

Table 1: Description of study variables

Type of Cost	Category of Cost	Description
Direct Cost	Therapy related cost	1. Actual cost of therapies including cost of card, folder and consultation
	Non-therapy cost	1. Cost of mobility aids, e.g. tripod, quadripod etc. 2. Cost of travel 3. Cost of food and drinks for patients and caregiver 4. Other miscellaneous cost (e.g. cost of phone call during physiotherapy service)
Indirect Cost	Cost of productivity loss	1. Productivity loss to the patient (i.e., waiting time, days lost and travel time) 2. Productivity lost to household members (i.e., waiting time, days lost and travel time)
Intangible Cost	Intangible Cost	1. Fear 2. Pain 3. Emotional suffering

3.5 Study Population

The study population consisted of stroke patients and their households who attended the Physiotherapy Department of the Tema General Hospital to seek physiotherapy care between May 2015 and June 2015.

The inclusion criteria for the study were all stroke patients who had been seeking physiotherapy services in the department within the last one month but not more than two years regardless of the sex and age. Stroke patients who were conscious and were in good state of mind were interviewed. The exclusion criteria were stroke patients who had not been seeking physiotherapy services in the department within the last one month but not more than two years. Stroke patients who were severely ill and could not talk were not interviewed.

3.6 Sample Size

The mean cost per visit per stroke patient per year was GHS523.50 with a standard deviation of GH¢198.00 (TGH Annual Report, 2013). However, to detect a 30% difference for this mean cost, 0.80 power and 0.05 alpha were used for the study. Using STATA 12.0, a sample size of 152 stroke patients was calculated and used for the study. Therefore a sample size of 152 was selected from the sampling frame for the study.

3.7 Sampling procedure

The individual folders of stroke patients who had been attending Tema General Hospital were used to compile the sampling frame for the selection of study participants. The folders were used because the general attendance register did not contain diagnoses of patients accessing various physiotherapy services and as such it was difficult to distinct stroke patients from non-stroke patients. The frame was then numbered to determine the total number of stroke patients in the sampling frame. Consequently, the total number of stroke patients in the frame was found to be 212 patients. Random numbers between 1-212 patients were generated using Microsoft

Excel random number generator and 152 patients were randomly sampled. Stroke patients whose numbers came up were then selected for administration of questionnaires. All patients whose numbers came up and they were unwilling to take part in the study were dropped. It was realized that patients were scheduled for four different times and batches at their chosen and appointed convenient times for the respective physiotherapy services. The usual days were Mondays and Wednesdays, Tuesdays and Thursdays as well as Wednesdays and Fridays. Physiotherapy services started in earnest at 8:30am to 9:30am for the first batch of patients at the gymnasium. This was followed by the second batch of patients who entered the gymnasium from 9:30am to 10:30am to undergo their physiotherapy modalities. The third batch of patients took their turns at 10:30am to 11:30am. The last batch of patients had their care from 11:30am to 12:30pm. Attendance was usually heavy between the times of 8:30am to 11:30am and low between 11:30am to 12:30pm. In all a total of 20 working days were used for the data collection with a minimum of 7 patients per day. Finally, questionnaires were administered to patients and accompanying caregivers at the hospital with their consent.

3.8 Data Collection Technique/Methods and Tools

Structured questionnaires were employed for data collection. The questionnaire was made up of both open and closed ended questions covering relevant information on patients' demographic information, employment status, and occupation. The questionnaire was focused on identifying the type of cost incurred by stroke patients as well as the type of therapies, services and the duration of patients receiving the service. It was further intended to elicit information on the intangible cost such as fear, emotional suffering and pain endured by patients.

3.9 Quality Control

Adequate mechanisms were put in place to safeguard and guarantee data accuracy, quality and devoid of biases. The measures included training of research assistants, pre-testing of questionnaires and data entry and processing. Research assistants were also monitored on daily basis. All completed data were validated and entered on daily basis. Furthermore, the dataset was cleaned before analysis.

3.10 Pre-data Collection Stage

3.10.1 Training of Research Assistants

Two research assistants conversant with physiotherapy services and stroke patients, who could read and write English language as well as fluent in two local dialects (Twi and Ga) were recruited and trained for a period of three days. The training involved explanation of the questionnaire, ethics and how to seek informed consent from the study participants. They were offered the opportunity on the last day to administer the questionnaires at the pre-testing phase. This was to make sure that accurate administration of the questionnaires was achieved.

3.10.2 Pre-testing of Questionnaire

The questionnaire was pre-tested prior to final administration to the study participants. Pre-testing was conducted on stroke patients and their accompanying household members at the Physiotherapy Department of the Tema General Hospital. This exposed any anticipated problems regarding wording of questions, instructions to delete or add on etc. It also offered the interviewer a better understanding of the questionnaire as well as the appropriate answers for the questions that were asked by the study population.

3.10.3 Data Collection Stage

The Principal Investigator visited the study site on daily basis to ensure compliance with research guidelines. Meetings were held at the end of each data collection day for discussion of issues bordering on validation and cross checking of completed questionnaire with the research assistants. This was done to ensure completeness of questionnaire as well as planned for the next day.

3.10.4 Data Entry and Processing

The data collected were thoroughly screened or validated, serialized and coded within 24 hours before entry into Epi Info version 7.1.5. After entry, the data set was crosschecked for errors with hard copies one after another to ensure every variable defined was in the right place. Microsoft Excel 2010 was used for analysis.

3.11 Data Analysis

The various costs incurred by stroke patients and households from May 2015 and June 2015 were estimated. That is a recall period of one month.

3.11.1 Estimation of Direct Cost

For this study, total direct cost was estimated by summing all direct costs incurred by stroke patients and accompanying family members for therapy and non - therapy costs. Therapy cost which included modality cost, cost of mobility aids (tripod, quadripod etc.) were added together. Non-therapy cost such as transport cost, cost of food and drinks for patient and caregivers, and miscellaneous cost (cost of phone call during care) were all summed up.

Therapy related cost: This was calculated by finding the proportion of stroke patients who patronized any of the physiotherapy modalities such as exercise, massage, electrotherapy etc. This was then multiplied by the cost of each modality to arrive at the cost of therapy.

Cost of mobility (walking) aids: A proportion of stroke patients who were encountered using mobility aids such as tripod, quadripod was determined and multiplied by the cost of each mobility aid.

The total therapy related cost was obtained by summing the cost of each modality and the mobility aids.

The non- therapy related cost was calculated as follows:

Transportation cost: This was computed by adding up the travel cost incurred by patients in seeking physiotherapy services.

Cost of food and drinks for patient and caregiver during treatment: This was calculated by summing the cost of food and drinks incurred by family members for patients and caregivers during physiotherapy care.

Other miscellaneous costs: The costs of other miscellaneous such as phone call made during care were computed by adding up the miscellaneous costs incurred by households in seeking physiotherapy service.

The total non-therapy related cost was therefore calculated by adding up total cost of transportation, total cost of food and drinks for patients and caregivers during treatment and total miscellaneous costs.

The total direct cost was determined by summing the total cost of therapy related and the total non-therapy related costs.

3.11.2 Estimation of Indirect Cost

The human capital approach which measures output losses by lost earnings was used in estimating the indirect cost. Productivity loss was therefore valued using the 2015 national minimum wage in the country (that is GHS7.00 per day).

Productivity losses: The estimation of household indirect cost is shown in the Table 2:

Table 2: Estimation of household indirect cost in seeking physiotherapy services

No	Category	Cost Estimation Approach
1	Days lost to patients (employed)	This is the summation of days lost to patients who are employed due to stroke per month
2	Days lost to household members	This is the summation of days lost to household members as a result of stroke per month
3	Productivity loss due to travelling time	This is the summation of the total number of hours spent by household members as travelling time to seek physiotherapy service per month
4	Total Indirect cost	This is the overall aggregation of the total valued productivity losses of patients and household members as a result of the stroke

The productivity days lost to an employed stroke patient was quantified by the estimated average number of days lost to patients who were gainfully employed. Furthermore, the productivity days lost to a family member due to the stroke was computed by the estimated average productivity days lost by family members as a

result of the stroke. Also, productivity days lost to an accompanying family member as travelling and waiting time to seek physiotherapy service was determined by the estimated average number of days lost as travelling and waiting time to seek physiotherapy service respectively.

The overall cost was estimated by the summation of the total direct cost and total indirect cost. The average cost per patient was determined by dividing the overall cost by the number of stroke patients sampled.

3.11.3 Intangible Cost

The Intangible cost was not quantified in monetary terms. However, it was described using the Likert scale. For this study, the Likert scale had a five dimension scale in which patients and family members were asked to rate the statements under each dimension as (1) 'not at all' (2) 'a little' (3) 'moderately' (4) 'quite a bit' (5) 'extremely' in respect of the fear, pain and emotional sufferings. The mean of the responses for each dimension and their individual items under them was estimated for patients and household members. This was then used to describe the effect of stroke on stroke survivors and their family members. The results were then displayed graphically using radar in Microsoft Excel 2010. Table 3 indicates the scale and scores of the intangible cost.

Table 3: Composite intangible physiotherapy cost

No	Domain	Scale	Score range
1.	Fear	1. Not at all 2. A little 3. Moderate 4. Quite a bit 5. Extremely	5-25
2.	Pain	1. Not at all 2. A little 3. Moderate 4. Quite a bit 5. Extremely	3-15
3.	Emotional suffering	1. Not at all 2. A little 3. Moderate 4. Quite a bit 5. Extremely	5-25
	Total		295
	Range		13-295

1 Scores estimated from 5 questions by 5 responses

2 Scores estimated from 3 questions by 5 responses

3 Scores estimated from 5 questions by 5 responses

3.11.4 Composite Intangible Physiotherapy Score

The total composite score was obtained by summing up the responses in each domain and multiplying by the number of questions. The results from the respective domains were subsequently aggregated. The total scores were then used to determine the dimension of low, moderate and high intangible cost with the corresponding range of 13-107, 108-202 and 203-295 respectively using the descriptive statistics tertile approach as shown in Table 4. The score with the range 13-107 was described as low, 108-202 constituted moderate and 203-295 represented high.

Table 4: Composite intangible physiotherapy score ranges

No.	Dimension	Range
1.	Low	13-107
2.	Moderate	108-202
3.	High	203-295

3.12 Statistical Methods

The type of data analysis employed was descriptive statistics of mean, median and standard deviation. Proportions of direct and indirect costs were displayed in pie chart. Subsequently, the average or mean and median costs were displayed in tabular form.

3.13 Ethical Considerations/Issues

3.13.1 Ghana Health Service Ethical Approval

Before the commencement of data collection, ethical approval was sought from the Ghana Health Service Ethical Review Committee of the Research and Development Division of the Service.

3.13.2 Approval from study area

Permission and approval was sought from the Hospital Administration of the Tema General Hospital where the research was carried out before data were collected.

3.13.3 Description of subjects involved in the study

The study population was stroke patients who were attending Tema General Hospital to access physiotherapy service in the last one month or more prior to the collection of data.

3.13.4 Potential Risk /Benefits

This research poses no potential risk to either the study population or the society. The study was envisaged to be beneficial to both the study population and the society in many ways. To begin with, the study will provide the study population knowledge about their annual expenditure on physiotherapy services. Secondly, quantification of household cost of physiotherapy services for stroke patients can be used to set the stage for informing government and policymakers about the economic burden associated with accessing physiotherapy services. Finally, it will provide useful information for strategic planning and budgeting for establishing special physiotherapy service centres for stroke patients at designated communities.

3.13.5 Privacy/confidentiality

Each patient or relative was interviewed on individual basis to maintain privacy and confidentiality. Questionnaires were administered without the names of study participants. Interviews were conducted in an enclosed place to achieve maximum privacy. Data was also reported in aggregates to minimize the likelihood of tracing information to respondents.

3.13.6 Voluntary Consent/Withdrawal

A written informed consent was sought from study participants and their accompanying family members prior to data collection. Participation was totally voluntary and the study participants were given the opportunity to withdraw from the study at any point in time.

3.14.7 Data Usage and Storage

All questionnaires were serialized and coded and kept under key locked up. The coded questionnaires were entered into Epi Info Version 7 and password by the Principal Investigator within 24 hours. Soft copy of the data was stored on external hard drive, pen drive and CD-ROM. The data will be kept by the Principal Investigator for a period of 3-4 years after which the data will be deleted from the external drives, pen drives and CD-ROM. Hard copies will be destroyed.

3.13.8 Compensation

No compensation in any form was given to stroke patients and accompanying family members for taking part in the study. However, their ideas and contributions were duly considered and appreciated.

3.13.9 Funding Information

This study was self-financed from own resources.

3.13.10 Declaration of Conflict of Interest

The study is purely for academic purpose and of public health importance. I therefore declared that I have no other personal interest in the study.

3.14 Assumption

The key assumption made in this study was that the prevailing national minimum wage in the country is reflective of the average income earned per day by respondents.

3.15 Limitations

The total number of days lost as well as time spent in respect of care giving, travelling and waiting for physiotherapy service was largely based on the recall of stroke patients and relatives and therefore might not be accurate and exact. Besides, fear, pain and emotional sufferings relative to the intangible cost were not determined in monetary terms but described using the Likert's scale.



CHAPTER FOUR

RESULTS

4.1 Background Characteristics of Respondents

A total of 152 questionnaires were administered to stroke patients and their household attending Tema General Hospital to access physiotherapy care. There was a 100% response rate. Sixty-one percent of the total respondents were male while thirty-nine percent constituted female respondents. The oldest respondent was 86 years and the youngest 19 years with a mean age of 58 years and a median age of 58 years. The age standard deviation was 11 years.

The respondents who were married constituted 89.5% with only 10.5% not married. Table 5 indicates that tertiary constituted the highest level of education for respondents accounting for 34%. This was followed by respondents with Middle school/Junior High School that made up 25.0%. The least recorded level of education among respondents was primary. Most of the respondents interviewed were employed constituting 81.6% prior to their sickness.

The most accessed modality therapy by respondents was exercise therapy accounting for 92.8% with electrotherapy constituting the second service of 5.9%. Most of the respondents were National Health Insurance Scheme (NHIS) card bearing members making up 73.7% of total respondents. Of all the respondents, 31.6% worked in the public sector. Respondents who were self-employed constituted 25.7% while pensioners accounted for 21.1% of the total respondents. The respondents who worked for someone else or other person was 62.5% while self-employed represented 27.0% of the total respondents. The least reported income earned in a month by a household was GHS500.00 (US\$120.19) while the highest reported monthly income

was above GHS 4000 (US\$961.54) as shown in Table 5. Again, the mean and median reported household income was GHS539.09 (US\$129.59) and GHS600.00 (US\$144.23). The most common modality therapy was exercise therapy.

4.2 Type of Physiotherapy Services at Tema General Hospital

The following types of physiotherapy services for stroke patients were identified at the Physiotherapy Department of the Tema General Hospital; (a) Exercise therapy; (b) Massage therapy; (c) Heat/thermo therapy; (d) Electrotherapy; and (f) Cryotherapy

4.3 Direct Cost of Physiotherapy Service

The total direct cost of physiotherapy service was estimated to be GHS16,123.05 (US\$3,875.93), constituting 30% of the cost profile of physiotherapy services. The average direct cost was estimated to be GHS162.86 (US\$39.15).

4.3.1 Therapy Related Cost

The total therapy related cost of physiotherapy service estimated was GHS2,299.65 (US\$552.82). Exercise therapy accounted for the highest component of the total therapy related cost estimated and 3.2% of the total cost profile as depicted in Table 6. This was followed by electrotherapy and heat/thermotherapy accounting for 1.1% and 0.1% respectively. Massage therapy was the least therapy accessed by stroke patients.

Table 5: Background characteristics of respondents

Variables	Number (%)
Sex	
Male	92 (60.5)
Female	60 (39.5)
Age (years)	
< 20	1 (0.7)
20-39	34 (22.4)
40-59	50 (32.9)
60 and above	67 (44.1)
Level of Education	
No Education	11 (7.2)
Primary	19 (12.5)
Middle/JHS	38 (25.0)
Secondary/Vocational	32 (21.1)
Tertiary	52 (34.2)
Marital Status	
Married	136 (89.5)
Not Married	16 (10.5)
Past Employment Status	
Self-employed	39 (25.7)
Private work	20 (13.2)
Public work	48 (31.6)
Pensioner	32 (21.1)
Unemployed	11 (7.2)
Others	2 (1.4)
Type of Therapy Modality	
Exercise therapy	141 (92.8)
Massage therapy	2 (1.3)
Electrotherapy	9 (5.9)
Payment Status	
NHIS valid card holders	112 (73.7)
'Cash and carry patients'	40 (26.3)
Current Employment Status	
Unemployed	28 (18.4)
Employed	124 (81.6)
Reported Monthly Income	
0-500	39 (43.8)
501-1000	23 (25.8)
1001-2000	22 (24.7)
2001-3000	3 (3.4)
3001-4000	2 (2.3)

4.3.2 Non-therapy Related Cost

The non-therapy related cost components constituted the largest profile of the total cost of physiotherapy services (26%). It was estimated to be GHS13,823.40 (US\$3,322.93). Walking stick remained the second largest component of the non-therapy related cost of the cost profile estimated at GHS3,320.00 (US\$798.08) translating into 6% after other related cost that made up of GHS5,220.00 (US\$1,254.81). Transportation cost equally accounted for GHS3,286.00 (US\$789.9). Total cost of drink incurred by patients during treatment was estimated to be GHS95.50 (US\$22.96).



Table 6: Cost profile of physiotherapy services

Cost Component	GHS	(US\$)*	Cost profile (%)
Direct Costs			
Therapy related costs			
Exercise therapy (NHIS Insured Patients)	1,269.99	305.29	2.4
Exercise therapy	430	103.37	0.8
Massage therapy	20	4.81	0.04
Heat/thermotherapy	45	10.82	0.1
Electrotherapy (NHI)	24.66	5.93	0.1
Electrotherapy	510	122.6	1
Subtotal	2,299.65	552.82	4.4
Non-therapy related costs:			
Walking stick	3,320.00	798.08	6.19
Tripod	1,070.00	257.21	2
Quadripod	337	81.01	0.6
Other cost	5,220	1,254.81	9.7
Travel	3,286	789.9	6.1
Food	145.2	34.9	0.3
Drink	95.5	22.96	0.2
Miscellaneous	349.7	84.06	0.7
Subtotal	13,823.40	3322.93	25.79
Total direct cost	16,123.05	3,875.93	30.21
Indirect costs ***			
Valued days lost by patients	27,706.00	6,660.10	51.9
Valued productivity lost by household members	9,415.00	2,263.22	17.6
Valued travel time	125.74	30.23	0.2
Subtotal	37,246.74	8,953.55	69.8
Grand total	53,369.79	12,829.28	100

* US\$ equivalent in brackets

** Exchange rate used was GHS4.16 as of June 16, 2015

*** National minimum daily wage for the year 2015 was used to value productivity days lost by households

4.4 Indirect Cost of Physiotherapy Services

The total indirect cost estimated for physiotherapy care was GHS37,246.74 (US\$8,953.55). Table 7 shows the productivity days lost to patients and household due to the stroke. Total days lost by patients were estimated to be 3,958 days while household members spent a total of 1,345 days in giving care to stroke patients which was valued as GHS9,415.00 (US\$2,263.22). Care giving by household member was

1% of the cost profile. Days lost by employed patients was the highest cost profile accounting for GHS2,7706.00 (US\$6,660.10). Productivity loss due to lost employment was estimated at 18% patients who had lost employment as a result of the stroke and translated into GHS9,415.00 (US\$2,263.22). This constituted the second highest cost profile of the total physiotherapy care. The total travel by patients and caregivers was estimated to be 5 days which was valued to be GHS125.75 (US\$30.32) as indicated in table 6. On the whole, the total indirect cost represented 70% of the total cost profile.

Table 7: Household productive day lost

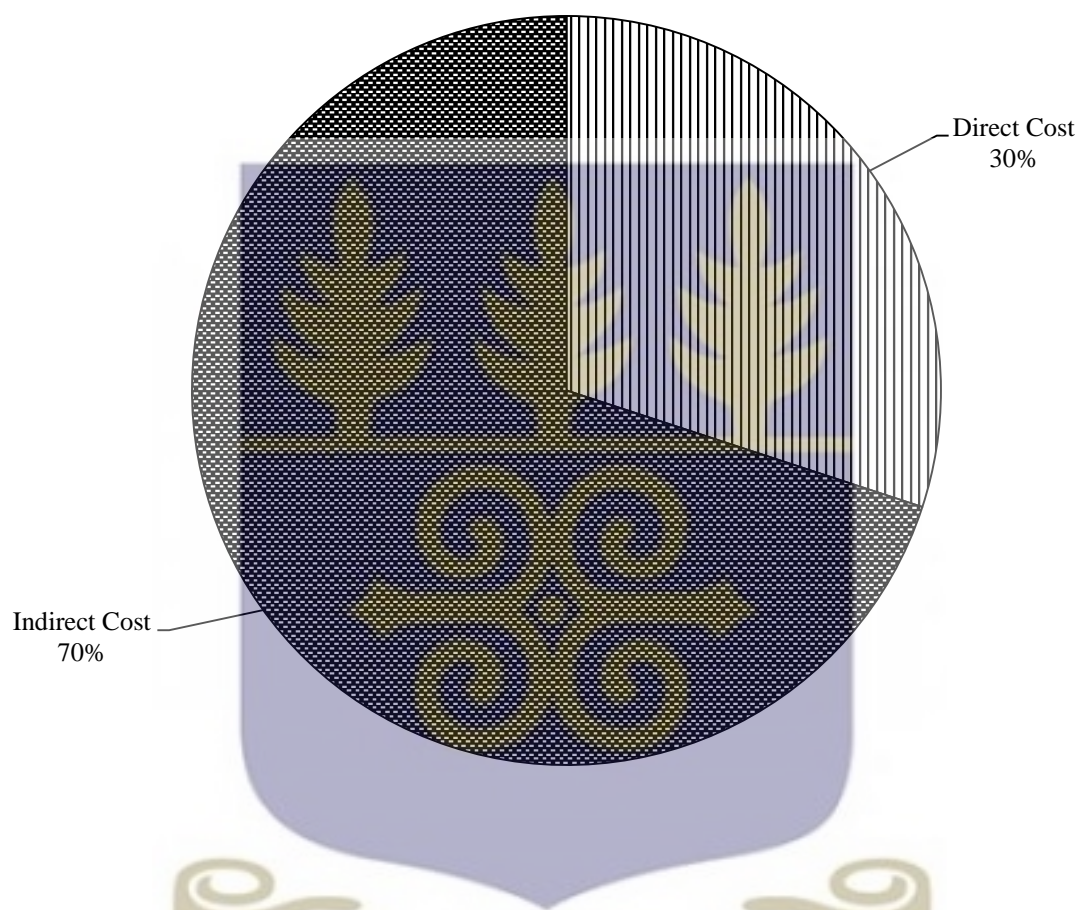
Category	Days lost
Care giving:	
Care giving by household members	1345
Subtotal	1345
Due to stroke illness:	
Days lost by employed patients	3,246
Days lost by unemployed patients	712
Subtotal	3,958
Physiotherapy care:	
Days lost by household members	44
Travel time*	5
Subtotal	49
Total	5,352

*Travel time was collected in minutes and hours and subsequently converted to days using 24 hours =

1day

4.5 Total Cost of Physiotherapy Services

Figure 2: Total household cost of physiotherapy services for stroke patients



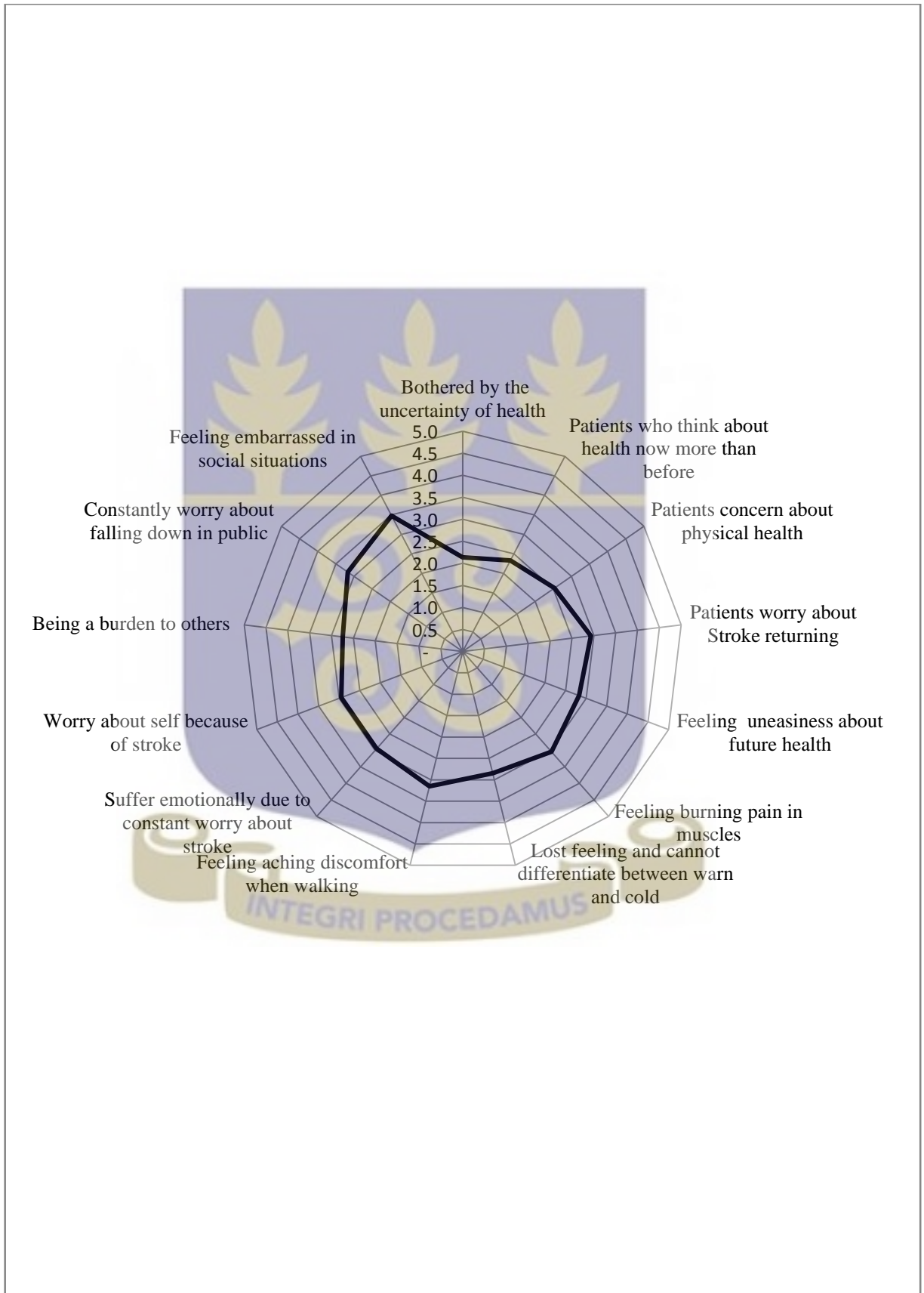
The total cost of physiotherapy services was estimated to be GHS53,369.79 (US\$12,829.30). The total indirect costs constituted the highest proportion (70%) of the total cost as depicted in figure 2. Direct cost accounted for the remaining 30%. Of the direct cost, non-therapy related cost was estimated to be the highest (86%). Therapy related cost estimated constituted the rest of the total direct cost (14%).

4.6 Intangible Cost of Physiotherapy Services

The means of the thirteen intangible cost dimensions for stroke patients is presented in the Figure 3. The dimension with the highest mean was patients feeling embarrassed in social situations (3.5) whereas the one with the least mean was patients bothered by the uncertainty about their health (2.1). The estimated means for constant fear of falling down in public, worry about stroke returning, feeling uneasiness about future health, feeling burning pain in muscles, and being a burden to others were 3.2, 2.9, 2.8, 3.0, and 2.7 respectively. The respective means of all items under the dimensions stated are shown in Appendix III.



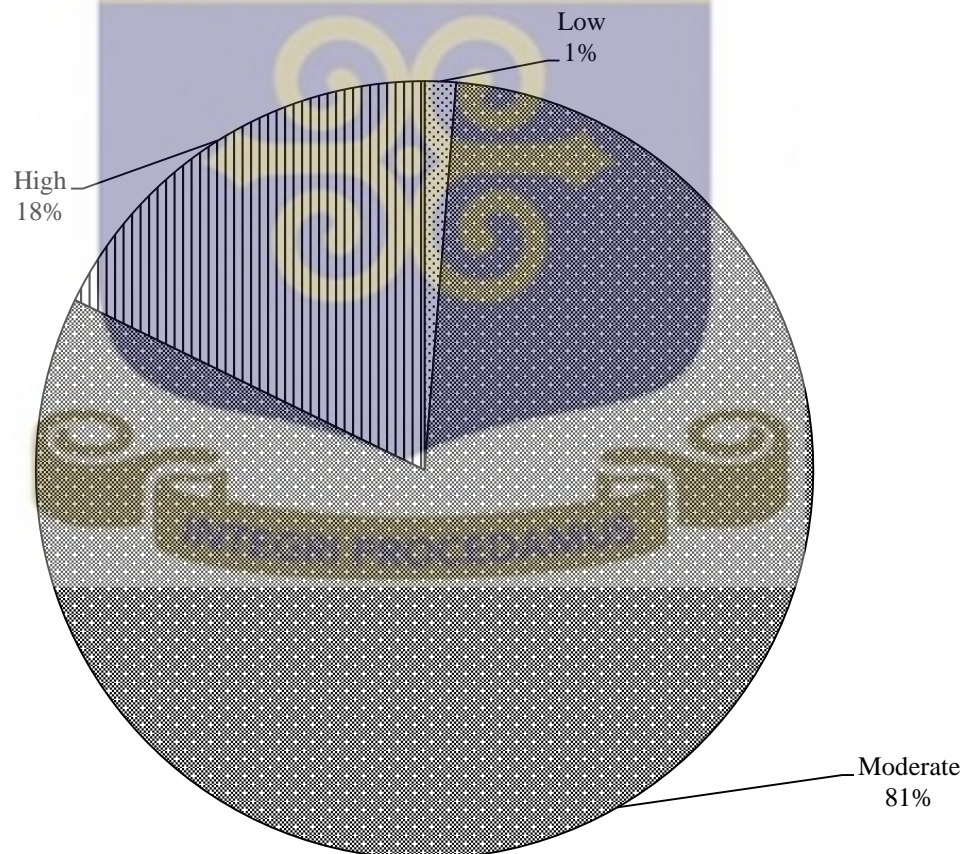
Figure 3: Means of intangible physiotherapy cost for stroke patients



4.7 Composite Intangible Physiotherapy Score

The intangible cost for stroke patients accessing physiotherapy services was further described using the respective composite scores in the dimension of low, moderate and high. The dimension with the least number was 2 and the highest number was 123. The highest composite physiotherapy score was moderate dimension accounting for 81% (123) of the total score. This was followed by a high dimension representing 18% (27). The least score was the low dimension constituting 1% (2). Figure 5 shows details of the various dimensions.

Figure 4: Composite intangible physiotherapy score



CHAPTER FIVE

DISCUSSION

The types of physiotherapy services determined at the Physiotherapy Department of the Tema General Hospital were exercise therapy, massage therapy, heat/thermo therapy, electrotherapy and cryotherapy.

The total cost of physiotherapy services was estimated to be GHS53,369.79 (US\$12,829.30) with indirect cost accounting for 70%. Direct cost which constituted 30% of the total cost had 86% being non-therapy related expenses and 14% therapy related expenditure. The mean of intangible cost estimated for stroke patients was highest for feeling embarrassed 3.5 and least for uncertainty about health (2.1).

5.1 Types of Physiotherapy Services at the Physiotherapy Department of TGH

Exercise therapy is a form of physical activity intended to achieve specific therapeutic goals. Stroke patients were usually engaged in various supervised exercise regimens targeted at the affected body parts mostly the hands, arms, shoulders, and legs. Exercise therapy was therefore categorized into range of motion (ROM), arm strengthening, hand and leg exercises as well as balance exercises. ROM involved moving the joints of patients in different directions to help keep the joint flexible, minimize pain and improve balance and strength. ROM could be passive, active or active assistive. The arm strengthening exercise entails gradual and slow movement of the arms of stroke patients against resistance or using either dumbbells or theraband in order to overload the muscle to become stronger. Hand exercise was concerned with picking up grains of maize by stroke patients one at a time transferring each one to the palm of the other hand and holding onto it as the next grains of maize were being

picked up. Other hand exercises were stack pennies, playing checkers, and putting puzzles together. This was meant to improve fine motor skills as well as restore hand function. Leg exercises comprised foot and ankle circles, sitting knee extension, squats, standing knee extension among others. Balance exercises which were meant to prevent falls and improve activities of daily living composed of weight shift side to side, weight shift forward and back. Other forms of exercises for stroke patients include walking, stair climbing, riding static and elliptical cycles as well as holding and squatting using wall bar.

Another physiotherapy treatment available at the department was massage therapy. It encompasses rubbing and manipulating defective muscles and joints of stroke patients to increase blood circulation, decrease anxiety and stress as well as reduce muscle stiffness. The physiotherapist usually made the patient comfortable in bed at screened area and squeezed fluid into her hands and started rubbing the areas with motor loss applying little pressure, using the thumbs and asking the patients whether to go deeper with the rubbing or not. Essentially, all body parts of stroke patients (face, neck, thighs, knees, shoulders, foot, calves etc.) were therapeutically massaged by physiotherapists except the genitals and breast.

Additionally, physiotherapists applied heat at the regions with motor loss to improve blood flow and thus enhance healing. The thermotherapy devices used on patients were paraffin wax, hot packs, infrared heat and shortwave diathermy.

Electrotherapy modality comprises placing electrodes on the skin of stroke patients which caused changes in the muscles to enhance the body's natural ability to stimulate and control the healing and repair processes. The clinical effects were to relieve pain, reduce edema and increase circulation. This modality also requires the

use of ultrasound machine and lumber traction for stimulating the bodies of stroke patients.

Cold therapy or cryotherapy as the name implies involves the application of cold to the body parts of stroke patients with musculoskeletal challenges. The main aim was to relieve patients of pain, minimize swelling and edema formation. It was seen to be useful after deep kneading massage for stroke patients as well as during acute strains and sprains conditions. The most common types of cold therapy employed were cold or ice packs, ice massage and cold gel pack.

5.2 Direct Cost of Physiotherapy Services

The direct cost estimated was 30% of the total cost of physiotherapy services. This is less as compared to that estimated by Birabi *et al* (2012) in Nigeria which made up of 46% of the total cost of physiotherapy intervention. This difference can be attributed to the components of cost calculated and the perspective of the cost study. Birabi *et al* (2012) estimated cost of physiotherapy intervention from government and private hospital (Provider) perspectives whilst this study looked at the cost from the patient perspective only. Societal perspective looks at the cost of both the patient and the provider's viewpoint. Birabi *et al* (2012) estimated the direct cost to the care provider which comprised cost of medication and medical investigations whereas this study explored only the cost to the patient and the household. However, of the cost incurred by patients and households, therapy related cost constituted only 14% of the total direct cost.

The findings of this study are consistent with those of Addo *et al* (2013) and Casado *et al* (2006). In evaluating the household cost of mental health, Addo *et al*

(2013) found direct cost to constitute 26% of the total direct cost even though components of cost estimated varied slightly with this study. The study basically evaluated direct and indirect costs of mental illness to patients and their families. Casado *et al* (2006) also found direct cost accounting for a large proportion (60%) of the total cost of multiple sclerosis. The cost components evaluated included cost of ambulatory assistance, rehabilitative exercise, transport, mobility aids and informal care provided by relatives.

Out of the total direct cost estimated, therapy related cost and non-therapy related accounted for 14% and 86% respectively. This corroborates the findings of Amoakoh and Aikins (2013) where medical cost constituted 3% and non-medical 97%. Components of cost estimated in each case were, however, different for direct cost. Additionally, Das Gupta and Guest (2002) estimated the non-healthcare direct medical cost of mental healthcare as 79% of the total direct cost, which further firms up the findings of the study. Their direct medical cost accounted for the direct mental healthcare and treatment (in-patient days costs and out-patient cost) and non-direct treatment (for example medical treatment in non-mental health settings). The non-therapy related cost constituted 86% of the total direct cost. This is comparable to that of Amoakoh and Aikins (2013) and Saka *et al* where it constituted 97% and 60% respectively. The components of costs calculated were fundamentally the same accounting for the observed similarities. Travel/transportation cost comprised 23.8% of the total non-therapy related cost.

5.3 Indirect Cost of Physiotherapy Services

The total indirect cost estimated for physiotherapy services was GHS37,246.74 (US\$8,953.55), constituting the highest proportion (70%) of the total cost of physiotherapy services. This concurs with the findings of Addo *et al* (2013) and Das Gupta and Guest (2002). Addo *et al* estimated indirect cost as total productive losses which were as a result of the negative effect of mental illness on the patient's capacity to work. The overall output losses evaluated was 74% of the total cost of mental illness. Besides, Das Gupta and Guest (2002) estimated the indirect cost to be 76.9% of the total bipolar disorder in the United Kingdom. Out of this, excess unemployment constituted 85% whereas the cost estimated for productivity days lost by stroke patients who were gainfully employed was 51.9% of the total indirect cost in this study. The cost due to care giving by household members made up the second highest proportion (17.6%) of the total indirect cost of physiotherapy services incurred by stroke patients at the Tema General Hospital.

However, in contrast to this study, the estimated indirect cost of out-patient treatment of buruli ulcer in Ghana by Amoakoh and Aikins (2013) constituted 4% of the total indirect cost because of the fact that respondents were residents at home coupled with being students whose productivity was not valued. This is not the case in this study. Casado *et al* (2006) found indirect cost to be 40% of the total cost of multiple sclerosis. This therefore affirms the findings of this study.

It must be noted that the estimated indirect cost of this study may have been overestimated or underestimated simple because some employee may in reality be earning more or less than the approved national daily minimum wage in the country that was applied to value the productivity days lost. This defect could be rectified in future studies when patients and household members endeavour to disclose the right

estimate of their monthly incomes. Additionally, productivity losses could have been over or undervalued because of recall and respondents not knowing the exact and actual hours lost due to stroke. This limitation can also be addressed if a prospective study is undertaken rather than a retrospective study such as this study.

5.4 Total Cost of Physiotherapy Services

The total cost of physiotherapy services was estimated to be GHS53,369.79 (US\$12,829.28). However, there was no marked difference among the various cost components incurred by the respondents. The average monthly cost of physiotherapy services incurred per patient was estimated at GHS539.09 (US\$129.59). This is higher in comparison to that estimated by Addo *et al* (2013) (GHS103.77 per month per patient). The difference between these costs can be attributed to the respective cost components that were estimated as well as the various perspectives of the cost of illness study. The mean cost is, however, consistent with that of Amoakoh and Aikins's (2013) that arrived at a mean cost of US\$521.04. It is significant to note also that the studies of Addo *et al* (2013) and Amoakoh and Aikins (2013) as well as this study dwelt on only the cost incurred by patients and their household and did not include the actual cost of providing physiotherapy services to stroke patients. It is therefore clear that the cost of physiotherapy services estimated is largely based on the perspective of cost of illness and the components of cost estimated relative to stroke patients.

Moreover, with the reported median monthly income of respondents being GHS600.00 (US\$144.23) and the cost of physiotherapy services per stroke patient per month as GHS539.09 (US\$129.59), it can be estimated that cost of physiotherapy

service accounts for 89.8% of the income accruing to them on monthly basis. However, under the National Health Insurance Scheme Act, (Act 852) (2012) stroke patients have a maximum of 12 sessions out-patient department physiotherapy services irrespective of the type of modality to undergo at the gymnasium. In spite of this, stroke patients intending to access physiotherapy care have to incur some cost including cost of mobility aids and transportation which serves as a huge financial burden to both the patients and their household. It therefore presupposes that adequate provision has not been made in the National Health Insurance Scheme to fully cater for the physiotherapy care of stroke patients.

The direct non-therapy related cost including cost of walking stick, quadripod and tripod constituted 86% of the total direct cost can be reduced if sufficient provisions were made for these mobility aids and other costs in the Scheme. Again, the 12 sessions approved for stroke patients in seeking physiotherapy service under the Scheme is woefully inadequate since stroke patients required 18 or more sessions of the various physiotherapy interventions to achieve and maintain sensorimotor control of the upper and lower limbs, dexterity as well as activities of daily living (Pollock *et al.*, 2008). The remaining 6 sessions have to be borne by patients and their household at the point of service delivery. The aggregate of physiotherapy care for stroke patients would have been higher if intangible costs were to be quantified in monetary terms. The study by Xie *et al* (2008) pointed out that intangible cost forms the highest proportion of cost of illness. To this end, the total cost of physiotherapy services arrived at in this study may not be the true reflection of the real household cost of physiotherapy services for stroke patients. This shortcoming can be adequately addressed in future studies by valuing the intangible cost in monetary terms.

5.5 Household Intangible Cost of Physiotherapy Services

The findings of this study revealed that 94.3% of stroke patients felt embarrassed in social situations as a result of their illness (mean score of 3.5). As such they were unable to attend and mix well with other people at social gatherings. This assertion was further buttressed by 86.3% (mean score of 3.2) of stroke patients who constantly expressed their apprehension and anxiety of falling down in public due to their conditions. Stroke patients therefore endured some level of emotional sufferings resulting from the illness. Similar proportion of patients indicated feeling arching discomfort when walking. On the hand, stroke patients who expressed burning pain in their muscles, nerves and around their shoulder had a mean score of 3.0, suggesting that pain was the next component of the intangible cost that bother stroke patients.

However, the least mean score in the domain of pain was 2.1 which implied that stroke patients were not bothered so much by the uncertainty of their health. Household members (mean score of 2.7) postulated that stroke patients were not a burden to them. The emotional suffering and perhaps the condition of stroke patients could have been worsened if household members had perceived stroke patients to be burden to them. Although the stroke patients could have considered themselves to be burden to their relatives, this was not ascertained and hence a limitation of this study. This defect can be corrected in further studies when questionnaires are administered at the household level and intangible cost of each member of the household estimated, and the mean taken as the household intangible cost.

5.6 Composite Intangible Physiotherapy Score

The intangible cost for stroke patients seeking physiotherapy services was further described using the composite scores to determine the variations of patients' response to the combined intangible cost items. The highest composite physiotherapy score was moderate dimension making up 81% (123) of the total score. This was followed by the high dimension representing 18% (27). The least score was the low dimension constituting 1% (2).

The highest composite physiotherapy score in the dimension of moderate implies that the response of more than two-thirds of stroke patients to the composite intangible cost items was marginal as compared with their reactions to the individual intangible cost items. The scores further revealed that less than one-third of stroke patients responded above average or were significantly affected by the composite intangible cost variables. Only two stroke patients were little and minimally affected by the composite variables. However, irrespective of the level of dimension, stroke patients to a large extent express fear, endure some level of pain and suffer emotionally and therefore need treatments. Whilst stroke patients who scored moderate and high dimensions are likely to continually seek physiotherapy services and counseling, those in the score of low dimension may not necessarily need much physiotherapy care and counseling since they are not much affected. Household members and caregivers can therefore play significant roles in managing the effects of these variables on stroke patients.

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

The cost of physiotherapy services for stroke patients and their households can be categorized into direct, indirect and intangible costs. Based on the findings of the study a number of conclusions were drawn.

Firstly, direct non-therapy related costs such as walking stick, tripod, quadripod, travel and other costs made up one-third of the total direct therapy cost which was borne by stroke patients and their households.

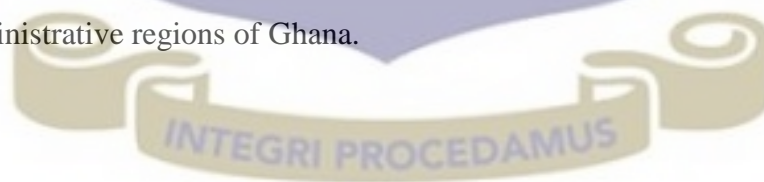
Secondly, indirect cost constituted two-thirds of the total cost of physiotherapy services for stroke patients estimated. To this end, patients and their households should be made aware that costs associated with physiotherapy rehabilitation could be exorbitant and hence the need for households to financially support stroke patients to undergo rehabilitation.

The study further identified that stroke patients suffer emotionally in the form of embarrassment in social situations as well as constant fear of falling down in public as a result of the stroke. In this regard, household members and caregivers can help in managing the emotional aspects associated with stroke.

6.2 Recommendations

This study aimed at estimating the cost incurred by stroke patients in seeking physiotherapy services at one of the public hospitals in the country. The following recommendations are therefore made in respect of the findings of the study;

1. The total household cost of physiotherapy services estimated in this study should serve as a reference point for strategic planning and budgeting for future physiotherapy services, informing government and health policy makers in instituting a financial framework as well as options for preventive, promotive and intervention programmes for stroke patients.
2. There is the need for regular psycho-social counseling for stroke patients and their caregivers to mitigate the emotional sufferings associated with stroke. Households should be encouraged to offer financial supports to stroke patients to enable them to undergo physiotherapy rehabilitation.
3. Finally, further studies should be conducted into estimating the total cost of physiotherapy services for stroke patients from the societal perspective at various levels of physiotherapy rehabilitation centres and across all the administrative regions of Ghana.



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APPENDICES

Appendix I: Informed Consent for participation

Research Title: **Household Cost of Physiotherapy Services for Stroke Patients at Tema General Hospital.**

Introduction

My name is Yakubu Mohammed, a student from the School of Public Health, College of Health Sciences, University of Ghana, Legon. I am carrying out a study on the Household Cost of Physiotherapy Services for Stroke Patients at Tema General Hospital. The main objective of the study is to estimate the household cost of physiotherapy services for stroke patients attending Tema General Hospital.

Procedures

The study will involve answering questions from a closed-ended questionnaire about the cost incurred by patients and household members in seeking physiotherapy services. Participation in the study is absolutely voluntary and no coercion to obtain responses from participants. It will be much appreciated if you could participate in this study. The study is purely academic and forms part of the requirements for the award of a Master degree in Public Health.

Risks and Benefits

This research poses no potential risk to either the study population or the society. There is no direct benefit to you for participation or monetary gain. However, the study is envisaged to be beneficial to both the study population and the society in many ways. To begin with, the study will provide the study population knowledge about their annual expenditure on physiotherapy services. Secondly, quantification of household cost of physiotherapy services for stroke patients can be used to set the stage for informing government and policymakers about the economic burden associated with accessing physiotherapy services. Finally, it will provide useful information for strategic planning and budgeting for establishing special physiotherapy service centres for stroke patients at designated communities.

Voluntary Participation

Participation in this study is voluntary and you can choose not to answer any individual question or all the questions. You are free to withdraw from the study at any time. However, you are kindly requested to fully participate in the study since

your answers are important to help estimate the cost of physiotherapy services to the household.

Anonymity and Confidentiality

You are assured that all information provided will be kept confidential, privacy and would not be shared with anybody who is not part of the study team.

Dissemination of Results

A durbar (including hospital staff, patients’ households and other key stakeholders of health) will be held at the hospital to disseminate the findings of the study at Tema General Hospital. A copy of the study will be kept in the hospital as reference.

Before taking Consent

Do you have any questions you wish to ask about the study? Yes No

If yes, please, indicate the questions below).....

In case you have any questions later please, do not hesitate to contact **Yakubu Mohammed**, Department of Health Policy, Planning and Management (Tel: 0202698585). School of Public Health, University of Ghana. Email: yakumoha@yahoo.com.

Also, if you need further clarifications about this study please, kindly contact the Administrator of the Ghana Health Service Ethical Review Committee, **Hannah Frimpong** (0243235225 or 0507041223). Email: Hannah.Frimpong@ghsmaail.org.

Voluntary Consent

I have read the information provided above, or the information above has been read to me and I understand. I have been given the opportunity to ask questions regarding this study; questions have been answered to my satisfaction. I now voluntarily agree, and also voluntarily agree for my relative to participate in this study knowing that I have the right to opt out and also withdraw my relative from this study at any time without affecting future health care services.

.....
Name of household head/relative	Signature	Thumbprint	Date

.....
Name of witness Signature Thumbprint Date

.....
Name of researcher Signature Thumbprint Date

.....
Name of interviewee Signature Thumbprint Date

Interviewers Statement

I, the undersigned, have explained this consent to the subject in English language/Ga/Twi, and that she/he understands the purpose of the study, procedures to be followed, as well as the risks and benefits of the study.

The participant has fully agreed to participate in the study.

Signature of Interviewer.....

Date.....

Address.....



Appendix II: Questionnaire

TITLE: Household Cost of Physiotherapy Services for Stroke Patients at Tema

General Hospital

Dear Respondent,

This is a research carried out on **Household Cost of Physiotherapy Services for Stroke Patients at Tema General Hospital**. I will therefore like to take a few minutes of your precious time to answer these questions as candidly as possible. You are assured that the answers you give will be strictly confidential and your name will not be mentioned in my research reports.

Qns No.	Questions	Response
	Respondent ID	_ _ _ _
Section one	Demographic Information	
1.	Sex 2. Male 3. Female	_ _
2.	Age in years (above 18 years)	/_ _ /_ _ /
3.	What is your current level of education? 1. No education 2. Primary 3. Middle/JHS 4. Secondary/Vocational 5. Tertiary	_ _
4.	What is your marital status? 1. Married 2. Not married	_ _
5.	Employment status 1. Unemployed 2. Employed	_ _

6.	<p>What type of therapy modality are you seeking at the physiotherapy department?</p> <ol style="list-style-type: none"> 1. Exercise therapy 2. Massage therapy 3. Heat/thermo therapy 4. Electrotherapy 5. Cryotherapy 6. Other(Specify) 	_ _
7.	How many times in a week did you come for therapy?	_ _ _ _
8.	<p>Do you have a valid National Health Insurance Scheme card for this year?</p> <ol style="list-style-type: none"> 1. Yes 2. No 	_ _
9.	<p>If no how did you pay for your therapy fee?</p> <ol style="list-style-type: none"> 1. By myself 2. By employer 3. By relative 	_ _
10.	<p>What was your occupation before the illness?</p> <ol style="list-style-type: none"> 1. Self-employed 2. Private work 3. Public work 4. Apprentice 5. Pensioner 6. Unemployed 7. Farmer 8. Other (specify)..... 	_ _
11.	<p>Were you doing this work for a member of your family, for someone else, or were you self-employed</p> <ol style="list-style-type: none"> 1. Family member 2. Someone else 3. Self-employed 	_ _
12.	<p>Were you paid in cash or kind for this work or you were not paid at all?</p> <ol style="list-style-type: none"> 1. Cash only 2. Cash and kind 3. In kind only 4. Not paid 	_ _
13.	If paid in cash, how much were you paid in cedis?	_ _ _ _ _ _ _ . _ _ _ _

14.	Are you still working? 1. Yes 2. No	<input type="text"/>
15.	If yes to question 14, has there been a reduction in your pay or salary? 1. Yes 2. No	<input type="text"/>

SECTION TWO (DIRECT COST)

16. How much have the household spent on the following through seeking physiotherapy services for the last one month?

Therapy Related Cost

Type of therapy	Cost category	
	NHI GHS	Cash GHS
1. Exercise		
2. Massage		
3. Heat/thermo		
4. Electrotherapy		
5. Cryotherapy		
6. Others (Specify)		
Mobility Aids		
7. Walking Stick		
8. Tripod		
9. Quadripod		
10. Others (Specify).....		

17. Non-Therapy related Cost

Cost Category	Amount paid for each category GHS
Travel cost (transportation)	
Food during therapy	
Drink during therapy	
Other miscellaneous cost (e.g. phone calls)	

SECTION THREE (INDIRECT COST)

18. How many days within the last one month have you absented yourself from work because of your stroke? |___|___|

Household (To be answered by household head or his/her representative)

19.	How many hours did you spend travelling in and out to seek physiotherapy service in the last visit?	___ ___ . ___ ___
20.	How many hours did you spend seeking physiotherapy service?	___ ___ . ___ ___
21.	How many days within the last one month have you absented yourself from work because you had to take your relative to access physiotherapy services?	___ ___ ___
22.	How many hours in a day does a household member spend in taking care of you out of his/her own usual activities?	___ ___ . ___ ___

SECTION FOUR (INTANGIBLE COST)

23. Please, rate the following statements from “not at all” to ‘extremely’ depending on how it applies to you.

FEAR		
23a.	I am bothered by the uncertainty of my health 1. Not at all 2. A little 3. Moderately 4. Quite a bit 5. Extremely	___
23b.	I think about my health now more than before I had my stroke 1. Not at all 2. A little 3. Moderately	___

	<p>4. Quite a bit 5. Extremely</p>	
23c.	<p>Because of my physical health, my future is of concern to me</p> <p>1. Not at all 2. A little 3. Moderately 4. Quite a bit 5. Extremely</p>	____
23d.	<p>I am always worry about my stroke returning</p> <p>1. Not at all 2. A little 3. Moderately 4. Quite a bit 5. Extremely</p>	____
23e.	<p>When I think about my future health, I feel some uneasiness</p> <p>1. Not at all 2. A little 3. Moderately 4. Quite a bit 5. Extremely</p>	____
PAIN		
24a.	<p>I always feel burning pain in my muscles, nerves and around my shoulders</p> <p>1. Not at all 2. A little 3. Moderately 4. Quite a bit 5. Extremely</p>	____
24b.	<p>I lose my feeling and not able to tell the different between warm and cold</p> <p>1. Not at all 2. A little 3. Moderately 4. Quite a bit 5. Extremely</p>	____
24c.	<p>I feel aching discomfort when I am walking</p> <p>1. Not at all 2. A little 3. Moderately 4. Quite a bit 5. Extremely</p>	____
EMOTIONAL SUFFERING		
25a.	<p>I suffer emotionally because I constantly worry about my condition</p>	

	<ol style="list-style-type: none"> 1. Not at all 2. A little 3. Moderately 4. Quite a bit 5. Extremely 	<input type="text"/>
25b.	<p>I feel worry about myself because of my illness</p> <ol style="list-style-type: none"> 1. Not at all 2. A little 3. Moderately 4. Quite a bit 5. Extremely 	<input type="text"/>
25c.	<p>I think I am a burden to others because of my illness</p> <ol style="list-style-type: none"> 1. Not at all 2. A little 3. Moderately 4. Quite a bit 5. Extremely 	<input type="text"/>
25d.	<p>I am constantly worry about falling down in public</p> <ol style="list-style-type: none"> 1. Not at all 2. A little 3. Moderately 4. Quite a bit 5. Extremely 	<input type="text"/>
25e.	<p>I feel embarrassed in social situations</p> <ol style="list-style-type: none"> 1. Not at all 2. A little 3. Moderately 4. Quite a bit 5. Extremely 	<input type="text"/>

THANK YOU.



Appendix III: Means of Intangible Cost Items

Intangible cost	Frequency					Mean
	Not at all	A little	Moderately	Quite a bit	Extremely	
Fear						
Bothered by the uncertainty of health	44	64	27	13	4	2.13
I think about my health now more than before I had the stroke	26	66	47	9	4	2.33
Patients concern about physical health	33	35	61	16	7	2.53
Always worry about my stroke returning	18	39	48	29	18	2.93
I feel uneasiness about my future health	19	40	54	26	13	2.82
Pain						
I always feel burning pain in my muscles, nerves and around my shoulders	17	34	47	34	20	3.04
Lost feeling and cannot differentiate between warm and cold	24	39	46	22	21	2.85
Feeling aching discomfort when walking	12	27	54	44	15	3.15
Emotional Sufferings						
Suffer emotionally due to constant worry about condition	21	31	48	39	13	2.95
Worry about self because of stroke	14	43	50	27	18	2.95
I think I am a burden to others because of my illness	24	45	44	24	15	2.74
Constantly worry about falling down in public	18	28	42	38	26	3.17
Feel embarrassed in social situations	16	23	33	32	48	3.50

Appendix IV: Ghana Health Service Ethical Approval

GHANA HEALTH SERVICE ETHICAL REVIEW COMMITTEE

*In case of reply the
number and date of this
Letter should be quoted.*



*My Ref. :GHS-ERC: 3
Your Ref. No.*

Research & Development Division
Ghana Health Service
P. O. Box MB 190
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Email: Hannah.Frimpong@ghsmail.org

23rd March, 2015

Mohammed Yakubu
School of Public Health
University of Ghana
Legon, Accra

ETHICAL APPROVAL - ID NO: GHS-ERC: 66/02/15

The Ghana Health Service Ethics Review Committee has reviewed and given approval for the implementation of your Study Protocol titled:

“Household Cost of Physiotherapy Services for Stroke Patients at Tema General Hospital”

This approval requires that you inform the Ethical Review Committee (ERC) when the study begins and provide Mid-term reports of the study to the Ethical Review Committee (ERC) for continuous review. The ERC may observe or cause to be observed procedures and records of the study during and after implementation.

Please note that any modification without ERC approval is rendered invalid.

You are also required to report all serious adverse events related to this study to the ERC within seven days verbally and fourteen days in writing.


You are requested to submit a final report on the study to assure the ERC that the project was implemented as per approved protocol. You are also to inform the ERC and your sponsor before any publication of the research findings.

Please note that this approval is given for a period of 12 months, beginning March 23rd 2015 to March 22nd 2016.

However, you are required to request for renewal of your study if it lasts for more than 12 months.

Please always quote the protocol identification number in all future correspondence in relation to this approved protocol

SIGNED.....


DR. CYNTHIA BANNERMAN
(GHS-ERC CHAIRPERSON)

Cc: The Director, Research & Development Division, Ghana Health Service, Accra

