section collected data on the indirect costs of seeking care. The time lost due to illness and the time lost by caregivers were collected (travel time, waiting time, lost workdays). All costs were measured from the patient's perspective. The final part covered intangible costs, which measured the level of pain and emotional suffering when receiving oral healthcare. Intangible costs were measured using a 5-point Likert scale (1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree). The questionnaire captured comprehensive data on the costs, focusing on events and costs incurred over the previous 12 months.

Data processing and analysis

The data collected was entered into Microsoft Excel 2016, checked, and cleaned. Data was imported into STATA version 16 for further analysis. Descriptive statistics such as means, standard deviations, and proportions were used to summarise socio-demographic data and cost-related information. All costs were calculated in both Ghanaian cedis (GHS) and US dollars (US$), using the Bank of Ghana's interbank exchange rate of US$ 1 = GHS 12 (as of March 10, 2023).

Economic cost estimation

Total economic cost

The outcome variable "total economic cost" was estimated by summing all direct and indirect costs of oral care.

Direct cost estimation

The total direct cost was estimated by summing both medical and non-medical costs incurred by the patients. Direct medical costs comprised consultation fees, diagnostic tests, treatments and medications. The direct non-medical costs comprised transportation, food and drinks, accommodation for accompanying relatives and communication costs. The average direct cost was estimated by dividing the overall direct cost by the total number of participants.

Indirect cost estimation

Indirect costs were estimated using the human capital approach (HCA), which assigns monetary value to time lost due to illness. These costs comprised productivity loss for patients and their accompanying caregivers, estimated based on the number of workdays lost, travel time, and waiting time. Workdays lost were defined as the total number of working days lost by employed patients during diagnosis and treatment. Productivity loss due to travel was calculated by summing the total time spent by patients and their relatives commuting to and from the hospital. Productivity loss due to waiting time was based on the average time spent waiting for oral care services at the hospital. The total waiting time was multiplied by Ghana's minimum wage of GHS13.53 (as of 2022) to estimate the monetary value. The total indirect cost was calculated by aggregating productivity losses for patients and caregivers.

Intangible cost

A five-point Likert scale was used to describe intangible costs rather than assign monetary value to them. There were five different responses: "strongly disagree," "disagree," "neutral," "agree," and "strongly agree." Patients reported emotional and physical discomfort, speaking difficulty, changes in eating habits, persistent worry about their oral condition, difficulty smiling, and avoiding social situations because of dental disease. These responses were summarised as percentages and presented descriptively.

Sensitivity analyses

A one-way and multi-way sensitivity analysis was conducted. Wages and medication costs were varied by +3%, +5%, and +7% to evaluate their impact on overall cost estimates. These key variables were used in the sensitivity analyses due to the uncertainty associated with them.

RESULTS

Socio-demographic characteristics of respondents

A total of 224 patients participated in the study, with more than half (58.0%) being males. The mean age of participants was 37.9 (± 13.4) years. Approximately 36% of the participants had completed tertiary education, while over half (53.6%) of the participants were unmarried, and 73.7% of the participants were employed. About 90% of participants had a valid National Health Insurance Scheme (NHIS) card.

Oral conditions and type of treatment

Table 1 presents the various oral conditions experienced by the participants, along with the type of treatment received. Dental caries was the most prevalent oral condition (54.4%), while oral cancers were the least prevalent (1.8%) among participants. In relation to the type of treatment, extraction was the most common (31.7%), while root canal therapy was the least common (1.8%) among study participants.

Economic cost of oral health services

Direct cost of oral health services

As shown in Table 2, the total direct cost of oral care was approximately GHS 477,116.50 (US$ 39,759.71) for the 12-month period. The direct cost comprised medical and non-medical costs, estimated at GHS 445,348.00 (US$ 37,112.33) and GHS 31,768.50 (US$ 2,647.38), respectively. The average direct medical costs for registration and consultation was GHS 55.38 (US$ 4.62), diagnostics were GHS 274.24 (US$ 22.85), treatment was GHS 1,472.12 (US$ 122.68), and medication was GHS 186.42 (US$ 15.54). The average direct non-medical costs were highest for transportation at GHS 121.02 (US$ 10.09), followed by food at GHS 14.96 (US$ 1.25), and drinks and water at GHS 5.85 (US$ 0.49). On average, a patient spent an estimated GHS 2,129.98 (US$ 177.50) as a direct cost

on oral health services, of which medical costs constituted 93.4% in the past 12 months.

Table 1. Oral conditions of Participants and type of treatment received

Oral Condition	Frequency	Percentage (%)
Dental caries (Apical periodontitis, reversible pulpitis, irreversible pulpitis, class 1 cavity)	122	54.4
Gingivitis	33	14.7
Periodontitis	10	4.5
Impacted tooth/pericoronitis	6	2.7
Oral cancers	4	1.8
Complicated crown fracture	15	6.7
Partial edentulism	13	5.8
Others e.g., Ameloblastoma, mandibular fracture, Keloid.	21	9.4
Type of treatment		
Scaling and polishing/cleaning	32	14.3
Dentures	13	5.8
Medications	46	20.5
Biopsy	5	2.2
Extraction	71	31.7
Crown	7	3.1
Fillings	38	17.0
Root canal therapy	4	1.8
Surgery under general anaesthesia	8	3.6

Indirect cost of oral health services

The total indirect cost of oral health services was GHS 55,037.56 (US$ 4,586.46) in the past 12 months. The total productivity loss for the patient was GHS 27,747.55 (approximately US$ 2,312.30), while caregivers recorded a loss of GHS 27,290.01 (approximately US$ 2,274.17). Also, on average, the patients' estimated cost of days absent from work was GHS 50.98 (US$ 4.25), the period of travelling to and from the health facility was GHS 61.12 (US$ 5.09), and the waiting time to be attended by a dentist was GHS 11.78 (US$ 0.98) (Table 3). Furthermore, on average, caregivers estimated the cost of days absent from work at GHS 8.82 (US$ 0.74) over the past 12 months, and the cost of travelling to and from the health facility was GHS 113.01 (US$ 9.42). On average, a patient spent an estimated GHS 245.70 (US$ 20.48) as a total indirect cost on oral health services, of which patient productivity lost constituted 50.4%. The estimated total economic cost of oral health services was GHS 532,154.06 (US$ 44,346.17) over the 12-month period. Thus, most of the cost of oral health services (89.7%) was direct costs, while 10.3% was attributed to indirect costs.

Sensitivity analysis of the cost of oral health services

The one-way and multi-way sensitivity analyses of cost were conducted using the costs of medication and wages. A definite increase in the cost of medication also leads to a rise in total cost. As shown in Table 4, a 3% increase in medication leads to a 0.24% increase in total cost. Similarly, a 5% and 7% increase in medication costs over a

Table 2. Direct Cost Estimates

Costs	Sum GHS (US$)	Mean GHS (US$)	SD GHS (US$)	Min GHS (US$)	Max GHS (US$)	Cost Profile (%)
Direct Medical						
Registration & Consultation	12,405.00 (1033.75)	55.38 (4.62)	22.93 (1.91)	0.00 (0.00)	130.00 (10.83)	2.6
Diagnostics	61,430.00 (5,119.17)	274.24 (22.85)	644.67 (53.72)	40.00 (3.33)	5,000.00 (416.67)	12.9
Treatment	329,755.00 (27,479.58)	1,472.12 (122.68)	8,182.81 (681.90)	59.00 (4.92)	120,000.00 (10,000.00)	69.1
Medication	41,758.00 (3,479.83)	186.42 (15.54)	428.27 (35.69)	10.00 (0.83)	4,000.00 (333.33)	8.8
Total direct medical	445,348.00 (37,112.33)	1,988.16 (165.68)	8484.15 (707.01)	199.00 (16.58)	121,620.00 (10,135.00)	93.4
Direct non-medical						
Transportation	27,108.00 (2,259.00)	121.02 (10.09)	220.33 (18.36)	0.00 (0.00)	1,440.00 (120.00)	5.7
Food	3,350.00 (279.17)	14.96 (1.25)	10.80 (0.9)	0.00 (0.00)	68.00 (5.67)	0.7
Drinks and Water	1,310.50 (109.21)	5.85 (0.49)	4.01 (0.33)	0.00 (0.00)	20.00 (1.67)	0.3
Total Direct non-medical	31,768.50 (2,647.38)	141.82 (11.82)	221.24 (18.44)	0.00 (0.00)	1,455.00 (121.25)	6.6
Total Direct	477,116.50 (39,759.71)	2,129.98 (177.50)	8,545.26 (712.11)	238.00 (19.83)	122,111.00 (10,175.92)	100.0

Note: SD = Standard Deviation, Min = Minimum Value, Max = Maximum Value

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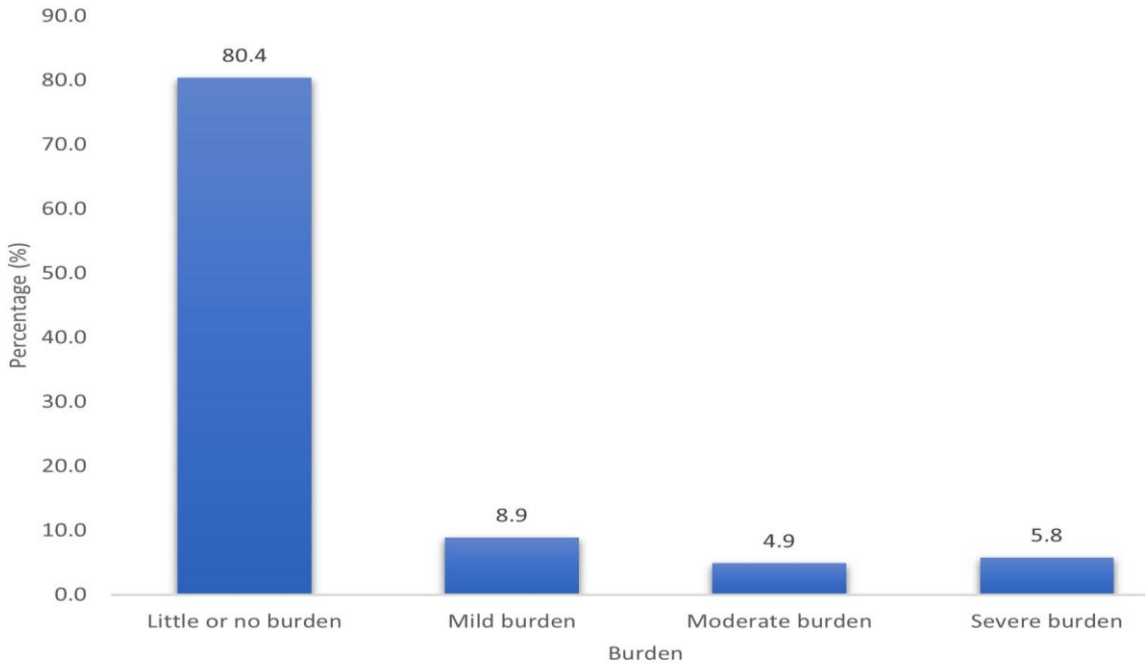

Figure 1. Intangible burden on patients

Table 3. Indirect cost estimates

Costs	Sum GHS (US$)	Mean GHS (US$)	SD GHS (US$)	Min GHS (US$)	Max GHS (US$)	Cost Profile (%)
Patient Indirect						
Days absent from work	11,419.32 (951.61)	50.98 (4.25)	108.51 (9.04)	0.00 (0.00)	811.80 (67.65)	20.75
Traveling time	13,690.33 (1,140.86)	61.12 (5.09)	62.93 (5.24)	3.38 (0.28)	649.44 (54.12)	24.87
Waiting time	2,637.90 (219.83)	11.78 (0.98)	6.62 (0.55)	0.23 (0.02)	40.59 (3.38)	4.79
Total patient indirect	27,747.55 (2,312.30)	123.88 (10.32)	148.35 (12.36)	10.82 (0.90)	1,068.87 (89.07)	50.4
Relatives/friends Indirect						
Days absent from work	1,975.38 (164.62)	8.82 (0.74)	23.78 (1.98)	0.00 (0.00)	189.42 (15.79)	3.6
Traveling time	25,314.63 (2,109.55)	113.01 (9.42)	68.97 (5.75)	13.53 (1.13)	676.50 (56.38)	46.0
Total Relatives/friends Indirect	27,290.01 (2,274.17)	121.83 (10.15)	73.31 (6.11)	13.53 (1.13)	744.15 (62.01)	49.6
Total Indirect	55,037.56 (4,586.46)	245.70 (20.48)	200.38 (16.70)	31.57 (2.63)	1,813.02 (151.09)	100.0

Note: SD = Standard Deviation, Min = Minimum Value, Max = Maximum Value

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Table 4. Sensitivity analysis of the cost of oral health services

					% of the total cost		% change in the total cost	
	Cost component GHS (US $)	% change in parameter	Total cost GHS (US$)	% change in the total cost	Direct	Indirect	Direct	Indirect
Scenario								
Basic Scenario		0	532,154.06 (44,346.17)		89.7	10.3	0	0
Variation (One-way sensitivity analysis)	Medication							
	41,758.00 (3,479.83)	3	533,406.80 (44,450.57)	0.24	89.7	13.3	0.0	29.1
		5	534,241.96 (44,520.16)	0.39	89.7	15.3	0.0	48.5
		7	535,077.12 (44,589.76)	0.55	89.7	17.3	0.0	68.0
Variation (One-way sensitivity analysis)	Wage rate							
	11,419.32 (951.61)	3	532,496.64 (44,374.72)	0.06	92.6	13.3	3.2	29.1
		5	532,725.03 (44,393.75)	0.10	94.6	15.3	5.5	48.5
		7	532,953.41 (44,412.78)	0.15	96.5	17.3	7.6	68.0
Multi-way sensitivity analysis)	Medication & Wage rate							
	53,177.32 (4,431.44)	3	533,749.38 (44,479.12)	0.30	92.4	13.3	3.0	29.1
		5	534,812.93 (44,567.74)	0.50	94.2	15.3	5.0	48.5
		7	535,876.47 (44,656.37)	0.70	96.0	17.3	7.0	68.0

Note: USD 1.00 equivalent to GHS 12 (Bank of Ghana interbank exchange rate, 10 March 2023).
The national minimum wage per day of GHS13.53 (US $ 1.13) as of December 2022 was used to value productivity days and time lost to patients.

Table 5. The various burdens experienced by the study participants

Burden	SD n (%)	D n (%)	N n (%)	A n (%)	SA n (%)
Severe Pain	91 (40.6)	81 (36.1)	6 (2.7)	17 (7.6)	29 (13.0)
Difficulty smiling	41 (18.3)	151 (67.4)	6 (2.7)	11 (4.9)	15 (6.7)
Change Diet	96 (42.9)	98 (43.8)	5 (2.2)	11 (4.9)	14 (6.2)
Always worried about the condition	55 (24.6)	136 (60.7)	15 (6.7)	5 (2.2)	13 (5.8)
Are embarrassed to smile in social situations	43 (19.2)	148 (66.1)	13 (5.8)	5 (2.2)	15 (6.7)
Difficulty in speaking	50 (22.3)	147 (65.7)	5 (2.2)	9 (4.0)	13 (5.8)
Sleepless nights	88 (39.3)	93 (41.5)	13 (5.8)	13 (5.8)	17 (7.6)
Low self-confidence	31 (13.8)	153 (68.3)	23 (10.3)	2 (0.9)	15 (6.7)
Avoid the company of others	31 (13.8)	160 (71.4)	15 (6.7)	2 (0.9)	16 (7.2)

Note: n = Frequency, SD = Strongly Disagree, D = Disagree, N = Neutral, A = Agree, SA = Strongly Agree

year results in a 0.39% and 0.55% increase in total cost, respectively. When the wages were increased by 3%, the economic cost of oral health services increased by 0.06%. The direct cost increased by 0.0% (thus from 89.7% to 89.7%), and the indirect cost component decreased by 29.1% (thus from 10.3% to 13.3%) when varied by 3%.

Intangible Cost

More than 50% of the participants either disagreed or strongly disagreed with experiencing severe pain, difficulty smiling, changing diet, worrying about the condition always, feeling embarrassed to smile in social situations, having difficulty speaking, sleepless nights, low self-confidence and avoiding the company of others (Table 5). Figure 1 shows the overall intangible burden among patients. Most patients (80.4%) experienced little to no burden. Approximately 9% of patients had a mild burden, while only 4.9% and 5.8% had moderate and severe burdens, respectively.

DISCUSSION

The provision of oral health care in Ghana exerts a substantial financial burden on the patients. The study's findings indicate that patients encounter a substantial financial burden when seeking oral health services. The average direct cost incurred over a 12-month period was GHS 2,129.98, which was equivalent to US$ 177.50. The average direct cost in this study is higher than the cost of US$ 33.78 reported in another study in Ghana [15]. The study site in this current study is a tertiary facility that treats more advanced oral health conditions, which could be a contributing factor to the observed difference. In Sonoma County, United States, a study reported an average direct cost of US$283 for the prevention and early treatment of dental disease [17]. The average cost reported in the United States was higher than the average costs in this study. Authors noted in a global cross-region and country analysis that the highest levels of expenditure on dental conditions were reported in high-income countries in North America, Australia, Western Europe and East Asia (18). The average medical cost in this study was estimated to be GHS 1,988.16 (approximately US$ 165.68), which exceeds the average medical cost of US$ 29.33 in the United States [17]. Meanwhile, the average non-medical cost was GHS 141.82 (approximately US$ 11.82). The findings of this study indicate that direct costs were the largest proportion of overall expenditures, aligning with previous studies in Ghana [15] and other countries [18]. While the present study, along with previous studies on the cost of oral diseases [15], focused on estimating the costs associated with oral health services as perceived by patients, Warmerdam et al. [17] investigated a broader societal viewpoint by considering costs borne by both patients and healthcare providers [17]. Furthermore, it should be noted that the costs estimated in the present study were calculated on a monthly basis, whereas Deh et al. [15] and Warmerdam et al. [17] conducted their analyses over a period of ten days and one year, respectively [15,17]. Thus, the disparities observed can be ascribed to the varying sampling time in these investigations.

The findings of this study indicate that most patients seek medical care at the hospital for curative procedures, such as medication, extraction, and filling, which are associated with higher direct costs compared to indirect costs. This finding is consistent with previous studies [15,16], which indicate that a significant proportion of individuals seeking oral health care received therapeutic interventions such as medication, tooth extraction, and dental fillings. This implies that the expenses associated with oral health treatments in Ghana are substantial, potentially resulting in a considerable economic strain on households. Studies have noted that out-of-pocket expenses on oral health care are among the main drivers of catastrophic health expenditures [19,20]. A study in Ghana explained that the absence of a comprehensive national oral health preventative programme may lead to the emergence of elevated treatment costs, as evidenced in this study [15]. Given the prevailing daily minimum wage of GHS 13.35 (approximately US$1.12), it is evident that many households with limited incomes may face significant financial burdens due to oral disorders, as indicated by the average treatment cost of GHS 1,472.12 (approximately US$122.68) observed in this study. On average, the per-patient annual indirect cost of oral healthcare amounted to GHS 245.70 (approximately US$ 20.48). The indirect cost recorded in this study is more than 20 times the mean indirect cost of GHS 8.12 (US$ 0.68)reported in a previous study in Ghana [15]. This cost variation may be attributed to the characteristics of the research location, which offers a limited range of services and encounters a lower volume of complex patients compared to a tertiary hospital setting. In the present study, a proportion of patients expressed dissent about modifying their dietary habits. They consistently reported feelings of anxiety, embarrassment in social interactions, impaired speech, diminished self-esteem, and a tendency to isolate themselves due to their oral health issues. This finding affirms that most patients who utilise oral health services encounter minimal to moderate levels of burden. Patients' experience of a minimal to moderate burden can be attributed to the fact that a proportion of them seek treatment, such as medication, extraction, and filling, at the oral health department. Patients who seek surgical procedures at the oral health department tend to feel a higher level of pain in comparison to those who visit for routine procedures such as polishing or cleaning. The present observation aligns with previous findings wherein a subgroup of patients had challenges in executing the act of smiling [21].

The present study revealed a statistically significant disparity between the average indirect costs incurred by employed patients and those incurred by unemployed patients. This phenomenon can be attributed to the fact that working individuals may experience a greater degree of productivity loss due to their absence from work compared to individuals who are unemployed. This is also evidenced in studies in Japan [22,23] and Canada [24]. According to the study's findings, the mean number of days lost over the 12-month period seeking care for the disease was 3.8 days. The observed value exceeded the productivity loss of 1.6 days reported by Deh et al. [15]. Studies on oral disease and productivity loss have reported that there exists a correlation between inadequate dental health and reduced work hours, potentially impacting an individual's overall productivity [22,23]. This association has also been reported in the United States [25]. In Southern Brazil, these associations were reported, with a linkage between poor oral health and poor academic performance and absenteeism [26]. There is, thus, a need for evidence-informed policymaking on oral health [27] to mitigate excessive out-of-pocket payments, leading to catastrophic health expenditures, and to increase productivity.

Strengths and limitations

The study, conducted in Ghana's largest referral hospital, ensured a representative sample of individuals from diverse

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areas and broadened the analysis by including intangible costs. However, the single facility may limit generalizability. Recalling bias could have affected the accuracy of data from the past 12 months. Using the daily minimum wage instead of actual income could lead to an underestimation of the true economic cost of oral care. The study's cross-sectional design limits the ability to establish causality. These limitations, however, do not negatively impact the overall findings.

Conclusion

The study highlights a substantial economic burden of oral healthcare in Ghana, with direct medical costs, particularly treatment and diagnostics, being the largest expense for patients. Indirect costs, though smaller, also contribute to the overall burden on both patients and caregivers. To address these issues, policies should aim to expand the scope of oral health disorders under the National Health Insurance Scheme, which will help reduce treatment costs and improve access. Further studies are necessary to track the economic burden over time and identify cost-effective strategies for oral healthcare in low- and middle-income countries.

DECLARATIONS

Ethical consideration

The study obtained ethical approval from the Korle Bu Teaching Hospital Scientific and Technical Committee/Institutional Review Board (KBTH STC/IRB/000174/2022). The informed consent process was carefully designed to ensure participants fully understood the study's purpose, procedures, risks, and benefits. Participants were provided with a detailed explanation of the study in either English or their preferred local language. For those unable to read or write, the consent form was explained by a research assistant or a witness. Participants were allowed to ask questions and clarify doubts before providing consent. Two copies of the signed or thumb-printed consent form were provided, one for the participant to keep and one for the research team. Participants were assured that their participation was voluntary and that they could withdraw from the study at any time without any consequences. All data collected was anonymised and securely stored to protect participant confidentiality.

Consent to publish

All authors agreed on the content of the final paper.

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None

Competing Interest

The authors declare no conflict of interest

Author contribution

MT, RO, and MOB conceived the study. MT, RO, and IA designed the study and data collection instruments, and SAB and MOB supervised data collection. MT, RO, and DDO contributed to data analysis. MT, SAB, IA and DDO drafted the manuscript. All authors reviewed and approved the final manuscript.

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Availability of data

Data is available upon request to the corresponding author

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