SCHOOL OF PUBLIC HEALTH

COLLEGE OF HEALTH SCIENCES

UNIVERSITY OF GHANA

ECONOMIC BURDEN OF BREAST CANCER IN WOMEN: A STUDY AT THE KORLE-BU TEACHING HOSPITAL

BY

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DECLARATION

I, Doreen Pokua Gyau, hereby declare that apart from reference made to other people's work which have been duly acknowledged, this work was done by me. I further declare that it has not been submitted anywhere for the award of a degree in any university.

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DEDICATION

I dedicate this thesis to all breast cancer patients in Ghana and all the medical staff that care for them. I hope that this work will be useful in formulation of policies to improve breast cancer care as well as increase financial access for all women with breast cancer in Ghana.

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ABSTRACT

Introduction: Breast cancer is a malignant tumor that grows in the cells of the breast. A malignant tumor is a group of cancer cells that can invade surrounding tissues or spread (metastasize) to distant areas of the body. Globocan puts the annual estimated incidence rate of breast cancer in Ghana at 25.8 cases per 100,000 women and mortality rate at 15.2 deaths per 100,000 women. In Ghana, treatment of cancer at all stages in combination with mammography screening cost $2000-6000 per Disability Adjusted Life Years. However, there is a paucity of studies on the economic burden of the disease.

Objective: The objective of this study was to estimate the economic burden of breast cancer in women attending the Korle- Bu Teaching Hospital.

Methods: This descriptive cross-sectional study was carried out using the cost of illness analytic approach. Data was collected from 56 women with breast cancer attending the Oncology Unit(s) of the Department of Surgery at the Korle-Bu Teaching Hospital. The study estimated the direct and indirect cost and described the intangible cost associated with breast cancer.

Results: These results show that the mean monthly cost was GHS714.43 (USD183.19) with 90.54% being direct cost. Further, a total of 2,496 productive hours were lost to 82.14% breast cancer patients in the study sample who were economically active.

Conclusion: The economic burden of breast cancer in patients and their household need to be addressed since it is a heavy burden on them. Policies and programs are needed to tackle the burden associated with the disease.

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LIST OF ABBREVIATIONS

COI	Cost of Illness
DALY's	Disability Adjusted Life Years
GHS	Ghana Cedis
HCA	Human Capital Approach
KBTH	Korle-Bu Teaching Hospital
NHIS	National Health Insurance Scheme
QLQ	Quality of Life Questionnaire
WHO	World Health Organization

DEFINITION OF TERMS

Breast cancer - Breast cancer is a malignant tumor that grows in the cells of the breast.

Direct cost - Direct cost of illness simply refers to the actual patient and household cost incurred in seeking treatment.

Disability Adjusted Life Years - It is the measure of overall disease burden expressed as the number of years lost due to ill-health, disability or death from a disease.

Economic burden - Economic burden is defined as a loss of economic resources and opportunities due to disease.

Household - Family or relatives of an individual.

Indirect cost - The indirect cost of breast cancer pertains to cost incurred due to loss in productivity as a result of the disease.

Intangible cost - Intangible or psychosocial costs are pain and suffering from disease and its treatment that affect health and well-being.

Mastectomy - Surgical removal of the breast.

Prosthesis - Artificial body parts used, eg breast.

Quality of life - It is how a person perceives her health in the presence of a disease condition or disability.

CHAPTER ONE

INTRODUCTION

1.1 Background to the study

Breast cancer in recent times is one of the popular cancers all over the world affecting women in low, middle and high-income countries with a significantly huge economic burden (Youlden *et al.*, 2012). It is the commonest cancer affecting women with the current estimated lifetime risk of one in eight women. In the United Kingdom, the number of women affected rose to 52,250 in 2011 with the highest risk in women aged 50-69years. About 1.3 million women are diagnosed worldwide annually, with 465,000 deaths. Incidence increases with age, over 80% of women diagnosed with the disease are aged over 50years (Davies, 2016). In the developed nations, the rate of breast cancer is markedly higher compared to undeveloped countries. Incidence is put at 42.7 per 100,000 in Japan, 76.0 in the United States, and 89.1 in the United Kingdom (Kim *et al.*, 2015).

In Sub-Sahara Africa, breast cancer is increasingly becoming a major public health issue and it is contributing greatly to terminal conditions in women. Treatment of cancer at all stages in combination with mammography screening cost $2000-6000 per DALY (Zelle *et al.*, 2012). In general, breast cancer is the second most common malignancy of women in the region, after cancer of the uterine cervix.

In Ghana, data on breast cancer cases are slowly becoming more available through better documentation of hospital admissions, suggesting that Ghana has a higher incidence of breast cancer than estimations from global statistical predictions. Cases are rising due to

the aging population, demographic and reproductive changes, and improved access to diagnostic and treatment resources (Mehdi *et al*., 2014).

Late presentation of breast cancer remains a challenge in Ghanaian women with over 60% of patients reporting with either in stage 3 or 4 of the disease which means an increase in the cost of management as well as the risk of metastasis (Opoku, Benwell, & Yarney, 2012).

According to a study done in Australia that sought to describe the cost and quality of life breast cancer patients, the quality of life of breast cancer patients is markedly influenced by the age of the patient as the younger ones tend to be more negatively affected than the older or aged women. In a like manner, those treated without surgical removal of their breast reported a higher body image than their counterparts who had undergone mastectomy (Kenny *et al*., 2000).

At the Korle-Bu Teaching Hospital, confirmed breast cancer cases in 2013 were 346 and these were new cases with 342 of them being females and 4 being men **(**KBTH annual report, 2013). Globocan puts the annual estimated incidence rate of breast cancer in Ghana at 25.8 cases per 100,000 women and mortality rate at 15.2 deaths per 100,000 women (Obrist *et al*., 2014).

1.2 Problem statement

The annual cost of breast cancer in countries across the European Union was about 15 billion pounds. Out of this, 6.7 billion was incurred on health care, 5 billion was attributable to productivity loss and cost for informal care was about 3.2 billion (Luengo-Fernandez, Leal, Gray, & Sullivan, 2013).

Breast cancer comes with a huge cost which sometimes deters patients from seeking treatment. There are numerous economic implications following the diagnosis of breast

cancer (Lamerato, Havstad, Gandhi, Jones, & Nathanson, 2006). Kim *et al*. (2015), found that breast cancer is a prominent disease in terms of the cost incurred.

In Ghana, though the National Health Insurance Scheme (NHIS) caters for some aspects of treatment, the majority of the cost is borne by the patient and family. Breast cancer is the most common cancer in Ghanaian women, followed by colorectal and lung cancer (Kim *et al.,* 2015). Diagnosing the disease involves the use of mammogram, magnetic resonance imaging, biopsies etc. which are all expensive investigations (Gewefel & Salhia, 2014). Treatment involves a lot of interventions which is costly because these interventions are usually not available in one health facility. Treatment may involve surgery (mastectomy), chemotherapy and radiotherapy. Chemotherapy and Radiotherapy are very cost intensive and available in only a few government hospitals. This means one can only seek treatment in particular facilities in Ghana. The economic burden escalates when complications arise with treatment. The cost of treatment apart from being overwhelming to patients and household goes a long way to affect the society and the nation as a whole (Niens, Nyarko, Zelle, Jehu-Appiah, & Rutten, 2014).

This study sought to use the cost analysis approach to estimate the economic burden of breast cancer in women who attended the Korle-Bu Teaching Hospital.

1.3. Study objectives

1.3.1. General objective

The general objective of this study was to determine the economic burden of breast cancer in women at the Korle-Bu Teaching Hospital.

1.3.2. Specific objectives

The specific objectives were:

1. To estimate the direct cost of breast cancer in women.

2. To determine the indirect cost of the disease.

3. To determine the intangible cost of breast cancer in women.

1.4. Research questions

To estimate the household cost of breast cancer in women attending the Korle-Bu Teaching Hospital, the questions below were used to answer objectives:

1. What is the direct cost incurred by breast cancer patients and their families in seeking treatment?

2. What is the indirect cost incurred by breast cancer patients and their household?

3. What is the intangible cost associated with breast cancer?

1.5. Significance of the study

Available reports indicate that data on the disease are incomplete and mostly of epidemiological or clinical nature. There are limited studies in Ghana assessing the economic burden of breast cancer from the patient's perspective hence the need for this study. The most predominant cause of cancer death among women in low and middle-income countries is breast cancer (Zelle *et al.*, 2012). The attention of government, policy makers and other stakeholders must therefore be drawn to the relevance of affordable and accessible breast cancer care. Estimating the economic burden of this disease is a way to achieve this aim. This study will provide an overall view of the economic burden of breast cancer on the patient and the household which may inform government and policy makers about the allocation of resources. The study may also be useful in strategic

planning and budgeting to facilitate easy access to breast cancer care in other health facilities.

This study sought to use cost as a tool to advocate for increased financial access to breast cancer care in Ghana. Aside from specifically estimating the economic burden of breast cancer disease at the Korle-Bu Teaching Hospital, information gathered by this study may be relevant for future studies.

1.6. Conceptual framework

The various cost incurred by breast cancer patients and their households in seeking care for breast cancer can be categorized into three as illustrated in Figure 1 below. These are the direct cost, indirect cost and intangible cost. The direct cost includes both medical and non-medical cost. Medical cost refers to all cost, incurred due to seeking actual treatment such as laboratory and radiological investigations, surgical interventions, chemo and radio therapies as well as the cost of managing complications associated with the disease. Non-medical cost, on the other hand refers to costs which are not directly related to treatment but in one way or the other contribute to seeking treatment such as food and drinks, transportation, prosthetic breast and other miscellaneous expenditures. Feeding cost (food/drinks) here refers to all payments made for food and drinks consumed by patient and accompanying relative during treatment of the disease. Transportation (cost of travel) includes all cost incurred by patient/accompanying relative as a result of moving to and from the treatment area. This excludes travel cost for other illnesses which are not related to breast cancer disease but includes cost of travelling to seek treatment for complications associated with the disease.

Indirect cost encompasses all invisible costs the disease brings such as loss of productivity or death (Ekwueme *et al.*, 2014). Loss of productivity is an indirect cost

incurred due to the patient and household member's loss of working time during treatment.

Intangible cost describes the psychological impact of the disease on the patient. This includes fear, pain and emotional suffering on patient caused by breast cancer management.

All three costs on the patient and household associated with the disease increase the economic burden of breast cancer.

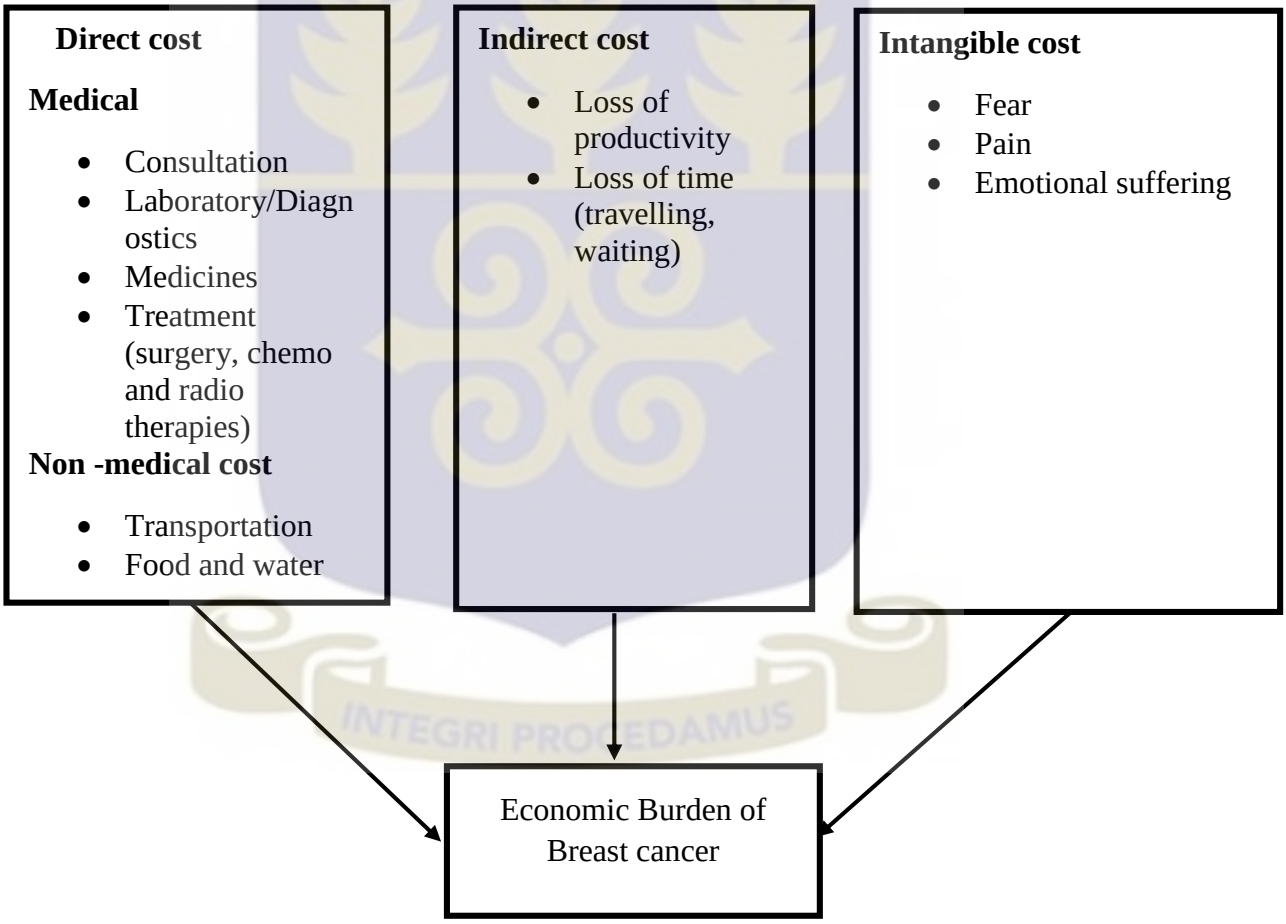

Figure 1: Conceptual framework on economic burden of breast cancer

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter focuses mainly on the thematic areas of the study such as breast cancer disease, (management of breast cancer, mastectomy, chemotherapy and radiotherapy, complications and staging of the disease), the economic burden of breast cancer (direct, indirect and intangible cost) and cost of breast cancer in Ghana.

2.2. Breast cancer

Cancer is the uncontrolled growth of cells, which can invade and spread to distant areas of the body. Cancer can have severe health consequences (Davies, 2016). Lung, prostate, colorectal, stomach, and liver cancers are the most common types of cancer in men, while breast, colorectal, lung, uterine cervix and stomach cancers are the most common in women. More than 30% of cancer deaths could be prevented by modifying or avoiding key risk factors, especially tobacco use. Early detection, accurate diagnosis, and effective treatment, including pain relief and palliative care help increase cancer survival rates and reduce complications (Sayed *et al.*, 2013). Treatment options include surgery, chemotherapy and radiotherapy (Edge, Buccimazza, Cubasch, & Panieri, 2014).

Other options include hormone therapy and use of biological agents which aid in reducing recurrence and improve the outcome of treatment ((Davies, 2016).

Breast cancer is a malignant tumor that grows in the cells of the breast. A malignant tumor is a group of cancer cells that can invade surrounding tissues or spread (metastasize) to distant areas of the body. The actual cause is unknown though several predisposing factors exist. The disease occurs almost entirely in women, but occasionally affects men. Cancer starts when cells begin to grow out of control (Akhtari-Zavare, L,

Juni, Md Said, & Ismail, 2015; Suami, Pan, Mann, & Taylor, 2008). Breast cancer is hormone related, and the factors that modify the risk of this cancer when diagnosed pre-menopausally and when diagnosed post-menopausally vary (Stewart & Wild, 2015).

Breast cancer disease is categorized into four main stages (stage i, ii, iii and iv) and one of the most important factors in predicting survival from breast cancer is the stage at diagnosis. The four main stages at diagnosis of breast cancer are usually defined according to the Tumor, Node, and Metastasis (TNM) system and thus are further categorized into early (TNM stage groups I and II), advanced (stage groups III and IV) and metastatic (stage group IV) for the purposes of analysis (Seneviratne *et al.*, 2016). Women diagnosed with early stage of breast cancer disease have an excellent prognosis while those with metastatic disease at diagnosis have a 5-year survival of around 20% (Seneviratne et al., 2014; Wang *et al.*, 2012).

The stage at which a woman is diagnosed can be influenced by the diagnostic pathway and the characteristics of the tumor. However, a study done in Saudi Arabia revealed that due to lack of education, women do not engage in screening practices such as mammography screening (Al-Foheidi, Al-Mansour, & Ibrahim, 2013).

A study done in Ghana that looked at 4,109 female breast specimens from women of different age groups over a period of five years revealed that 1,342 thus (32.7%) were malignant (Naaeder, Tettey, & Gyasi, 2013). Breast cancer disease is associated with several complications which are usually aggravated by late diagnosis and complications vary depending on the treatment plan, drugs and the individual (Coleman, 2014).

Following a unilateral (loss of one breast) or bilateral (loss of both breast) mastectomy, patients sometimes secure external breast prosthesis (artificial breast for cosmetic purposes) (Veronesi *et al.*, 2013).

2.3. Economic burden of breast cancer

Breast cancer imposes a considerable economic burden on societies and policy makers and health planners are always interested in understanding the economic costs of illnesses to assess the allocation of health resources to disease categories and to evaluate the potential costs and benefits of public health interventions (Daroudi *et al*., 2015). From a social perspective, breast cancer is a disease that in addition to contributing to mortality and disability, adds a major public and private economic burden (Ekwueme, Allaire, Guy, Arnold, & Trogdon, 2016). Apart from the physical, psychological and social pain caused by breast cancer, it exerts enormous economic burden as well (Fattore *et al.*, 2012).

Economic burden is often defined as a 'loss of economic resources and opportunities due to disease' and cancer and its survival is associated with a great economic burden (Drummond, Sculpher, Claxton, Stoddart, & Torrance, 2015). In order to calculate the economic burden of a disease, the direct costs resulting from the use of the resources for medical care and the indirect costs, resulting from the loss of economic resources and opportunities associated with disease and treatment, are calculated (Daroudi *et al*., 2015)

A study conducted in South Korea reveals that breast cancer is a disease which is economically costly. The top three cancers that have the greatest economic impact globally are lung cancer (USD188 billion), colorectal cancer (USD99 billion), and breast cancer (USD88 billion). It was further observed that the yearly economic burden of breast cancer was increasing. The economic burden of breast cancer was USD668.49 million in 2007 and increased annually until 2010, thus USD773.98 million in 2008, USD777.22 million in 2009, and USD940.75 million in 2010, which was 1.4 times greater than the cost incurred in 2007. This means that the total socioeconomic costs incurred by breast cancer increased by approximately 40.7% from USD668.49 million in 2007 to USD940.75 million in 2010 (Kim *et al*., 2015). A variety of treatment is available for

patients with breast cancer, which differ in safety, efficacy and cost. Therapeutic options for a given patient depend on several different factors including age, menopausal status, general health, tumor location, tumor cell type, and breast size. The most important factor is the stage of cancer since the cost increases if the disease is diagnosed in an advanced stage (Meneses, Azuero, Hassey, McNees, & Pisu, 2012).

The economic burden increases as cancer progresses, with a greater economic burden seen in the 6 months prior to death. The last 2 months of life is said to even present greater economic burden as a result of acute inpatient care (Bramley, Antao, Lunacsek, Hennenfent & Masaquel, 2016).

Breast-conserving surgery plus adjuvant chemotherapy, or radical mastectomy plus chemotherapy are the options usually considered (although this choice is not without controversy and cost) (Suami *et al*., 2008).

In the United States for instance, it is estimated that breast cancer will account for approximately 32% of all new cancer diagnoses among women during 2005 and account for over 40,000 deaths and the management of breast cancer accounts for a large percentage of healthcare budgets. In the United States, such management accounts for 15% to 20% of all cancer costs and for 1% of the total healthcare budget (Lamerato, Havstad, Gandhi, Jones, & Nathanson, 2006).

These statistics suggest that the cost of treating breast cancer can be overwhelming for the patient, her household and the nation. Hence resource poor or countries with low socioeconomic capacities are prone to suffer more from the economic burden of breast cancer than developed countries (Ginsberg, Lauer, Zelle, Baeten, & Baltussen, 2012).

Research shows that African-American women experience an overall lower breast cancer burden compared with that of Caucasian-American women but have the highest mortality

burden and it has been suggested that this higher mortality is partially due to a lower socioeconomic status (Sighoko, Fackenthal, & Hainaut, 2015).

Also, the economic burden exerted by breast cancer is related to the stage of the disease as studies have shown that patients with early stage breast cancer paid considerably lower treatment cost than those at the advanced stage. This indicates that early detection and treatment of breast cancer may have a real economic significance for reducing the burden of the disease (Li, Huang, Huang, & Li, 2013).

Thus "the global burden of breast cancer highlights the need for primary prevention strategies that demonstrate both favorable clinical benefit/risk profile and good value for money. Endocrine therapy with selective estrogen-receptor modulators or aromatase inhibitors has been associated with a favorable clinical benefit/risk profile in the prevention of breast cancer in women at high risk of developing the disease" (Groom & Younis, 2016).

2.4 Direct cost

The primary concern of any breast cancer victim upon diagnosis is the capacity or ability to meet the direct medical cost that will emanate from treating the disease. This is because the associated strategies, processes and technologies used in treating breast cancer is economically demanding. One's ability to meet these demands depends on her financial status as well as her family's support (Cheng, 2015; Soerjomataram *et al.*, 2012; Wesson, 2012).

Direct cost of illness simply refers to the actual patient and household cost incurred in seeking treatment. This includes all medical and non-medical cost. Direct therapy related cost describes expenditures for all forms of therapies (drugs, surgical interventions, chemo and radio therapies) as well as palliative care (Folland, Goodman, & Stano, 2007).

Another study done in Central Vietnam to look at the cost of breast cancer treatment over a period of five years among various age groups revealed that a lot of money was spent during the period of seeking treatment at the initial stages as well as for chemotherapy and follow-up. This is because the disease is treated over a long period (Lan, Laohasiriwong, Stewart, Tung, & Coyte, 2013; Nguyen *et al*., 2013).

Direct non-medical cost includes all resources such as transportation, food and drinks incurred by patient/household during the period of seeking treatment. The cost of relocating and property losses, as well as telephone calls and other informal care givers are all considered as part of the non-therapy cost (Zarogoulidou *et al*., 2015). Also, a study in Mexico showed that the total cost for transport over 6months was USD2,942.30 for 102 women included in the study. The cost of meals for only 18 of these patients over 6months of treatment was calculated as USD9,553.84. The total cost of dietary change was USD70,615.38. Other non-medical expenses due to the illness were reported by 56 patients (64.70%); the average cost for this group over 6months of treatment was USD5,235.57 (Gomez-Rico *et al*., 2009).

A study done to assess the relationship between distance and radiotherapy facility and initial treatment revealed that some breast cancer patients even have to relocate to urban areas in order to have easy access to care which also contributes to their economic burden (Nattinger, Kneusel, Hoffmann, & Gilligan, 2001).

A study conducted in South Korea to determine the economic burden of breast cancer defined direct cost as any expenditure for medical services associated with the treatment and care of the disease entity (Lee *et al*., 2013). In another study in Japan, direct costs are defined as medical expenses (treatment costs, hospital charges, laboratory costs, drug costs, etc.) (Matsumoto *et al*., 2015).

According to Kim, Seo, Kim, Lee, & Jung,(2015), the direct medical care costs for breast cancer patients in 2010 were 1.4 times greater (USD399.22 million) than for 2007 (USD278.71 million) while the direct non-medical costs rose from USD50.69 million in 2007 to USD75.83 million in 2010, representing a 49.6% increase.

The gravity of the direct cost of breast cancer is better appreciated when viewed against the treatment of other disease conditions. For instance, a study in the United States of America examined the treatment costs of breast cancer among younger women aged 19-44 years enrolled in Medicaid. A sample of 5,542 younger women aged 19-44 years enrolled in fee-for-service Medicaid with diagnosis codes for breast cancer in 2007 were compared with 4.3 million women aged 19-44 years enrolled in fee-for-service Medicaid without breast cancer. The study results showed that the estimated monthly direct medical costs for breast cancer treatment among younger women enrolled in Medicaid was USD5,711 (95% CI=USD5,039, USD6,383) per woman while the estimated monthly cost for outpatient services was USD4,058 (95% CI=USD3,575, USD4,541), for inpatient services was USD1,003 (95% CI=USD708, USD1,298), and for prescription drugs was USD539 (95% CI=USD431, USD647) (Ekwueme *et al.*, 2016).

Several cost drivers may account for the direct cost incurred by breast cancer patient. A study showed that the main cost driver per breast cancer patient was the inpatient hospital stay and the dominant proportion of inpatient expenditures was assigned to breast cancer surgery and chemotherapy treatment. It further notes that the breast cancer direct medical cost increased according to the diagnosed stage of diseases from 2409 (95% CI 2196-2621)EUR in stage 1 to 3688 (95% CI 2703-4672)EUR in stage 4 whilst the direct medical cost was inversely proportional to age (Ivanauskiene, Domeikiene, Kregzdyte, Milasauskiene, & Padaiga, 2015).

2.5 Indirect cost of breast cancer

Estimating the indirect cost incurred by victims of breast cancer is important in order to quantify holistically the burden of treating the disease in every country (Park, Lee, & Choi, 2013). The significant burden of this disease is the reason for its importance and the need to determine the toll it has on victims in terms of cost incurred indirectly in managing the disease (Onukwugha *et al.*, 2016).

The indirect cost of breast cancer pertains to cost incurred due to the loss of productivity as a result of the disease. It could also be referred to as productivity cost. This loss of productivity is not only limited to the patient with breast cancer but it includes any loss in productivity from remote sources like family members, friends, church members, coworkers among others who are involved in caregiving (Round, Jones, & Morris, 2015).

A study done in eight countries in Asia on the catastrophe associated with healthcare revealed that a year after diagnosis of cancer, about a half of their household experienced catastrophic health care expenses (Group *et al.*, 2015).

The vital role played by family caregivers in supporting dying breast cancer patients cannot be overemphasized, but the burden and economic impact on caregivers are poorly estimated and poorly understood. In a study to determine the family caregiver burden of breast cancer patients, findings revealed that a majority of caregivers experienced an adverse impact on their employment, particularly during the terminal period. The study further found that 5% of caregivers had quit their jobs or declined advancement and a large proportion lost work hours or used special leave or holidays to fulfill their caregiving responsibilities (Grunfeld *et al*., 2004).

According to Gomez-Rico *et al*. (2009), the total indirect cost of time at the hospital also leads to a great economic cost. Their study found a cost of hospital stay ranging from USD1312.61– USD1961.1 and loss of income due to illness was USD16,442.30 for 56 patients in 6 months.

Studies suggest that the indirect cost of breast cancer increases proportionally with advancing stages of the disease. For instance, a study compared the indirect costs of productivity loss between metastatic breast cancer and early stage breast cancer patients, as well as their respective family members. The results showed that metastatic breast cancer patients had significantly higher short-term disability costs than early breast cancer patients and metastatic breast cancer patients' families incurred 39.7% ($p = 0.06$) higher indirect costs compared to early breast cancer patients' families. Hence productivity loss and associated costs in metastatic breast cancer patients are substantially higher than early breast cancer patients or the general population and this underscores the economic burden of metastatic breast cancer in terms of indirect cost (Wan *et al*., 2013).

Breast cancer disease in essence leads to a great loss of productivity which may be due to ill-feeling at work or days lost by staying at home as was reported in a study done in the United States. People with breast cancer lose about three to seven days on the average in a month (Zheng *et al*., 2016).

2.6. Intangible cost

Intangible or psychosocial costs are pain and suffering from disease and its treatment that affect health and well-being not reflected in the categories of direct cost or productivity costs (Guy *et al*., 2013). A diagnosis of advanced breast cancer can be devastating for the patient and their household as well as caregivers leading to anxiety, depression and uncertainty. People with advanced breast cancer and their families and caregivers often

have complex and changing psychosocial, physical, spiritual and financial support needs (Scharff, 2012; Soerjomataram *et al*., 2012).

Psychosocial needs are often influenced by family and social circumstances for example individuals caring for young children or elderly parents may need support to care for their dependents during treatment. Regular assessment of such needs may help to ensure they are met and that people are signposted to appropriate support. Access to supportive and palliative care can improve the patient's experience, but patients often report that they were unaware of the psychosocial support services available (Cleary *et al*., 2013; Smith *et al.*, 2013). Many studies reported persistent disturbances in family functioning because marital issues were ignored during the cancer treatment phase. Body image and age, especially after mastectomy, have also been detected as concerns (Cleary *et al.*, 2013; Hojan, Manikowska, Molinska-Glura, Chen, & Jozwiak, 2014).

A study found that the proportions of caregivers of breast cancer patients were anxious (39% v. 35%, p = 0.18) and more of these caregivers were depressed (30% v. 9%, p = 0.02) and experienced a higher level of burden (mean score 26.2 v. 19.4, p = 0.02). It was further observed that caregivers' depression and perceived burden increase as patients' functional status declines and strategies are needed to help reduce the psychosocial, occupational and economic burden associated with caregiving (Grunfeld *et al*., 2004). Another study done on the social support of over 3000 breast cancer survivors diagnosed within a period of five years disclosed that those who had good social support from their spouses, relatives and friends had a better emotional state and quality of life than those who had no support (Kroenke *et al*., 2013)

2.7 Cost of breast cancer in Ghana

In Ghana, medical care is free for citizens registered under the National Health Insurance Scheme (NHIS). The scheme covers over 95% of disease conditions and surgeries. Breast and cervical cancer treatments were added to the scheme in 2011 (Obrist *et al*., 2012). However, the scheme does not cater for the entire cost of the disease. This is because chemotherapy and radiotherapy treatments cost are solely out of pocket payment as well as most of the chemistry laboratory investigations done. These therapies inflate the cost of treatment hence an increase in economic burden. An addition to the cost of treatment is cost brought by complications. Zelle *et al*. (2012), did a study on the cost of breast cancer in low and middle-income countries including Ghana. Their study examined the cost estimates and health effects of breast cancer interventions in Ghana from the healthcare perspective. Analyses in their study were based on WHO-CHOICE methodology and health effects were expressed in Disability Life Adjusted Years (DALY). The study was based on local epidemiologic and economic data.

This study examines at the economic burden of breast cancer in women from the perspective of the patient. The various cost components are estimated (direct and indirect cost) and the intangible cost described.

2.8 Conclusion

From the literature reviewed, the economic burden of breast cancer cannot be underestimated. Breast cancer disease brings about a huge economic cost to the patient and household. This burden in one way or other affects the society and the nation as a whole.

Survivors may also suffer some complications worsening the disease burden since it usually prolongs treatment. In Ghana, though NHIS caters for medical cost, not all

aspects of the disease costs are covered by the scheme. In fact, the cost intensive therapies and investigations are funded mainly by out-of-pocket funds.

The economic burden of breast cancer can be put into three categories thus direct cost, indirect cost, and intangible cost. The direct and indirect costs which are quantifiable in monetary terms can be estimated by finding the averages under each cost category. The human capital approach (HCA) was be used to estimate the indirect cost. Intangible cost was be estimated using the Likert's scale

CHAPTER THREE

METHODS

3.1. Introduction

This section provides a detailed description of the research methods used for this study. The issues discussed include the research design, study area, study variables, study population, sample size, sampling procedure, data collection techniques and tools, quality control, pre-data collection stage, data processing and analysis, estimation of direct, indirect, intangible cost and statistical methods, ethical considerations, descriptions of subjects, potential risks and benefits and data usage and storage.

3.2. Study design

The study was a descriptive cross-sectional study which adopted the cost-of-illness analytical approach to estimate the economic burden of breast cancer in women who were seeking treatment at the Korle-Bu Teaching Hospital (KBTH).

3.3. Study area

This study was done at the Korle-Bu Teaching Hospital. It is a tertiary hospital receiving referrals from all over Ghana from both private and government facilities. Patients from neighboring countries such as Togo, Burkina Faso, etc. also patronize the hospital. It is a 2000 bed capacity facility with 17 clinical and diagnostic departments/units. The hospital on the average sees 1500 patients daily with about 250 daily admissions. The annual breast cancer cases are about 346 (KBTH annual report, 2013). KBTH is located in the Ablekuma South District in the Greater Accra Region. The district has a population of about 213,914 with 47.4% males and 52.6% females (Ghana Districts.com, 2014). The main economic activities peculiar to this district is fishing (due to its proximity to the Atlantic Ocean) and trading.

3.4. Study population

The study population was be made up of all women with breast cancer who sought care at the Oncology Unit(s) of the Department of Surgery, Korle-Bu Teaching Hospital in June 2016.

3.5. Study variables

Table 1 provides the description of the variables. It includes the type of cost and the various categories of cost that were estimated in the study. It also describes the components of the cost incurred by women in seeking treatment for breast cancer. The intangible costs components are fear, pain and emotional suffering.

Table 1: Description of study variables

Type of cost	Category of cost	Description
Direct cost	Medical cost	1.cost of consultation 2.cost of medication, 3 treatment (surgery, chemo and radio therapies) 4 laboratory/diagnostics 5.chemotherapy 6.radiotherapy
	Non-medical cost	1.cost of travel 2. cost of food and drinks for patient 3.other miscellaneous cost eg. Telephone calls, chewing gum
Indirect cost	Cost of productivity	1. productivity loss to the patient 2. travel time 3. waiting time
Intangible cost	Psychological problems	1.fear 2.pain 3.emotional suffering

3.5.1. Inclusion criteria

Women of all ages with breast cancer who sought care in June 2016 and were willing to participate in the study were included.

3.5.2 Exclusion criteria

All women with breast cancer who were too sick to communicate were excluded from the study.

3.6. Sample size

From previous research done on "Equity in Ghanaian Breast Cancer Treatment Outcomes" in the Komfo Anokye Teaching Hospital of Ashanti region in Ghana, the mean household expenditure on breast cancer care was GHS231 (SD= GHS127.5) (Niens *et al.*, 2014). With this study's outcome of interest being continuous quantitative variable, the sample size is calculated as follows:

$$n = \left[\frac{z_{\alpha/2}\sigma}{E}\right]^2$$

Where: n: sample size $z_{\alpha/2}$ Critical z-value (1.96), σ: Standard deviation of cost of breast cancer treatment in Ghana (GHS127.5), E: Margin of error around average costs to be estimated (GHS120.00).

$$\Longrightarrow n = \left(\frac{1.96*127.5}{35.00}\right)^2 = \frac{(249.9)^2}{1225.00} = \frac{62450.01}{1225.00}$$

n = 51

Adjusting for 10% non-response rate,

$\Longrightarrow$51 x 0.1

= 5

Hence,

Total sample size (N) = sample size (n) + 10% non-response

$\Longrightarrow N = 51 + 5$

$= 56$

Therefore the sample size determined for this study is approximately 56.

3.6.1. Sampling procedure

A list of all breast cancer patients seeking care in the stated period at the KBTH was obtained from the Oncology Unit and their folder retrieved from the records department. All women with breast cancer seeking treatment in June 2016 who were capable of talking and were willing to partake in the study were eligible for selection. Simple random sampling technique was used to select participants who had been booked for treatment for each day. Questionnaires were administered to patient/accompanying relatives at the treatment centre to collect data in addition to the information obtained from folders.

3.7. Data collection technique and tools

Face to face interviews were done using structured questionnaires to collect data. The questionnaire had both open and closed ended questions covering relevant information on patients' demographic information, employment status, and occupation. Another aspect the questionnaire tackled was the cost incurred by patients as a result of the surgery done, therapy sessions, stage of diagnosis and duration of treatment and their time lost in a month to seek treatment (direct and indirect costs). To gather information on the intangible cost, such as pain, fear and emotional suffering, the Likert's scale was used.

3.8. Quality control

Several mechanisms were put in place to ensure and guarantee data accuracy and quality devoid of biases. These included training of research assistants, pre-testing of questionnaires and supervised data entry and processing. The research assistants were

monitored on daily basis. Completed questionnaires were also validated and entered daily after which data was cleaned.

3.8.1. Pre-testing of questionnaire

The questionnaires were pre-tested with the two research assistants before the actual administration was done. Pre-testing included women with breast cancer and their household members who always accompanied them to the KBTH for treatment. It lasted for a period of one week. This offered the chance to identify most of the problems and tackled them accordingly.

The principal investigator held meetings daily with the research assistants to cross-check and validate all completed questionnaires and discussed matters that cropped up. This also helped in correcting errors and planning for the subsequent days.

3.8.2. Training of research assistants

Two research assistants who were conversant with breast cancer treatment and were fluent in Ga, Twi and Ewe were recruited and trained for the study. The training involved the explanation of questionnaires, ethics and how to seek informed consent from participants.

3.9. Data entry and processing

Data collected was validated, serialized and coded. Epi Info version 10 was used in processing data. Data was cross-checked for errors on hard copies to ensure correct entry of the variables. Microsoft excel and STATA 13 were then be used for analysis.

3.10. Data analysis

The various cost incurred by breast cancer patients and their accompanying relatives in June 2016 was estimated. Recall period for the study was one month.

3.10.1 Estimation of direct cost

The total direct cost was estimated by summing up all direct costs incurred by breast cancer patients for medical and non-medical cost. The medical cost which included the costs of consultation, medicines, laboratory/diagnostics, surgery, chemo and radio therapies and non-medical costs such as transportation, food and drinks and miscellaneous costs such as telephone calls were added and their averages found. The estimated cost incurred by all the patients in the study were added and divided by the total number of respondents that incurred that cost to obtain the average cost.

3.10.2 Estimation of indirect cost

The human capital approach was employed in measuring the lost earnings for the patient. Productivity loss was estimated using the national daily wage of GHS8 for respondents in the formal sector and GHS15 for those in the informal sector.

Indirect cost was categorized as follows:

Hours lost at work to patient (employed) - it is the sum of all work hours lost by patient who were employed during the period of illness.

Productivity loss due to travelling- this is the summation of hours lost to patient due to travelling to and from treatment centers as well as hours spent for all journeys made in relation to the disease.

Productivity loss due to waiting time- the sum of all hours spent waiting to be seen by the a health personnel as well as time spent during treatment.

The indirect cost was estimated as the product of the number of days lost and the national daily minimum wage of GHS8 (GHS8=1day for formal sector and GHS15 for the informal sector). The total indirect cost was the overall total valued losses of the

patient. Averages for all values obtained after the summation was determined (by dividing the sum by the number of respondents). Those who were not working at the time of illness were excluded from the indirect cost.

3.10.3 Estimation of intangible cost

The Likert's scale for this study had a five dimension scale in which respondents were asked to rate statements under each dimension. The scales were (1) 'not at all' (2) 'a little' (3) 'moderately' (4) 'a lot' (5) 'extremely' considering psychological elements like fear, pain and emotional suffering. The mean of the responses for each dimension and their individual items under them was estimated for patients. The total composite score was determined by summing up all responses and the average found. Composite intangible cost values were put into two categorical ranges thus low and high with a high score being above 2.5 and a low score 2.5 and below. This was used to describe the intangible burden of breast cancer on respondents.

3.10.5 Statistical methods

Descriptive statistics of mean and standard deviation were used to describe the data. Proportions of direct medical and non-medical cost were displayed using a pie chart as well as for intangible cost.

3.10.6 Dissemination of results

Findings of the study will be disseminated through presentations at scientific conferences and peer review articles. In addition to this, a dissemination forum will be organized for patients/families who participated in the study.

3.11 Sensitivity analysis

Sensitivity analysis was undertaken to assess the robustness of cost estimates. This was done by varying some of the key costs or estimates such as costs of medications and 2

3incomes of patients to see whether they had any effect on the conclusions to be drawn from the analysis. One-way (1-way) and multi-way (M-way) sensitivity analysis (SA) were done by varying relevant costs components. These components were selected due to the presence of uncertainty associated with those items. The test was conducted by increasing the two cost components by 3%, 5% and 7% respectively.

Some uncertainty issues that were addressed were: errors made in the measurements of costs, biased or conflicting estimates from the literature reviewed and over-estimation or under-estimation due to recall bias.

3.12 Ethical considerations

3.12.1 Ethical approval

Approval was sought from the Korle-Bu Teaching Hospital Institutional Review Board as well as Ghana Health Service Ethical Review board prior to the commencement of this study.

3.12.2 Description of subjects in the study

The population for this study was women with breast cancer who were seeking care at the

KBTH in June 2016.

3.12.3 Recruitment and sampling procedures

The principal investigator and the two research assistants recruited participants and interviewed these patients during the period of data collection each day until the sample size of 56 was attained. The participants were obtained using simple random sampling

after a list of appointed patients for each day was obtained. The recruited patients consented and were interviewed using structured questionnaires. Participants could at any point in the study withdraw if so desired.

3.12.4 Potential risk/benefits

This research in no way posed any risk to either the study population or community with the exception of discomfort associated with answering questions. The study only sought to be beneficial to both the population and the community in diverse ways. The study will provide the study population information about the estimated annual cost of breast cancer to patients. Secondly, quantification of the cost of breast cancer cost will inform government and policy makers about the economic burden associated with this disease. This will aid in budgeting and planning for breast cancer cases in various communities.

3.12.5 Privacy and confidentiality

Data collected from patient and accompanying relatives interviewed was kept private and confidential. Questionnaires were also anonymous. Interviews were conducted in enclosed places. Data was reported in aggregates to minimize traceability of respondents.

3.12.6 Voluntary consent/withdrawal

Written informed consent was obtained from study participants and the family before data was collected. Participation in the study was solely voluntary and participants had the option to opt out at any desired time.

3.12.7 Data usage and storage

Questionnaires were serialized, coded and kept under lock and key to which only the principal researcher had access. The coded questionnaires were entered into Epi Info

Version 10 with a password by the principal investigator. Soft copies were stored on external drive. After use of data, all soft copies will be cleaned and hard copies destroyed after two years.

3.12.8 Compensation

There was no form of compensation for participants used in the study other than a word of appreciation.

3.12.9 Declaration of conflict of interest

This study was solely for academic purpose and of public health importance. There was no other intended purpose for this study.

3.13 Funding

Funding for this study was self only.

3.14 Assumption

The main assumption made in this study was that the national minimum wage in the country was reflective of the average wage earned by respondents.

CHAPTER FOUR

RESULTS

4.1 Introduction

This chapter presents the findings of this study. It shows the socio-demographic characteristics of the women with breast cancer, the direct cost incurred by patients in seeking care for the disease as well as their indirect cost and intangible cost. The response rate varied in various aspects of the questionnaire since not all respondents answered all questions. A total of 56 respondents were obtained out of the expected 56.

4.2 Socio-demographic characteristics

As shown in Table 2 below, 14 of the women with breast cancer disease who participated in the study were below age 40. Out of the total sample, 8 were aged between 40 years and 49 and 16 were aged between ages 50 and 59 years. The majority of the respondents (18) were aged 60 years and above.

About 23 of the women with breast cancer who took part in the study were married. Single women in the study were 6, divorced women were 10 and widowed women in the sample were 12.

The religions of the respondents were categorized into two thus Christian and Muslim/others. Christians in the sample were 41 and 12 were Muslims and others with Muslims being the greater majority.

The educational statuses of various participants were reported approximately as follows: respondents with no education were 11, those with primary education 7, middle/JHS/JSS level 15, SSS/SHS level 11 and tertiary educated were also 11.

Unemployed women with breast cancer who took part in the study were 16, those working in the private sector were 11. Those working in the public sector were 7 and the largest number was 22, which was those who were self-employed.

The occupations of the respondents were as follows: the number of respondents who were into trading were 14, those working in the health sector were 3, civil servants were 5, military 2 and banking/finance 2. The business sector workers were 8 and those with other occupations were 22 which constituted the majority.

Table 2: Socio-demographic characteristics

Characteristics	Number (N)	Percentage (%)
Age		
<40	14	25.0
40 - 49	8	14.3
50 - 59	16	28.6
60+	18	32.1
Marital status		
Married	23	41.1
Single	6	10.7
Divorced	5	8.9
Windowed	12	21.4
Separated	10	17.9
Religion		
Christian	41	77.2
Muslim/others	12	21.4
Educational status		
No education	11	19.6
Primary level	7	12.5
Middle/JHS/JSS	15	26.8
SSS/SHS	11	19.6
Tertiary	11	19.6
Employment status		
Unemployed	16	28.6
Private sector	11	19.6
Public sector	7	12.5
Self employed	22	39.3
Occupation		
Trading	14	25.0
Health service	3	5.4
Civil service	5	8.9
Military	2	3.6
Business	8	14.3

Characteristics	Number (N)	Percentage (%)
Banking/finance	2	3.6
Others	22	39.3
Total	56	100.0

4.3 Health status of study patients

The respondents who participated in the study were diagnosed at different stages of the breast cancer disease, thus from stage one to stage four as shown in Figure 2. Those diagnosed at stage one constituted 5.4%. Respondents diagnosed at stage two formed 33.9% and those diagnosed at stage three formed 44.6 % which was the largest proportion. Respondents diagnosed at stage four of breast cancer also constituted 16.1% of the total number of respondents.

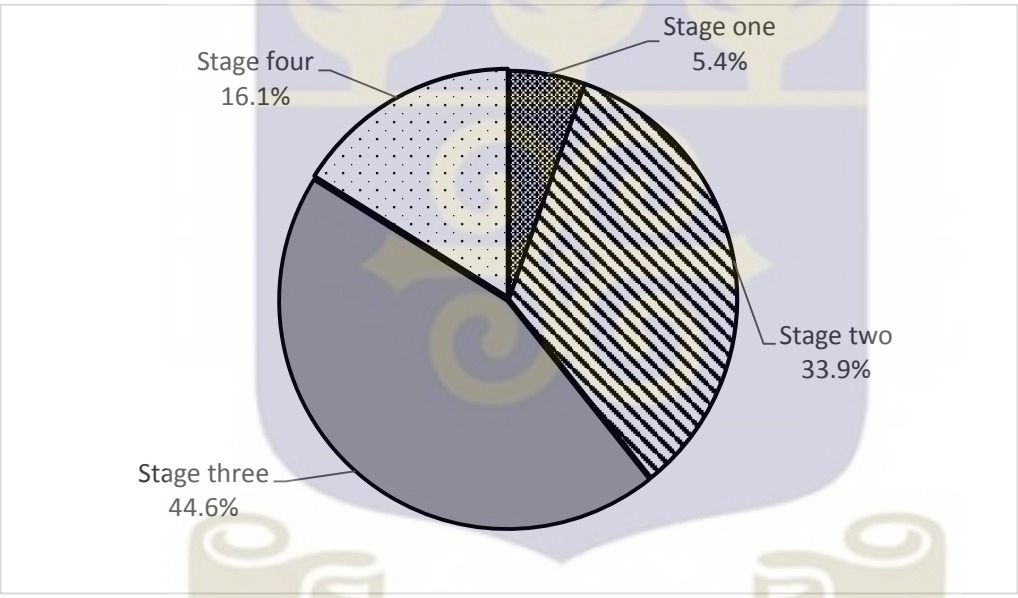

Figure 2: Distribution of stages of breast cancer

4.4 Direct treatment cost

The total direct cost of treatment for breast cancer incurred by the respondents in this study in a month was estimated at GHS36,224 (USD9,288.21) with an average of GHS646.86 (USD165.86). Table 3 shows the various components of the direct cost.

Table 3: Direct treatment cost

Cost component	N	Total cost (GHS)	Mean (SD)	Median	Minimum	Maximum	Cost profile (%)
Direct cost							
Direct medical cost							
Consultation	56	1725	30.80 (3.79)	30	30	50	4.76
Laboratory/Diagnostics	56	10358	184.96 (372.50)	40	0	2120	28.59
Medicine	41	1955	47.68 (43.36)	30	7	200	5.40
Treatment	56	19673	351.30 (527.76)	120	0	1900	54.31
Sub total		33711	601.98 (810.28)	220	50	3630	**93.06**
Direct non-medical							
Travel cost (In-out)	56	1623	28.98 (23.67)	21	3	90	4.48
Food	56	729	13.02 (10.05)	10	3	44	2.01
Miscellaneous	56	161	2.88 (8.40)	0	0	40	0.44
Sub total		2513	44.86 (33.33)	35	9	134	**6.94**
Total direct cost		36224	646.86 (819.64)	264	59	3764	100.00

USD1.00 equivalent to GHS3.9 (Bank of Ghana average monthly interbank exchange rate, June 2016)

All 56 respondents reported cost on consultation. It constituted 4.76% of the total direct cost with an average of GHS30.80 (USD7.90) which was the least expenditure in the direct cost category. The average cost of laboratory/diagnostics incurred by all the respondents in a month was a little over one-fourth of the total monthly cost (28.59%) thus GHS184.96 (USD47.43). The cost incurred on medicines formed 5.40% of direct medical cost with an average of GHS47.68 (USD12.23). The average cost of treatment was approximately GHS351.30 (USD90.08) thus 54.31% which was the largest proportion. However, some cost such as surgery and some laboratory/diagnostic investigations are not incurred every month.

Direct non-medical cost incurred in a month by the respondents was as follows: travel cost in and out of treatment centers incurred by patients and their accompanying relatives on the average was GHS28.98 (USD7.43) forming 4.48% of total direct cost. Cost of food consumed by patient and accompanying relative (if any) also had an average of GHS13.02 (USD3.34) constituting 2.01% of total direct cost. The final direct non-medical category was the cost for miscellaneous (telephone calls, chewing gum, cola nuts etc.) which was the smallest component estimated at an average of GHS2.88 (USD0.74) which formed 0.44% of total direct cost.

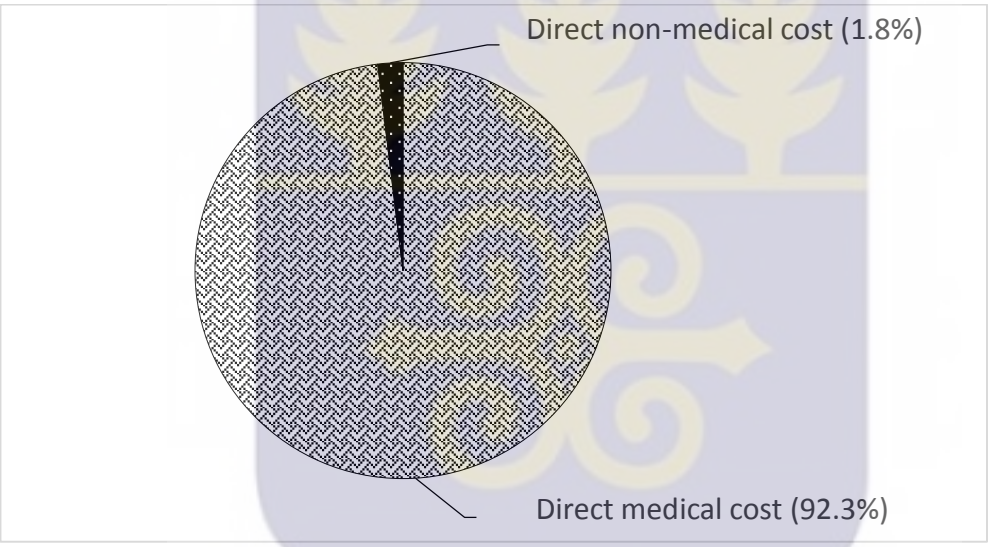

Figure 3: Distribution of direct cost

As shown in Figure 3 above, the direct cost incurred in the treatment of breast cancer disease consisting of various components listed in Table 3 was put into two main categories: medical and non-medical. The medical cost (medicines, treatment, laboratory/diagnostics) formed 92.3% of the total direct cost thus GHS33,711 (USD8,643.85) and the non-medical cost constituted the remaining 1.8% of about GHS2,513 (USD644.36).

Table 4: Indirect treatment cost

Cost component	N	Total hours lost	Total cost (GHS)*	Mean (SD)	Median	Min	Max	Cost profile (%)
Formal employment sector	16	1024	1024	64 (128.40)	20	0	480	27.06
Informal employment sector	22	1472	2760	125.45 (132.28)	98	0	480	72.94
Total indirect cost		2496	3784	99.58 (132.51)	32	0	480	100.00

USD1.00 equivalent to GHS3.9 (Bank of Ghana average monthly interbank exchange rate, June 2016)
*The national minimum wage per day of GHS8.00 as at June, 2016 was used to value productivity days and time lost to formally employed patients and GHS15 was used for informally employed patients

Table 4 indicates a breakdown of the indirect cost incurred as a result of seeking treatment for breast cancer by women who took part in this study. The employment statuses of the women were classified as formal and informal. The assumed daily minimum wage of GHS8 was used to estimate cost incurred due to productive hours lost as a result of time spent travelling and waiting to seek treatment thus hours lost at work (in a month) by 16 respondents in the formal sector whiles a daily wage of GHS15 was used for those in the informal sector (22). Respondents in the formal sector lost a total of 1024 hours, which can be estimated in monetary terms as losing on the average GHS64 (USD16.41) in a month. The formal sector therefore contributed to 27.06% of the total indirect cost. With respect to the informal sector, a total of 1472 hours were lost to breast cancer disease yielding an average of GHS125.45 (USD32.170) thus 72.94% of total indirect cost.

Table 5: Total treatment cost for women with breast cancer

Cost component	N	Total cost (GHS)	Mean (SD)	Median	Minimum	Maximum	Cost Profile (%)
Direct cost							
Direct medical cost							
Consultation	56	1725	30.80 (3.79)	30	30	50	4.31
Laboratory/Diagnostics	56	10358	184.96 (372.50)	40	0	2120	25.89
Medicine	41	1955	47.68 (43.36)	30	7	200	4.89
Treatment	56	19673	351.30 (527.76)	120	0	1900	49.17
Direct non-medical							
Travel cost (In-out)	56	1623	28.98 (23.67)	21	3	90	4.07
Food	56	729	13.02 (10.05)	10	3	44	1.82
Miscellaneous	56	161	2.88 (8.40)	0	0	40	0.40
Total direct cost		36224	646.86 (819.64)	264	59	3764	90.54
Indirect cost							
Formal sector	16	1024	64 (128.40)	20	0	480	2.56
Informal sector	22	2760	125.45 (132.28)	98	0	480	6.90
Total indirect cost		3784	99.58 (132.51)	32	0	480	9.46
TOTAL COST		40008	714.43 (877.27)	295	117	3796	100

As indicated in Table 5, the total direct cost of treating breast cancer in women in a month was estimated at GHS36,224 (USD9,288.21) which formed 90.54% of the total cost incurred by the respondents in this study in a month. The average direct cost incurred in a month was estimated at GHS646.86 (USD165.86). Cost incurred on consultation on the average was GHS30.80 (USD7.90) constituting 4.31% of the total cost. Laboratory/diagnostics on the average was GHS184.96 (USD47.43) which was 25.89% of total cost. Average cost of medicine was estimated at GHS47.68 (USD12.23) thus 4.89%. In a month, productivity loss by respondents in the formal sector averaged GHS64

(USD16.41) which was 2.56% of the total cost GHS351.30 (USD90.08) which constituted 49.17% of the total cost hence the highest percentage. For the non-medical cost direct cost, travel cost (in and out) was estimated at an average of GHS28.98 (USD0.80) forming 4.07% of total cost. Average monthly cost on food was estimated at GHS13.02 (USD3.34) thus 1.82% of total cost. The smallest component (0.40%) was cost on miscellaneous items which had an average monthly cost of GHS2.88 (USD0.74).

For indirect cost, the total hours lost (productivity loss) for the formal sector (16 respondents) was 1,024 hours as a result of travelling and waiting to be treated leading to an average cost of GHS64 (USD16.41). Those in the informal sector (22 respondents) incurred a cost with an average of GHS125.45 (USD32.17) for productivity loss due to breast cancer constituting 6.90% of total cost. The informal sector therefore in a month lost a total of 1,472 hours as a result of seeking treatment for breast cancer.

4.5 Sensitivity analysis

As shown in Table 6, 1-way SA conducted by varying the cost of medication by 3%, 5% and 7% yielded respectively 0.1%, 0.2% and 0.3% increases in total cost. However, same analysis conducted on wage rate yielded percentage increases of 0.3, 0.5 and 0.7 respectively in total treatment cost. Also, while the 3%, 5% and 7% variations in medication respectively resulted in 0.01, 0.02 and 0.03 percentage increases in direct cost, the same level of variations in wage rate respectively resulted in 0.3, 0.4 and 0.6 percentage increase in indirect cost. Furthermore, concurrent variations in both medication and wage rate by 3%, 5% and 7% resulted in a percentage fall in direct cost in proportions to total treatment cost. However, there was 0.4, 0.7 and 1.0 percentage increases in total treatment cost respectively.

Table 6: Sensitivity analysis of total cost estimate

Scenario	Cost component	Proportion change in parameter	Total cost	Percentage change in total cost	Proportion of total cost		Percentage change in proportions of cost	
			GHS		Direct	Indirect	Direct	Indirect
Base scenario		0	40,008.00	0.0	90.5	9.5	0	0
Variation (One-way sensitivity analysis)*	Medication	3	40,066.65	0.1	90.6	9.4	0.01	-0.01
		5	40,105.75	0.2	90.6	9.4	0.02	-0.02
		7	40,144.85	0.3	90.6	9.4	0.03	-0.03
Variation (One-way Sensitivity analysis)*	Wage rate	3	40,121.52	0.3	90.3	9.7	-0.26	0.26
		5	40,197.20	0.5	90.1	9.9	-0.43	0.43
		7	40,272.88	0.7	89.9	10.1	-0.60	0.60
Multi-variation (Multi-way sensitivity analysis)*	Medication and Wage rate	3	40,180.17	0.4	90.3	9.7	-0.24	0.24
		5	40,294.95	0.7	90.1	9.9	-0.40	0.40
		7	40,409.73	1.0	90.0	10.0	-0.56	0.56

*The cost of medication and wage rate was varied by *3%, 5% and 7%* increment respectively.

4.6 Intangible cost of treatment

Intangible cost of treatment refers to the psychological problems that women with breast cancer encounter. This aspect of their economic burden focuses on three main domains which are fear, pain and emotional suffering experienced due to the disease condition using a Likert's scale of one to five with one being the best. Responses solicited from all the respondents were categorized as either low or high after the mean was ascertained as shown in Figure 4. The low burden category is 2.5 and below and above 2.5 formed the high burden category. Those with a low intangible burden (24) formed a smaller proportion (42.86%) as compared to those with high intangible burden (32) who constituted 57.14%.

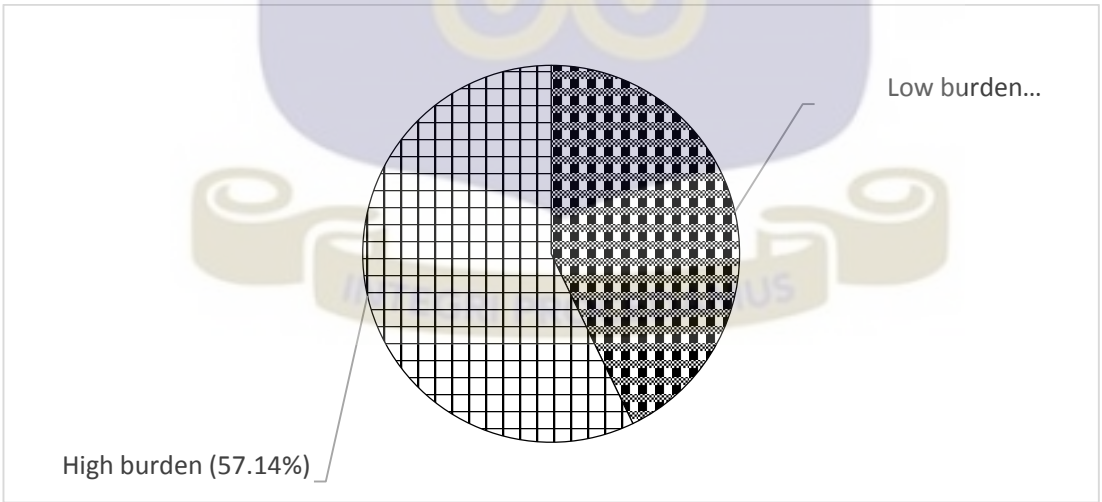

Figure 4: Percentage of intangible burden

CHAPTER FIVE

DISCUSSION

5.1 Introduction

This chapter discusses the findings of the study as compared to literature based on the study's objectives. The average cost per month incurred by women with breast cancer in the study sample is estimated at GHS714.3 (USD183.19). Direct cost contributes to 90.5% of cost incurred in the treatment of breast cancer. Indirect cost accounts for 9.5% of total cost and this is due to productivity losses. Over 50% report having a high intangible burden as a result of the disease.

5.2 Direct cost of treatment for breast cancer

The findings of this study suggest that direct cost is the major cost incurred in treating breast cancer disease. Direct medical cost constitutes 84.26 % of the total cost. This cost is financed mainly by patients and their family and friends. Others have financial support from work and their pensions in addition to NHIS to cater for their cost of care. Majority of the patients earn less than GHS500 (USD128.31) which indicates that women with breast cancer lose a lot of money seeking treatment. All respondents indicated that they had in the past month incurred some cost on consultation which formed 4.31% of the total cost.

Laboratory/diagnostics cost yields over one-fourth of the total cost (25.89%) in a month, this means on the average women with breast cancer spend about GHS184.96 (USD47.43) which is almost the monthly salary of some respondents. A study in Central Vietnam by Nguyen *et al.* (2013) to estimate the various cost of breast cancer treatments found out that the mean cost of diagnostics was USD16.02 which is far less than what this study found

but this study combines laboratory and diagnostics. Also, the duration under consideration in that study was over a period of five years and over time, the cost incurred varies greatly. Some respondents (41) also reported incurring cost on medicines which were prescribed for them during treatment with a monthly average of GHS47.68 (USD12.23) thus USD 146.76 in a year. According to Ekwueme et al. (2013), breast cancer in young women results in about USD2,529 in a year on prescribed drugs. The cost compared to the findings of this study is much higher since this study looked at cost in just a month and the study was done among all age groups.

The largest cost component was the treatment which included the cost of surgery, chemotherapy and radiotherapy which was about almost a half of total cost expenditure (49.17%) thus on the average an amount of GHS351.30 (USD90.08) incurred in a month by all respondents. In the study done by Nguyen et al. (2013), it was realized that the cost of surgery, chemo and radio therapies together had an average of USD581.70 over the five year study period as compared to this study which combines the three treatments had an average of GHS351.30 (USD90.08) in a month and USD5,404.8 in five years. Comparatively, the cost in this study is much higher because surgery (mastectomy) is done only once but it is still part of the five year cost estimate.

Direct non-medical cost incurred by the respondents in this study is 6.28% of the total cost with an average of GHS44.86 (USD11.50) thus less than one-tenth of the total cost. Travel cost (in and out) incurred by all respondents in a month gave an average cost of GHS28.98 (USD7.43) thus 4.07%. Patients and their relatives report having to travel from far and near locations to seek treatment since breast cancer care is available in limited hospitals. A study done by Nattinger et al. (2001) to look at the relationship between distance and radiotherapy facility and initial treatment revealed that, some breast cancer patients even have to relocate to urban areas in order to have easy access to care. The mean direct cost

incurred by all respondents in the study within a month is about GHS646.86 (USD165.86) thus 90.5%. Similarly, a study done by Kim et al. (2015) reported that direct medical expenditure (USD399.22) of breast cancer patients was greater than that for non-medical cost (USD50.69) just as this study found.

This indicates that there is a great economic burden on patients with breast cancer. Although most of the respondents in this study used NHIS seeking treatment (92.9%), their direct cost was still burdensome.

5.3 Indirect cost of breast cancer treatment

Indirect cost of treating cancer in this study is mainly productivity loss to the patient in a month as a result of seeking treatment. Productivity loss may be due to losing hours of work travelling in and out of treatment center, waiting to be attended to and time spent receiving treatment as well as the number of days one absents herself from work due to the disease condition to stay at home. The indirect cost incurred in treating breast cancer disease is not restricted to the patient alone. About 27 patients (48.21%) who were involved in this study usually sought treatment accompanied by a relative which meant more productivity losses since those relatives also have to stay away from work to be able to give assistance. The indirect cost of treating breast cancer disease to the respondents in this study has an average of GHS99.58 (USD25.53) which forms 9.5% of the total cost. Respondents in the formal sector (16) lose about 1,024 productive hours in a month to seek treatment yielding an average of GHS64 (USD16.41). The informal sector respondents (22) also lose a total of 1,472 productive hours in a month with an average of GHS125.45 (USD32.17). A study in Mexico by Gomez-Rico et al. (2009) also reported an income loss due to the illness of about USD16,442.30 over a period of six months for 56 respondents. The cost of their time spent at the hospital ranged between USD1,312.61 to

USD1961.1. In this study, income loss to participants in both formal and informal sectors over 6months can be estimated at USD153.18. The great difference in the losses may be due to the different study settings. Some relatives of women with breast cancer also spend time taking care of them at home. According to Grunfeld et al. (2004), 5% of caregivers of breast cancer patients had to quit their jobs to cater for their sick relatives at home.

The mean number of productive hours lost as a result of seeking treatment by the working class in this study is 65.68 hours in a month. Zheng et al. (2016), in their study on productivity loss among cancer patients report that each breast cancer patient loses between three to seven days in a month either due to ill feeling or staying at home. Compared to this study, the average of three to seven days gives five days thus about 40 hours in a month per person. The difference in the number of hours may be due to the unknown employment statuses of their respondents which were assumed as formal.

The indirect cost of breast cancer in women is comparatively not as overwhelming as their direct cost.

5.4 Intangible cost

Intangible cost which has to do with the psychological challenges associated with breast cancer disease covers three domains in this study which are fear, pain and emotional suffering. Respondents reported their levels of these three aspects of their life in the presence of the disease using a Likert's scale of one to five with one being the best. All 56 respondents gave ratings for their levels of fear, pain and emotional suffering. Patients report going through a lot of psychological problems since they were diagnosed with the breast cancer disease. Scharff (2012) described that people with advanced breast cancer and their families and caregivers often have complex and changing psychological,

physical and social needs which is not different from the respondents in this study reported.

The findings of this study reveal that over half (57.14%) of the respondents in this study have a high intangible burden which indicates that, they are psychologically not at rest. Since breast cancer disease and its treatment is associated with a great financial cost to both patient and family as well as physical changes such as hair loss and mastectomy (surgical removal of the breast) and stigma, the psychological problems encountered cannot be overemphasized. Some women with breast cancer in this study even have to quit working because they are unfit to do so with the disease.

Others also apart from having to stay at home require another relative to take care of them at home. Some are also hospitalized depending on the stage of diagnosis and how they respond to the treatment. Smith et al. (2012) recommended access to supportive and palliative care as a way to improve patients' lives. A lot of marital problems also arise due to the disease since most patients lose one or both breasts through surgery as well as numerous physical changes. Cleary et al. (2013) stated that many studies report the disturbance in family functioning because of marital issues arising from the challenges the disease brings.

5.5 Limitation of the study

1. The study was conducted in only one facility and the sample size used was minimal compared to other studies hence findings could not be generalized to the larger population of cancer patients.
2. Intangible cost could not be valued in monetary terms due to methodological limitations, therefore these were described but not added to the total cost.

3. The direct and indirect cost incurred as well as the number of productive hours lost by the patient was solely based on recall which may not be accurate.

4. Time lost by accompanying relatives was not accounted for since there was no data collected on their occupational backgrounds.

CHAPTER SIX

CONCLUSION AND RECOMMENDATION

6.1 Conclusion

The study made the following conclusions against the backdrop of the findings and in relation to the objectives:

The study found that breast cancer patients incur huge direct cost in seeking treatment. Hence, it can be concluded that the major cost component incurred by breast cancer patients in this study is attributable to direct cost as it forms 84.26% of the total cost incurred by the patients and is financed mainly by patients and their family.

The indirect cost incurred by breast cancer patients in percentage terms is less than quarter (9.46%) of the total cost incurred and is attributable mainly to loss of productivity on the part of patients in seeking treatment. Almost half of the patients are accompanied by relatives, which increases the indirect cost of such patients compared to those who seek treatment alone.

Most (57.14%) respondents reported high intangible burden owing to breast cancer disease indicating that majority of the study participants experience a lot of psychological problems due to their condition. The major source of this psychological burden is as a result of the stigma associated with breast cancer because most of the patients report not wanting people to know about their condition.

In general, the direct cost of treatment of breast cancer is the major challenge confronting breast cancer patients.

6.2 Recommendations

In light of the findings of the study and the conclusions reached, the following recommendations are made for consideration by policy, practice and research:

1. To the extent that direct cost constitutes the major cost incurred by breast cancer patients, there is the need for a policy on breast cancer treatment with the aim of subsidizing the direct cost components of treating breast cancer. This could be done through effective advocacy and collaboration with private sector partners and interest group to raise the needed resources for reducing the direct treatment cost of breast cancer.
2. Cancer services must be decentralized by Ministry of Health since it costs patients a lot of money travelling in and out of treatment centres. Besides the money spent on transportation, time spent travelling is also another source of loss to patients and their accompanying relatives.
3. The study also found that almost half (44.6%) of the respondents were diagnosed at stage three of the disease progression while only 5.4% were diagnosed at stage one. This raises concerns about education and sensitization of the public about breast cancer screening and seeking for early treatment. There is thus the need for a persistent education and screening exercises on breast cancer to ensure early diagnoses and treatment since earlier studies reported reduced cost of treatment in early diagnosis.
4. Considering the intangible cost borne by women with breast cancer in this study (57.14% with high intangible cost), breast cancer support groups should be encouraged in order to assist patients psychologically as well as reduce the stigma associated with the disease.

5. It is also recommended that further studies be done to look at the correlation between economic burden of breast cancer and the quality of life of the patients.

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APPENDICES

Appendix I: Participant Information Leaflet

Project Title: Economic Burden of Breast Cancer: A study at the Korle-Bu Teaching Hospital

Background

My name is Doreen Pokua Gyau, a student from the School of Public Health, University of Ghana, Legon. I am conducting a study on the economic burden of breast cancer at the Korle-Bu Teaching Hospital. The main objective is to determine the economic burden of the disease in women seeking treatment at the Korle-Bu Teaching Hospital

Procedures

The study will involve answering questions from the attached questionnaire. No coercion will be used to obtain response from participants. It will be appreciated if you could participate in this study. This is purely an academic research which forms part of my work for the award of a Master's Degree in Public Health.

Risks and Benefits

Both the study population and the society stand to benefit from this study. The study population will know the total estimated cost of breast cancer. Also an estimate o21f the economic burden can serve as a plat form for sensitizing policy makers and opinion leaders about the economic burden of breast cancer. Subsequently, programs can be instituted to promote regular screening for breast cancer, early detection and treatment of breast cancer. This can help implement policies on subsidization of treatment of the disease. Knowledge of economic burden of breast cancer can help them make informed decisions about seeking treatment early to prevent complications and reduce cost. This research will pose no potential risk to study population or the society.

Right to Refuse

Participation in this study is voluntary and you can choose not to answer any individual question or all questions. You are at liberty to withdraw from the study at any point if desired. However, I will encourage you to fully participate in the study since your answers are important to help estimate achieve my aim.

Before taking Consent

Do you have any questions you wish to ask about the study?

Yes/No [ ] If yes, please, indicate the questions below

……

……

……

……

If you have any questions later, please contact Doreen Pokua Gyau on (0246850192), School of

Public Health, University of Ghana, Email: maamemegash@gmail.com.

You can also contact the administrator of Korle-Bu Teaching Hospital Ethical Review Committee on (0277743365 – Mr. Nartey) for further information.

Appendix II: Consent Form

I have read the information given above, or the information above has been read to me and I understand. I have been given a chance to ask questions concerning 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 withdraw and also withdraw my relative from this study at any time without affecting future health care services.

……..... …….. …… ……

Name of caregiver Signature Thumbprint Date

…… …… …… ……

Name of witness Signature Thumbprint Date

…… …….. …… ……

Name of researcher Signature Thumbprint Date

…… …….. .. …… …….

Interviewers Statement

I, the undersigned, have explained this consent to the subject in English language/ Twi/ Ga/ Ewe, and that I understand 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 III: Questionnaire

TITLE: Economic Cost of Breast Cancer in Women: a Study at Korle-Bu Teaching Hospital

Please kindly give me a little of your time so I can answer these questions with you. You are assured that the answers you give will be strictly confidential and would not be used against you.

Please tick (√) by the options provided as you deem fit.

Respondent code: _____ Date of interview (dd/mm/yy): _____

_____

SECTION A: SOCIO-DEMOGRAPHIC INFORMATION

No.	Question
1.	Age in years (at last birthday):
2.	Marital status [1] Married [3] Divorced [5] Separated [2] Single [4] Widowed
3.	Religion [1] Christian [2] Muslim [3] Traditionalist [4] Other:
4.	Educational status [1] No education [3] Middle/JSS/JHS [5] Tertiary [2] Primary level [4] SSS/SHS
5.	Employment status [1] Unemployed [3] Public sector employee [2] Private sector employee [4] Self-employed
6.	If employed, what is your occupation (what) kind of work do you mainly do? [1] Trading [4] Military [2] Health service [5] Business [3] Civil service [6] Banking and finance Others (please specify):
7.	If employed, are you still working in spite of your condition?

	[0] No [1] Yes
8.	What is your monthly income? *(All sources)*? GH¢
9.	Do you have a valid NHIS card for this year? [0] No [1] Yes
10.	When were you diagnosed of breast cancer? (_____ years, _____ months) ago
11.	At what stage of the disease were you diagnosed? [1] Stage 1 [2] Stage 2 [3] Stage 3 [4] Stage 4
12.	How long have you been on treatment? _____ years, _____ months
13.	What is the source of financing for the cost of care? *(Tick as many)* [1] Self [1] Pensions [1] Remittances [1] Donations/Gifts [1] Relatives [1] Private insurance [1] NHIS Insurance Other (please specify):
14.	Have you or a household member had to sell a property to cater for your disease? [0] No [1] Yes
15.	If yes in 14, what items did you sell? *(Tick as many)* [1] Car [1] House [1] Household items [1] Land Others (please specify):
16.	If you answered 15, how much did you derive in total? GH¢

SECTION B: DIRECT COST

Medical

17. How much do you and your household spend in a month on treatment?

	Item/Treatment	**Cost (GH¢)**
a.	Registration	
b.	Consultation	
c.	Laboratory investigations	
d.	Mastectomy	
e.	Histopathology	
f.	Chemotherapy	
g.	Radiotherapy	
h.	Other drugs	

i.	Radiological Investigations	
j.	Others (please specify)	

Non-Medical

18. How much do you and your household spend in a month on these items?

	Item	**Cost (GH¢)**
a.	Travel cost in and out	
b.	Food during treatment	
c.	Drink during treatment	
d.	Others (specify)	

SECTION C: INDIRECT COST

19.	How many days within the last month have you (patient) absented yourself from work because of your disease?	|___|___| days
20.	How many hours did you (patient) spend seeking treatment on your last visit? (traveling in and out and waiting time)	|___|___| hours

Household member accompanying patient

21.	How many hours did you spend seeking treatment on your last visit? (traveling in and out and waiting time)	|___|___| hours
22.	How many days within the last month have you been absent from work because you have to bring your relative for treatment	|___|___| days
23.	How many hours in a day does a household member spend taking care of the sick relative?	|___|___| hours

SECTION D: INTANGIBLE COST

24. Fear

Please rate the following using the options provided as it applies to you by ticking in the box.

a.	I am bothered by the uncertainty of my sickness [1] Not at all [2] A little [3] Moderately [4] A lot [5] Extremely
b.	I think about my health now more than before I was diagnosed. [1] Not at all [2] A little [3] Moderately [4] A lot [5] Extremely
c.	Because of my sickness my future is of concern to me. [1] Not at all [2] A little [3] Moderately [4] A lot [5] Extremely
d.	I am always worried about my cancer spreading [1] Not at all [2] A little [3] Moderately [4] A lot [5] Extremely
e.	Because of my disease I am always afraid of dying [1] Not at all [2] A little [3] Moderately [4] A lot [5] Extremely

25. Pain

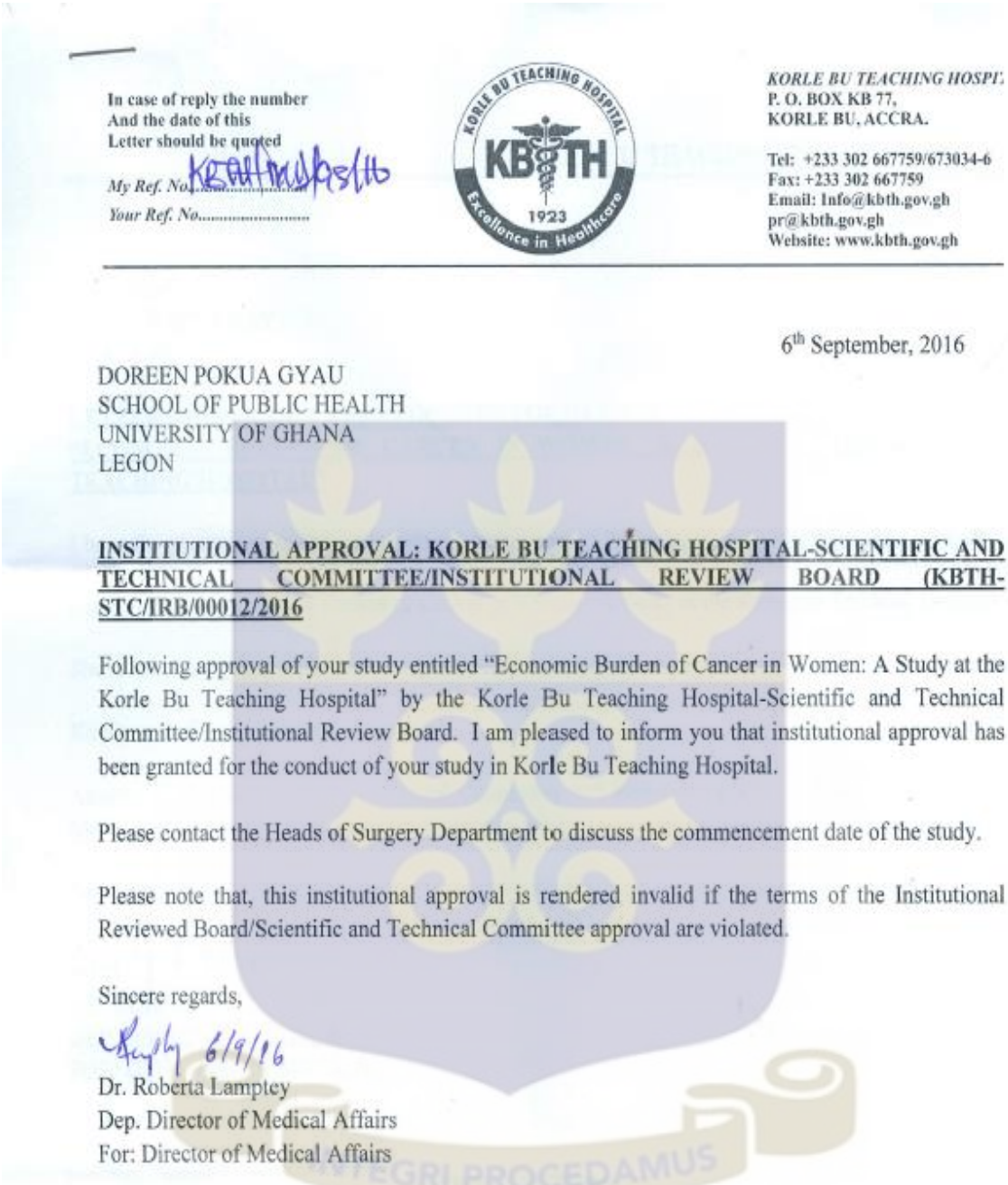
a.	I always feel pain around the affected breast [1] Not at all [2] A little [3] Moderately [4] A lot [5] Extremely
b.	I feel pain when I lift the arm on the affected side. [1] Not at all [2] A little [3] Moderately [4] A lot [5] Extremely
c.	I feel general body pains and weakness in the morning when I wake up [1] Not at all [2] A little [3] Moderately [4] A lot [5] Extremely

26. Emotional Suffering

a.	I feel I am a burden on to others who have to take care of me [1] Not at all [2] A little [3] Moderately [4] A lot [5]

	Extremely
b.	I think about my friends knowing about my condition and shunning my company [1] Not at all [2] A little [3] Moderately [4] A lot [5] Extremely
c.	I think about my sickness at night and cannot sleep [1] Not at all [2] A little [3] Moderately [4] A lot [5] Extremely
d.	I feel embarrassed to let people know of my condition [1] Not at all [2] A little [3] Moderately [4] A lot [5] Extremely
e.	I feel my partner does not like me again because of my condition [1] Not at all [2] A little [3] Moderately [4] A lot [5] Extremely

Appendix IV: Ghana Health Service Ethical Approval Certificate



In case of reply the number
And the date of this
Letter should be quoted

My Ref. No. KBTH/STC/IRB/00012/2016

Your Ref. No.....

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6th September, 2016

DOREEN POKUA GYAU
SCHOOL OF PUBLIC HEALTH
UNIVERSITY OF GHANA
LEGON

INSTITUTIONAL APPROVAL: KORLE BU TEACHING HOSPITAL-SCIENTIFIC AND TECHNICAL COMMITTEE/INSTITUTIONAL REVIEW BOARD (KBTH-STC/IRB/00012/2016

Following approval of your study entitled "Economic Burden of Cancer in Women: A Study at the Korle Bu Teaching Hospital" by the Korle Bu Teaching Hospital-Scientific and Technical Committee/Institutional Review Board. I am pleased to inform you that institutional approval has been granted for the conduct of your study in Korle Bu Teaching Hospital.

Please contact the Heads of Surgery Department to discuss the commencement date of the study.

Please note that, this institutional approval is rendered invalid if the terms of the Institutional Reviewed Board/Scientific and Technical Committee approval are violated.

Sincere regards,

6/9/16

Dr. Roberta Lamptey
Dep. Director of Medical Affairs
For: Director of Medical Affairs