SCHOOL OF PUBLIC HEALTH

COLLEGE OF HEALTH SCIENCES

UNIVERSITY OF GHANA

TRENDS IN CANCER CASES AND MORPHINE PRESCRIPTION AT THE KORLE-BU TEACHING HOSPITAL: 2011-2015.

BY

JULIANA AMANKWAH-MARFO

(10552103)

THIS DISSERTATION IS SUBMITTED TO THE UNIVERSITY OF GHANA, LEGON IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF MASTER OF PUBLIC HEALTH (MPH) DEGREE

JULY 2016

DECLARATION

I, Juliana Amankwah-Marfo author of this dissertation, hereby declare that except for references made to other people's work which I have duly acknowledged, this research dissertation is the result of my own original work and has not, either in part or in whole, been presented elsewhere for another degree.

....

Juliana Amankwah- Marfo Date

(Student)

....

Dr. Francis Anto Date

(Supervisor)

DEDICATION

This dissertation is dedicated to the almighty God for His mercies, protection and love shown to me and finally also to my entire family for their love, patience and encouragement towards the completion of this study.

ACKNOWLEDGEMENT

I would like to first acknowledge the almighty Lord for how far He has brought me. It has been by His doing, I sincerely thank Him.

I also wish to thank Dr. Francis Anto, my supervisor, for the constructive criticism, guidance and encouragement towards the success of this dissertation.

To the director at the National Radiotherapy and Nuclear Medicine Centre- KBTH, Dr. Joel Yarney for the audience granted me and also to staff at the records and cancer registry department, I cannot thank you enough, for all the time devoted to ensure that I got the necessary information.

I wish to sincerely thank my departmental head, lecturers and School of Public Health as a whole, for all the help and support offered me to make this work successful.

Lastly, to my husband, Mr. Stephen Amankwah-Marfo, for proof reading my work, encouraging and supporting me, as I always say, "Thanks so much dear".

ABSTRACT

A retrospective record review on cancer cases covering the period 2011 to 2015 was undertaken at the National Centre for Radiotherapy and Nuclear Medicine at the Korle Bu Teaching Hospital to determine trends in cancer cases and morphine prescriptions at the hospital. Data covering the period 2011 to 2015 were also retrieved from the cancer registry to ascertain the number of cases reported. Patients' data including age, sex, types of cancer as well as the various stages of the cancers and prescribed medications were also retrieved. The data revealed a declining trend in reported cancer cases from 2011 to 2013. A sharp rise was however, observed from 2014 to 2015. Higher proportions of cancer cases were reported among those aged above 41 years, with more females (66.8%, 668/1000) than males reporting at the Centre. The per capita morphine consumption decreased from the beginning of the study, 22.4% in 2011, to 17.9% in 2013 but there was a sharp increase to 27.9% in 2014 and decreased gradually to 12.7% in 2015 being the end of the study respectively. In conclusion, there was an increasing trend in the reported cancer cases for the past couple of years yet the prevalence of morphine use among these patients was inconsistent and seemed virtually low. The findings could serve as the basis for further research on the reasons of the low prescriptions of morphine since there seem to be an increasing trend in cancer cases.

TABLE OF CONTENT

Contents **Page**

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

AIDS	-	Acquired Immune deficiency Syndrome
FDA	-	Food and Drugs Authority
GHS	-	Ghana Health Service
GLOBOCAN	-	Global Burden of Cancer Study
HIV	-	Human Immunodeficiency Virus
INCB	-	International Narcotics Control Board
KBTH	-	Korle-Bu Teaching Hospital
LMIC	-	Low and Middle Income Countries
MOH	-	Ministry of Health
NCD	-	Non communicable disease
NCI	-	National Cancer Institute
NIH	-	National Institute of Health
SD	-	Specialist Drug
SPH	-	School of Public Health
STATA	-	Statistical software package (Statistics and Data)
UG	-	University of Ghana
UN	-	United Nations
US	-	United States
WHO	-	World Health Organization

CHAPTER ONE

INTRODUCTION

1.1 Background

Globally, cancer is seen to be a leading cause of disease. Almost every country reports of at least a type of a cancer case and observed to be increasing year by year in almost every country across the globe. Between 2008 and 2012, the prevalence of cancer was reported to be 32.5 million of which 6.3 million were women who had been diagnosed with breast cancer. Men of about 3.9 million were also diagnosed with prostate alone whilst both men and women who had been diagnosed of colorectal cancer were about 3.5 million and the remaining 18.8 million cases were cancers affecting both sexes in lesser percentages (WHO, 2014).

In 2012, an estimate of about 12.1 million new cases were reported globally. The new cases reported were mostly female breast, stomach, lung and colorectal cancers and these reported for more than 40% of all cases diagnosed globally. About 8.2 million deaths were recorded in the same year. Most of the deaths recorded were patients who had been diagnosed with stomach, breast, liver, colorectal and lung cancers.

In Sub-Saharan Africa, the incidence of cancer is growing rapidly and expected to exceed 1 million by 2030 (O'Brien et al., 2013). Many cancer cases in the developing countries are noticed when they have reached the complex stages at the time of diagnosis and this is because of delayed presentation to health facilities and deprived access to diagnostic technologies.

In Ghana, 10,160 new cancer cases were recorded between 2000 and 2012 according to the WHO Cancer profile 2014. Korle –Bu Teaching hospital (KBTH) had recorded 1,136 new cases of cancer in 2012. Their ages ranged between 1 year to 92 years whilst their mean were 52.3 ± 15.9 years and a median of 54 years. The cancer

patients seen were mainly females (70.2%) with most of the cases being breast, cervix and uterus cancers. In the males, the most prevalent cases reported were prostate, pharynx and colorectal cancers (Kenu et al, 2012).

However, in 2013, according to the KBTH annual report a prevalence of 14,479 cancer cases were recorded and out of these 1,118 new cases were diagnosed. This showed a gradual decreasing trend in the reported cancer cases that had been diagnosed in the country and therefore the need to implement measures to prevent, cure and care for this burden of cancer.

At all stages of this disease, cancer patients need pain relief. Pain arises in about one-third of patients receiving anti-cancer treatments. The pain relief procedures and anti-cancer treatment usually are undertaken at the same time (WHO, Cancer pain relief, 2014).

Usually, some of these pain drugs are got through prescriptions recommended by physician. Prescription is a physician's order for the preparation and administration of a drug or device for a patient. Morphine, a controlled drug and an opioid analgesic is among the drugs used in the management of pain amongst cancer patients. It is one of the essential drugs recommended by the WHO for the relief of pain (O'Brien et al., 2013).

It has some potential for abuse or dependence. In Ghana, the controlled drugs which consist of narcotic drugs, psychotropic substances and precursor chemicals have been explained in Section 126 of the Public Health Act 2012 (Act 851), and are solely regulated by the Food and Drugs Authority (FDA) for medical and scientific purposes. This agency is therefore responsible for the availability of the controlled drugs including morphine to be adequate for consumption. The FDA makes estimation of the drugs through the demands (backed with data) received from health

facilities and pharmaceuticals. Knowledge about cancer burden and morphine use is deficient in many low- and middle income countries, causing cancer control efforts less successful (WHO, 2014).

The access to morphine (opioids) for pain relief across Africa is limited by several factors such as legal and regulatory restrictions (lack of accurate estimation), procurement challenges, weak health systems, inadequate training of healthcare providers, cultural misperceptions about pain concerns about diversion, addiction and misuse (O'Brien et al., 2013). This further makes the consumption of morphine to be low in Africa and therefore ceases to address the needs of managing pain among cancer patients in the region for that matter Ghana.

1.2 Statement of Problem

In the regulation of controlled drugs, the FDA by law {Public Health Act, 2012 (Act 851)}, is the authorized agency mandated to ensure that these drugs are legitimately used for its intended purpose and not diverted into illicit purpose such as the manufacture of methamphetamines and furthermore furnish reports to the International Narcotics Control Board (INCB) on the yearly consumption. However, an annual estimate of how much these controlled drugs is required by our country to meet the demands for medical treatment (especially cancer patients) and for licit scientific research remains a challenge. The demand and supply of these drugs are usually done by estimation without any accurate data as proof for the actual consumption of the populace. It has been observed that some health facilities do not have adequate supplies of these controlled drugs and this could be linked to an inaccurate estimation of the annual requirement of the country for medical treatment and other factors such as problem sourcing from industry, fear of addiction, cultural

attitudes towards treatment of pain, lack of awareness and training regarding the rational use of narcotic drugs among members of the medical profession. Morphine, a controlled drug, is considered by the WHO to be one of the best recommended opioid analgesics to be used for moderate, severe and chronic pain management. As part of regulating morphine, there is the need to constantly know the trends of reported cancer cases that the country faces in order to meet the demand and supply of morphine for health facilities.

The estimated annual allocation of morphine for Ghana since 2011 to 2015 still remains 10kg (Évaluations & Cuadro, 2013) regardless of the trends of reported cancer cases in the country since 2011. The purpose of the current study therefore was to determine the rate of morphine prescriptions for cancer patients receiving care at Korle-Bu Teaching Hospital (KBTH), the largest hospital in the country.

1.3 Conceptual Framework:

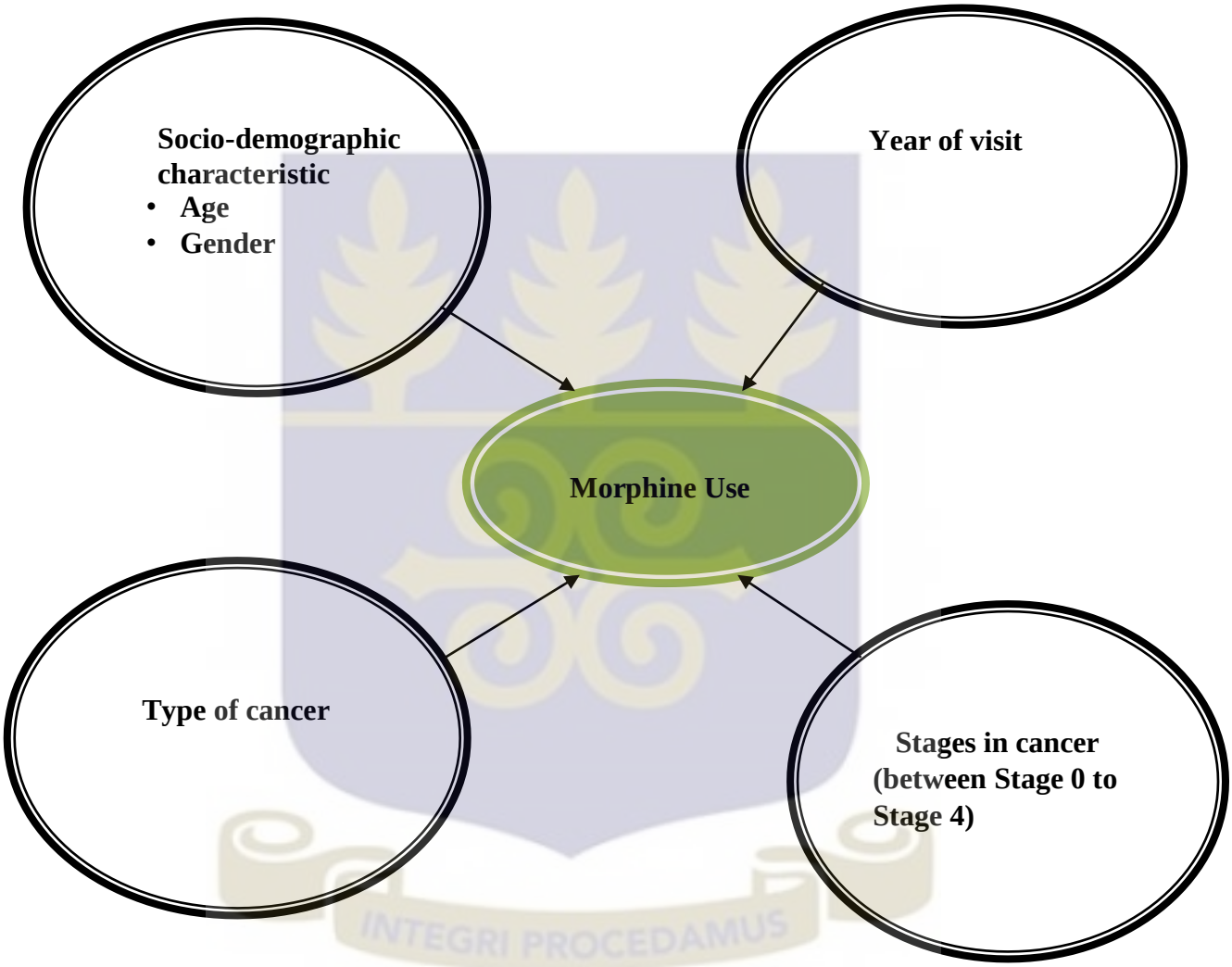


Figure 1: Conceptual framework of possible factors affecting the use of Morphine

Conceptual framework explained:

Globally, the increasing trend in cancer cases has a reflection in developing countries such as Ghana. WHO recommends the use of morphine as the main opioid for the treatment of moderate to severe pains in these cancer cases. However, patients related factors such as age, gender, type of cancer, stages in cancer which often best describe the level to which it has reached so that better treatments can be offered by the medical team at the health facility could influence the use of morphine.

There are various types of cancers diagnosed in Ghana and the commonest include breast, prostate, colorectal, stomach and lung. There are also rare cancer cases that are reported at the health centres. The stages of these cancers usually determine the amount of morphine that is to be used regardless of the type of cancer diagnosed. Occasionally, the late stages of the cancer diagnosed require higher doses of morphine if only available. Cancer generally affects both males and females irrespective of their ages. The management of cancer including the treatment of cancer i.e. Chemotherapy, Radiotherapy, Surgery and other medications for relieving pain could also affect morphine use. Early detection of cancer in a patient i.e at the early stages can help the treatment of cancer to be highly effective and this can also have an influence on the use of morphine. Finally, the year of visit where there are more records of cancers presented at health facilities could have an influence on the use of morphine. There could be a high or low consumption of the drug depending on its availability.

1.4 Justification

Cancer is the leading cause of death. The burden of cancer in Sub-Saharan Africa will develop swiftly in the coming years. However, the incidence is expected to go beyond 1 million per year by 2030 (O'Brien et al., 2013).

The increasing trend in cancer in the Sub-Saharan Africa is surely a public health concern. According to GLOBOCAN report in 2008, approximately 16,000 cases of cancer occur annually in Ghana, with the five most common diagnosed cancers consisting of the liver, breast, cervix, prostate, and stomach cancers. Cancer is recorded to be the fourth most common cause of deaths in the country (Stefan et al., 2013).

This affects both males and females alike irrespective of their ages. Among the females, the common cancers are of breast, cervix and uterus whilst in males prostate, pharynx and colorectal are the most common (KBTH 2013 annual report). Generally, cancers can be cured through surgery, radiotherapy or chemotherapy, if detected early. However, the treatment of cancer can bring various degrees of pain even at the different stages of the cancer diagnosed. Basically, the late appearance to the health facilities gives less access to diagnostic technology and treatments. Roughly, 80% of cases seen are diagnosed at their terminal stages. Majority of these patients' reports with moderate to severe pain which requires treatment with opioid analgesics. However, consumption of opioid analgesics such as morphine in the Sub-Saharan region is low. Data suggest that at least 88% of cancer deaths with moderate to severe pain are untreated. Access to essential drugs for pain relief is limited by legal and regulatory restrictions (lack of data for estimation), cultural misperceptions about pain, inadequate training of health-care providers, procurement difficulties, weak

health systems, and concerns about diversion, addiction, and misuse (Sorge & Scholten, 2011). WHO recommends the use of morphine as the main controlled drug for the management of moderate to severe pains in these cancer patients ("cancer pain relief WHO 2nd edition.pdf," n.d.) Additionally, morphine can also be used for the treatment of dyspnoea and anxiety.

It is anticipated that 80% of the world's populace does not have access to morphine for pain relief. Fortunately, the country has an annual allocation for morphine use (Cuadro et al, 2013) and the rate of the morphine prescription given among cancer patients would relieve them of their pain.

1.5 Research Questions:

1. What is the trend in cancer cases reported at KBTH from 2011 to 2015?
2. What is the age and sex distribution of reported cancer cases at the KBTH from 2011 to 2015?
3. What is the rate of morphine prescriptions among the reported cancer patients at the KBTH from 2011 to 2015?

1.6 Objectives

1.6.1 General Objective

To determine trends in cancer cases and morphine prescriptions at the KBTH from 2011 to 2015.

1.6.2 Specific Objectives

1. To determine trends in reported cancer cases at KBTH from 2011-2015
2. To assess the age and sex distribution of reported cancer cases from 2011-2015
3. To assess the prevalence of morphine prescriptions for cancer cases from 2011-2015

CHAPTER TWO

LITERATURE REVIEW

2.1 Cancer

Cancer is one of the non communicable diseases (NCDs) which globally accounts for about 8.2 million deaths each year and these deaths occurs mostly in low- and middle-income countries. Among the NCD's, cancer is rated as one of the leading causes of death. These come as a result of risk factors associated with humans such as unhealthy meals, , the harmful intake of alcohol, tobacco smoke and physical inactivity (National Cancer Institute-NIH, 2010).

Cancer is an uncontrolled growth and spread of cells. Ideally, the human cells grow and divide to form new cells as the body needs. When the cell grows old or becomes damaged, new cells take over after they die. When a cancer develops, this systematic process mentioned earlier breaks down. The cells gradually become irregular, the old or damaged cells survive when they should die and the new cells form when they are not necessary. These extra cells then divide without stopping and may form growths called tumours. Cancer can indeed change almost any part of the human body. The growths repeatedly invade nearby tissue and then metastasize to distant sites (America Cancer Society, 2010).

Most cancers can be prevented by avoiding exposure to common risk factors, such as tobacco smoke. In the same light, a significant proportion of cancers can be managed through surgery, radiotherapy and/or chemotherapy, only if they are managed early.

2.2 Trends in cancer cases

Globally, 16 million people die prematurely before the age of 70 each year. The developing countries recorded 4 out of 5 of the prematured deaths ("Führungskräfte - WHO NCDs Progress Monitor 2015").

World Cancer Report indicated that the incidence of cancer by 2020 could increase by 50% to 15 million. However, the report added that healthy lifestyles and public health measures by governments and health practitioners could curtail this trend by preventing as many as one third of cancers worldwide.

According to WHO 2003 world cancer report , in the year 2000, the higher rate of cancers were mainly accountable for the 12 per cent of the nearly 56 million deaths worldwide from all causes. More than a quarter of deaths recorded by most countries were attributable to these cancers. About 5.3 million men and 4.7 million women developed a malignant tumour and altogether 6.2 million died from this disease. Reports indicated that this major public health problem had emerged in developing countries with effect from industrialization and more. In 2012, 14.1 million new cancer cases and 8.2 million cancer deaths was projected to have happened worldwide. Breast and lung cancer were the most frequently diagnosed cancers and these were reported in less developed countries. However, in more developed countries, prostate cancer was the most frequently diagnosed cancer among men and lung cancer was the leading cause of cancer death among women.

Based on the GLOBOCAN estimates in 2012, the burden of cancer has now shifted to less developed countries over the years, accounting for about 57% of cases and 65% of cancer deaths worldwide. Cancer of the lung is seen to be the top cause of cancer death among males in both low and middle-income countries. Similarly, breast cancer

which was observed to be the top cause of cancer death among females in more developed countries still remains the chief cause of cancer death among females in less developed countries (Vento, 2013).

Other leading causes of cancer deaths in the more developed countries include colorectal cancer among males and females as well as prostate cancer among males. In less developed countries, liver, stomach cancers among the males as well as cervical cancers among the females still leads. The incidence rates for all of the cancers combined are nearly twice as high in more developed countries than in less developed countries for both sexes.

The gap in these figures reflects the regional differences in the mix of cancers, which is affected by risk factors and detection practices, and/or the availability of treatment. Risk factors associated with the leading causes of cancer death include tobacco use (lung, colorectal, stomach, and liver cancer), overweight/obesity and physical inactivity (breast and colorectal cancer), and infection (liver, stomach, and cervical cancer). A significant portion of cancer cases and deaths could be prevented by broadly applying effective preventive measures, such as tobacco control, vaccination, the use of early detection tests and pain managements (WHO,World Cancer factsheet, 2014).

In Africa, cancer is reported to be an emerging trend in the public health problems facing the continent. This is as a result of aging and growth of the population and the increased prevalence of risk factors associated with economic transition including smoking, obesity, physical inactivity, poor diet and reproductive behaviours.

The populace in Africa between 2010 and 2030 is expected to have an increase in cancer by 50% overall i.e. from 1.03 billion to 1.52 billion. During this period, about 90% of the aged i.e. 60 years and over would have recorded new cases of cancer ranging from 55 million to 105 million. Usually, 60 years and over is the prime age with which cancer frequently occurs.

Although current prevalence of adult cigarette smoking is low in Africa, there is the belief that the prevalence would increase due to the increased factors such as the disposable income and adoption of Western lifestyles driven by images such as films that portray smoking as a stylish activity (Jemal et al., 2012).

Again most urban populations in Africa have also been experiencing changes in reproductive factors toward earlier menarche, delayed childbearing and lower fertility. Changes in dietary patterns to high animal and hydrogenated fat intake as well as poor inactivity patterns towards reduced average energy expenditure are all examples of the factors influencing cancer. Despite these factors, cancer continues to receive a relatively low public health priority in this region basically due to limited resources and other pressing public health problems, including communicable diseases such as acquired immunodeficiency syndrome (AIDS) or human immunodeficiency virus (HIV) infection, malaria and tuberculosis (Jemal et al., 2012).

In 2008, an estimation of 715,000 new cancer cases and 542,000 cancer deaths were recorded in Africa, however, the incidence and mortality patterns varied remarkably across regions. About 92,600 (24%) new cases of breast cancer were the most commonly diagnosed cancer and the second leading cause of cancer death (50,000 deaths). This was followed by cervical cancer being the second most frequently diagnosed cancer, 80,400 (21%) new cases, yet became the leading cause of cancer

death (50,300) in African women the same year. Across the regions, the incidence and death rates in East Africa and West Africa was 5 times higher than the rates recorded in North Africa. Southern African women had the highest breast cancer incidence rates in all the African regions and this could be attributed probably due to higher prevalence of reproductive risk factors including early menarche and late childbearing (Jemal et al., 2012).

Among the men, prostate cancer was 39,500 (12%) the most commonly diagnosed cancer especially amongst the southern and western Africa which were particularly among South Africa, Nigeria, and Cameroon. However, the incidence rate in southern Africa is twice as high as the second highest regional rate in western Africa and nearly seven times higher than the lowest regional rate in northern Africa. It also accountered for the second leading cause of death 28,000 (10%) in men. Liver cancer was rated the second most common diagnosed cancer 34,600 (11%) and yet the leading cause of death i.e. 33,800 (13%) among this sex group. According to GLOBOCAN, approximately 16,000 cases of cancer occur annually in Ghana, with the five most common diagnosed cancers consisting of the liver, breast, cervix, prostate, and stomach cancers. Cancer is recorded to be the fourth most common cause of deaths in the country (Stefan et al., 2013).

In Ghana, though much cancer cases have been reported over the years, the trends in the incidence of cancer cases has become alarming and this can also be attributed to the modernization and urbanization lifestyle of the populace.

Additionally, according to WHO cancer profile, a total of 10,500 and 10,160 were recorded for cancer death and incidence of cancer cases in 2014 respectively. Korle-Bu Teaching Hospital (KBTH) recorded 1,136 and 1,118 cancer cases from 2012 to

2013 respectively. The most prevalent cancers seen in men were prostate, pharynx and colorectal whereas in the females' breast, cervix and uterus cancers were the most reported cancers (Kenu et al; 2012 and KBTH 2013 annual report).

The KBTH 2013 annual report indicated that out of the 1118 new cases, 280 (25%) were breast cancer cases, which was the most frequently diagnosed cancer amongst all the other cancers followed by cervix 163 (16.4%) , then head and neck 158 (14.1%) and prostate cancer in men 117 (10.5%). The rest of the common cancers such as colorectal, sarcoma, uterus, wilms, pancreas etc. were all in smaller percentages.

A study conducted in 2012 also revealed that out of a total hospital attendance of 413,514, the new cancer cases diagnosed were 1136. These cases consisted of 339 (29.8%) males and 797 (70.2%) females. Among the females, the common cancers were those of breast (40.8%), cervix (24.3%) and uterus (4.5%) whilst for the males, the commonest cancers seen were prostate (26.5%), pharynx (7.4%) and colorectal (6.5%) (Kenu et al; 2012).

The observations made at the KBTH regarding the commonest diagnosed cancers among both sexes (females and males) were similar compared to the various commonest cancer cases reported or observed both globally and/or Afro regions. This trend shows the growing public health problem in non-communicable diseases and in cancers in general.

The increasing trend can also be linked to the adoption of unhealthy western lifestyles such as smoking and physical inactivity and consumption of calorie-dense food as reviewed by other earlier studies triggering through to low and middle income

countries (LMIC) such as Ghana which falls part of these countries (Ministry of Health and GHS, 2012). Again, despite these advances, most patients with cancer still present at health facilities at the late stages because of personal factors and deficiencies in the general health-care system (Stefan et al., 2013).

2.3 Pain Management

According to the US National Cancer Institute, pain is defined as an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage ("US National Cancer Institute," 2004).

It has been observed that the highest prevalence of severe pain occurs in adult patients having advanced cancer. Chronic pain is an issue in cancer patients, with up to 33% continuing to have pain after curative therapy. During active cancer treatment and in advanced disease states, tumors causes most pain. However, survivors are affected more by pain related to modalities such as surgery, chemotherapy, or radiation therapy than by cancer-related pain.

Pain relief among cancer patients is needed at all stages of their disease. Technically, pain occurs in about one-third of patients who are receiving anti-cancer treatments. The main objective of giving treatment to patients living with cancer is to relieve them of pain to their optimum satisfaction so that they can function best and eventually die free of pain (Frcpc, Kattan, Frcpc, & Frcpc, 2014).

2.4 Stages in cancer

Staging in cancer describes the severity of a person's cancer based on the size and/or extent (reach) of the original (primary) tumour and whether or not the cancer has spread in the body. Staging is important since it helps doctors to plan the appropriate treatment and the suitable treatment option for a patient. It generally provides

knowledge of the way cancer has progressed in a patient ("US National Cancer Institute," 2004).

There are five main stages that are used for the prognosis of cancer. These are as follows;

Table 1: Five main stages in the prognosis of cancer

Stages	Definition
Stage 0	Carcinoma in situ
Stage I, Stage II, and Stage III	Higher numbers indicate more extensive disease: Larger tumour size and/or spread of the cancer beyond the organ in which it first developed to nearby lymph nodes and/or tissues or organs adjacent to the location of the primary tumour
Stage IV	The cancer has spread to distant tissues or organs

Source of table 1 from ("US National Cancer Institute," 2004).

2.5 Morphine Consumption and Prescription

Pain relief among cancer patients is needed at most stages of the disease. Technically, pain occurs in about one-third of patients who are receiving anti-cancer treatments. The main objective of giving pain treatment to patients living with cancer is to relieve them of pain to their optimum satisfaction so that they can function best and eventually die free from pain (WHO, cancer pain relief 2nd edition 2014).

Opioid analgesics which are controlled drugs are the only known effective treatments for pain in cancer patients. WHO recommends the use of morphine as the main opioid for the treatment of moderate to severe pains in these cancer patients (WHO, cancer pain relief 2nd edition 2014).

The WHO illustrates the 3-step analgesic ladder for pain treatment as shown below;

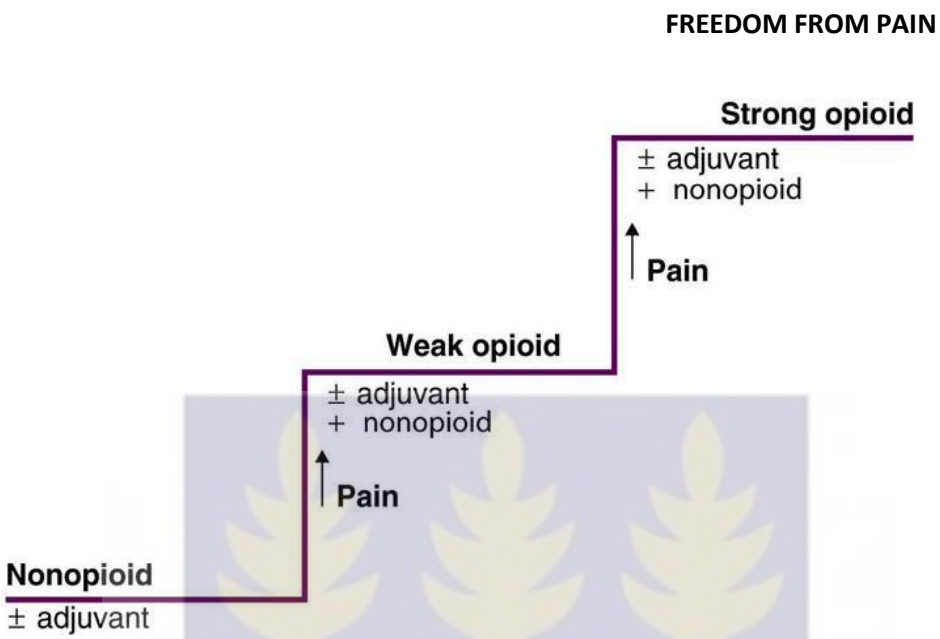


Figure 2. The World Health Organization cancer pain treatment step ladder.

The WHO developed this 3-step analgesic ladder to guide cancer pain management worldwide since studies showed that cancer pain was still a major problem (Medicine, 2004). The prevalence of pain was high in a range of 60 to 80% in advanced cancer patients. Among these group of patients, cancer pain from moderate to severity interferes with activity and the enjoyment of life in a great extent (Parala and Davis, 2013).

Across the world, the Sub-Saharan Africa continent has been noted to have a low consumption of morphine in the treatment of pain among cancer patients compared to the other countries (Kingham et al., 2013).

A global consumption of morphine in 2011 collated from INCB showed some disparities between high-income countries and low-and middle-income countries. The former recorded 92% of morphine consumption to which they represented 17% of the

world's population whilst the latter's morphine consumption was 8% of which they represented the remaining 83% of the total world population (Pain & Pain Studies group, Univ. of Wisconsin, 2014).

In the same year, Nigeria's consumption was 0.0032 mg/person compared to Canada's 87.48 mg/person. This huge striking difference between these two countries clearly indicates the rate of morphine consumption virtually low in developing countries. These figures point to the large and continuing disparity in morphine consumption among countries, and may suggest further evidence of the inadequate global treatment of pain, especially in low- and middle-income countries (Pain & Pain Studies group, Univ. of Wisconsin, 2014).

In 2013, Ghana placed 7th in the Afro regional morphine consumption of 0.1383mg per capita whilst neighboring countries Nigeria, Togo and Cote d'Ivoire placed 14th-0.0283mg/capita, 16th-0.0160 mg/capita and 19th-0.0042 mg/capita respectively. This showed that Ghana had a little bit higher consumption compared to the other neighboring countries (Helena & Rica, 2015).

Prescription is a physician's order for the preparation and administration of a drug or device for a patient. Morphine is however one of the controlled drugs that have some potential for abuse or dependence. A controlled drug can however be explained to be a drug which has been declared by law to be illegal for sale or use, but may be dispensed under a physician's prescription.

In Ghana, morphine is grouped under two levels which are first, the specialist drug (Level SD), these are drugs which are restricted for use by qualified specialists who may request for them (prescribed only medicine). The second level is restricted for District hospitals (level C). These two levels serves to confine the circulation of the

drugs to specific and appropriate settings and levels of health care delivery (Ghana Essential Medicines list, 2010).

In the KBTH 2009 report, the rate of prescriptions made by doctors alone for all medicines in general was 2000 prescription per day. This could make this hospital probably the single largest provider in terms of prescription volume in Ghana (Seiter, Bank, Gyansa-lutterodt, & Drugs, 2009).

The country's annual allocation for morphine use since 2011 to 2015 has been 10 kg (Évaluations & Cuadro, 2013) and the 2010 annual consumption of morphine was 0.071mg/capita (Profile, 2011).

The increasing reported cancer cases since 2011 are still being treated with the same annual 10 kg estimate of morphine (Évaluations & Cuadro, 2013).

From 2010 to 2013, Ghana's records on morphine consumption rose from 0.071mg/capita to 0.1383mg/capita. This might have showed an increment in morphine consumption among patients being managed for pain (Group, P.S 2015, AFRO consumption of morphine).

2.6 Accessibility and Availability of Morphine

The WHO recommends that countries gain access to controlled drugs since it is a legal principle supporting national responsibility to ensure the availability for medicinal purposes which is also expressed as an international right to health.

Medicines controlled under the international drug treaties are used to treat conditions. Opioid analgesics which forms part of these international drugs are meant for the treatment of moderate to severe pain (United Nations Children's Fund, WHO report-2012). The International Narcotics Control Board (INCB) is the independent and

quasi-judicial control organ responsible for overseeing the implementation of the United Nations three drug conventions;

a) the Single Convention on Narcotic Drugs of 1961 (1961 Convention) as amended by the 1972 Protocol,
b) the Convention on Psychotropic Substances of 1971 adopted in 1988,
c) the United Nations Convention against Illicit Drugs Trafficking and Psychotropic substances, 1988.

The Food and Drugs Authority, Ghana, by law (Section 126, Public Health Act 2012 (Act 851), is responsible in regulating the needed annual estimate of these controlled drugs for meeting the country's needs of controlled drugs for scientific and medical purposes. They are in turn monitored by the INCB whereby reports are furnished to this quasi-judicial organ on the yearly consumptions (needs/allocations) and seizures of these drugs.

However, access to these controlled drugs under international drug control treaties is lacking around the world especially in developing countries. The realization of the Millennium Development Goal 8e, states that, provision to affordable essential drugs in developing countries must be accessible. This is likely to be further away for some other drugs including opioid analgesics than for any other class of medicines. It is estimated that 5.5 billion people (83% of the world's population) live in countries with low to non-existent access to controlled drugs and hence have inadequate access to treatment for moderate to severe pain and these patients are suffering (Cleary et al., 2013).

In 2008, although Africa reported high incidence of cancer cases there was continual short of access to essential pain relief which made the living conditions of these

patients uncomfortable. This makes dying with cancer in Africa a very different experience compared to those with the disease living in the urbanized states.

About 80% of cancer patients in Africa are diagnosed at advanced stages of the disease, when pain relief is often the only choice of treatment. In Sub-Saharan Africa, challenges in weak health systems, legal and regulatory restrictions, inadequate training of health care providers, concern about diversion, addiction, and abuse, and cultural misperceptions about pain was seen to be creating a web of barriers for the treatment of pain for more than a million people (O'Brien et al., 2013).

It had been expected that some part of Sub-Saharan Africa countries had recorded about 50% of HIV deaths and 80% of cancer deaths. These patients if were to be alive would have required pain treatment enduring for an average of 3 months and the equivalent amount of morphine needed for them alone was approximately 6413 kg. However, the International Narcotics Control Board reported that Sub-Saharan African governments actually procured just 639 kg about 10% of morphine and its equivalent opioids (pethidine, oxycodone, and hydromorphone). These quantities were needed to be used at the terminal months of these cancer and HIV patients so they could have lived for some few days. These data evidently specify that for the massive majority of those in severe pain in Sub-Saharan Africa, treatment is just not accessible (Jemal et al., 2012).

In 2009, WHO data reported that, about 552,100 people died of cancer in sub-Saharan Africa and studies have shown that approximately 80% of these cancer deaths required pain management. Governments in sub-Saharan Africa reported on the whole an annual consumption of 720 kg of opioids. Based on the estimation, patients on the average needed pain treatments of 67.5 mg of morphine daily for 3 months before

they could die. 720 kg was enough to provide treatment for about 116, 600 people (i.e., about 8·6% of the total number of painful deaths from cancer or HIV/AIDS).

South Africa alone utilized 71% of the opioids in the region. Therefore, only 205 kg of opioids were consumed per year by the remaining countries—enough to treat about 33,000 people only (i.e. about 2.8% of the estimated1.17 million annual painful deaths from cancer or HIV/AIDS) (O'Brien et al., 2013).

2.7 Challenges and Way forward

Ghana experiences several challenges in the management of cancer. Some of these challenges including the lack of trained professionals, unaffordable costs of investigations and treatments. Even though a systemic lack of drugs affects the country, oncology treatment centers are working with insurance and pharmaceutical companies to make basic cancer drugs obtainable through the national health insurance system (Stefan et al., 2013).

Other challenges could also be general lack of alertness among policy makers, the general public and international private or public health agencies regarding the extent of the current and future cancer burden and its economic impact. There are indeed opportunities for significantly dropping the growing burden through the use of resource level interventions including vaccination for liver and cervical cancers, tobacco control policies, low-tech early detection methods for cervical cancers, and palliative care. Achieving this requires joint efforts among private and government public health agencies, the health industries and donors (Nations, 2011).

Strategies to make controlled drugs and for that matter morphine to be readily available and accessible might include:

1. evaluate legislation and its subsequent amendment
2. scheduling for improved availability, through developing good annual estimates and statistics (and submitting them to the INCB)
3. integrating access to controlled medicines into health and disease control policies
4. establishing adequate services where patients can obtain rational treatment without interruption
5. education of healthcare professionals and the general public (P. Sorge et al., 2011).

The observations made about the increasing trends in cancer cases in low- and middle- income countries like Ghana are associated with risk factors such as physical inactivity, tobacco use or smoke, unhealthy diets, harmful use of alcohol use.

Therefore healthy lifestyle programs and activities as well as public health actions by governments and health professionals can be done or implemented to prevent the increasing cancer cases. In Ghana, modernization and urbanization lifestyle of the populace is attributable to the trends in incidence of cancer cases.

It's also been observed that diagnoses of these cancer cases are usually seen at the advanced stages and pain relief is often the only choice. This is as a result of limited resources such as of low tech detection methods, diagnostic equipments, inadequate tobacco control policies and the need of awareness among policy makers, health professionals and the whole public. More research can however be done to address these areas. Preventive measures such as adequate availability of Morphine for pain managements, vaccinations, use of early detection methods, tobacco control, education among health workers and the public must be highly considered among the health ministry (Vento et al, 2013).

CHAPTER THREE

METHODOLOGY

3.1 Study design

A descriptive cross-sectional study was conducted to determine trends in cancer cases that had been reported at KBTH as well as their age and sex distribution patterns from 2011 to 2015. Additionally, the rate of morphine prescribed in the folders of cancer patients who had reported at KBTH was assessed from 2011 to 2015. This was done through the extraction of data from the Cancer registry and the folders of cancer patients who had been managed at the National Centre for Radiotherapy and Nuclear Medicine, KBTH. The relationship between the rate of morphine prescriptions and the number of cancer cases as well as the type of cancer cases managed at the centre was determined and described.

3.2 Study Area

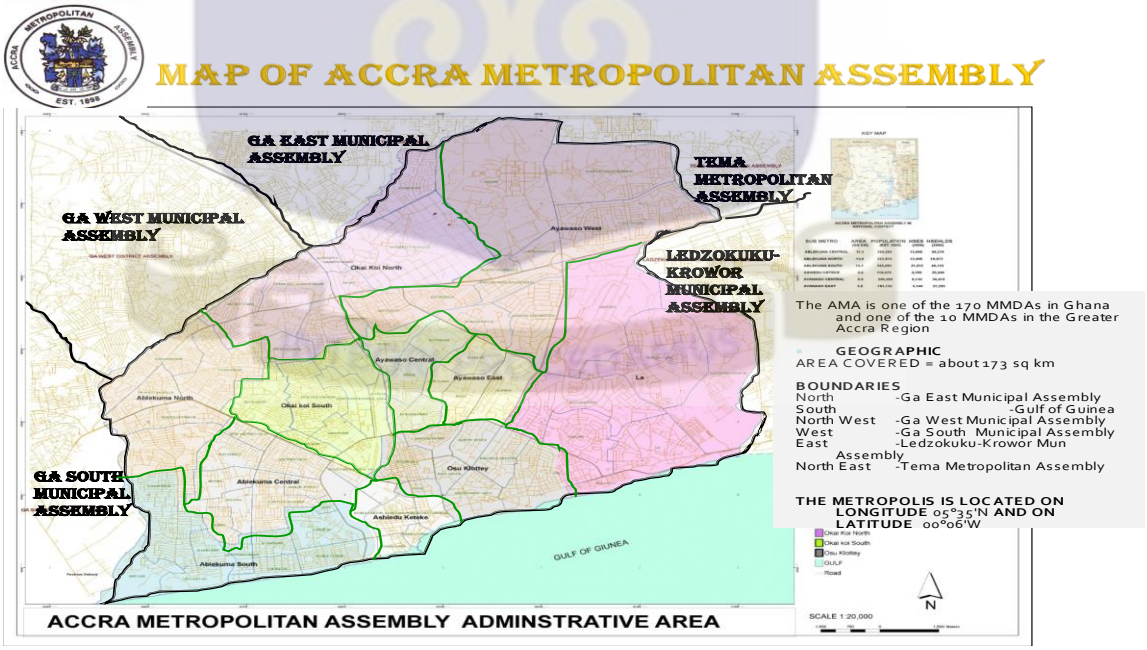


Figure 3- : Map of Accra Metropolitan Assembly showing the municipal assemblies and sub metros

The study was carried out at the National Centre for Radiotherapy and Nuclear Medicine unit of the Korle-Bu Teaching Hospital. Korle Bu Teaching Hospital (KBTH) located within the Accra Metropolitan Assembly had been known to be the national referral centre in Ghana and the 3rd largest hospital in Africa. It had over 2000 beds, 21 clinical and diagnostic Departments and three Centres namely; Reconstructive Plastic Surgery and Burns Centre, the National Cardiothoracic Centre and the National Centre for Radiotherapy and Nuclear Medicine.

The National Centre for Radiotherapy and Nuclear Medicine is the centre that caters for the management of cancer and made up of the Radiotherapy and Oncology departments. The centre managed solid tumors, benign tumors with ionizing radiation and chemotherapy. The records/statistics section of the radiotherapy department where study data was retrieved operated by keeping and recording all cancer cases reported at the department. The total staff strength was 60 consisting of doctors, nurses, therapy radiographers, oncologists and biomedical scientists.

3.3 Variables

Table 2: Description of variables

Variables	Operational definitions	Type of variable/Possible values
Dependent variable		
Morphine Use	Referred to a cancer patient who had been prescribed with morphine in his/her folder.	Categorical nominal Value: Free test
Independent Variables		
Age	referred to the current age of the cancer patient who had reported for treatments and been given morphine prescriptions or any other medication for pain management	Quantitative continuous
Sex	Sex of the patient that had been written in the patient's folder	Categorical dichotomous Values: M (Male) or F (Female)
Type of cancer (Diagnosis)	Referred to the particular or kind of cancer diagnosed for a patient in consultation with a Physician and written in the patient's folder.	Categorical nominal Value: Free test
Stage of cancer (Stage 0, Stage 1, Stage 2, Stage 3 and Stage 4)	Referred to the level of the type of cancer (diagnosed in a patient) which had spread from the place where it started. Only Stage 0 referred to cancer in the original place where it had not yet spread.	Categorical nominal Value: Free test
Other medication	Referred to any other drug (for pain management) other than morphine that had been prescribed for a cancer patient.	Categorical nominal Value: Free test
Year of visit	Referred to the particular year a cancer patient was present at the National Centre for Radiotherapy and Nuclear Medicine (KBTH) for treatment.	Quantitative continuous

3.4 Study Population

The study population was made up of all cancer patients who had been managed at the National Centre for Radiotherapy and Nuclear Medicine (KBTH) during the period 2011 to 2015.

3.5 Sampling

3.5.1 Sampling Size

A total of 1000 records of patients who received treatment during the period under review (2011 to 2015) were reviewed. The estimated number of patients who visited the National Centre for Radiotherapy and Nuclear Medicine (KBTH) during the period 2011 to 2015 was 5961. However, due to limited time constraints a total of 1078 records could not be reviewed, hence the 1000 records reviewed was to include missing data and inconsistencies in recording of information from the records or folders.

Using the Cochran formula (Cochran,W.G 2007 Sampling techniques):

$$n = \frac{Z_{1-\alpha/2}^2\, p\,(1-p)}{d^2},$$

Where:

n: sample size

p: estimated proportion of cancer cases for 1 year (In previous 2013 study 1,118 patients were treated hence an approximated 1,078 patients records were to be reviewed)

Absolute error, d=5%,

$Z_{1-\alpha/2}$=1.96 since α=5%

Confidence interval=95%

(Elr)Expected loss ratio is 10%

3.5.2 Sampling Method

Simple random sampling technique was used in this study. The set of random numbers was generated using Microsoft Excel (between 1-1000) and duplicated numbers were removed. The first 200 unique numbers generated was selected and used to identify the corresponding patient folders for one particular year. The generated numbers matched the number of digits for each patient's record number. This procedure was repeated for the rest of annual records that is from 2011-2015 which were to be reviewed. Data was extracted from the annual case folders of cancer patients that had been managed at the centre during the period 2011-2015. A total sample size of 1,000 of the cancer patient's folders was selected.

3.5.2.1 Inclusion criteria

All cancer cases that reported at the National Centre for Radiotherapy and Nuclear Medicine (KBTH) during the period 2011-2015 were included.

3.5.2.2 Exclusion Criteria

All cancer cases that reported to the National Centre for Radiotherapy and Nuclear Medicine (KBTH) during the period 2011-2015 but upon examination could not detect the existence of any tumour were excluded.

3.6 Data Collection Techniques & Tools

The data collection was a secondary data based hence a data extraction form was used to obtain the information from the folders of the cancer patients and the cancer registry. In each selected folder, the year of visit, age and sex of the cancer patients with their corresponding type of cancer was recorded. The prescribed dose of

morphine and other medications written at each specific stage of the diagnosed cancer was reviewed and recorded from the folder. The total number of cancer cases reported at the centre during the period 2011-2015 was reviewed and recorded from the cancer registry. It was done by recording the total number of cancer cases the cancer registry captured for each year.

For each day, the extraction of data from a selected folder was reviewed by recording the patient's sex, age and the year of visit to the centre. This information was entered into the data extraction form and was followed by identifying the patient's diagnosis of the type of cancer and the related stage (s) within the year it was managed. The prescription of morphine and its dose was also captured throughout the patient's treatment at the centre for that particular year. Any other medication written for treatment for the patient was finally recorded. All entry of data or information was done using the data extraction form.

3.7 Quality Control

Research assistants with previous experience in a similar survey were recruited and trained to ensure consistency and reliability of the data collected. Data collected was checked daily to ensure that all information have been properly collected and recorded. Data collected which seemed invalid for the study was excluded for inconsistencies or incompleteness and was kept for discussion in the final report. Double data entry was done to ensure that the right information had been entered.

3.8 Data Processing and Analysis

3.8.1 Data processing

All detailed information from the data extraction forms which were gathered from the folders of the cancer patients regarding, the year of visit, age, sex of the patient with their corresponding type of cancer diagnosed, prescribed dose of morphine and other medications was also entered into excel 2013 for analysis. Double data entry was done to avoid any errors which could result in wrong data analysis.

3.8.2 Data analysis

Data was analyzed using STATA version 13 and Excel 2013. All the data entered in excel 2013 was imported into STATA Version 13 Software. In the descriptive statistics, categorical variables were summarised as frequencies, percentages and cross tabulations were done. Socio-demographic data i.e. age was grouped into 3 categories: 0-20 years, 21-41years and >41 years as well as sex collected, were used to give a general description of the distribution of the reported cancer cases using percentages. Graphs were used to describe the trends of the reported cancer cases and the rate of the morphine prescriptions from 2011 to 2015. Determination of factors significantly associated with the dependent variable i.e. morphine prescriptions and the independent variables including the types of cancers diagnosed, stages of cancer, year of visits, other medications was done using Pearson Chi-square test and logistic regression (bivariate and multivariate analyses). The difference was considered statistically significant if P-value was less than 0.05. The measure of association was the Odds Ratio with the corresponding 95% Confidence Interval.

3.9 Ethical Issues

Ethical clearance was obtained from the Ethical Review Committee of the Ghana Health Service, the KBTH -Scientific and Technical Committee (STC) as well as the KBTH-Institutional Review Board (IRB). An Introductory letter from the Epidemiology and Disease Control Department, of the SPH-UG was also sent to the National Centre for Radiotherapy and Nuclear Medicine- KBTH for access to the folders of the patients.

Privacy

Confidentiality and anonymity was observed when data was being handled. Due to confidentiality in handling folders of the cancer patient, folders was reviewed at the research office of the centre.

Data storage and usage

Folders were returned to the records unit immediately data had been extracted and filed appropriately, this was to allow for easy identification. The data extraction forms were kept under lock and key. Objectivity was used when reporting results. Misrepresentation and plagiarism was not entertained in reporting results. All information obtained was accessible only to the research team and well protected and not available to a third party.

Consenting process

Individual informed consent from patients was not obtained in this secondary data collection process.

Voluntary Participation/withdrawal

Folders of patients who reported at the centre (KBTH) from 2011 to 2015 was used hence no voluntary participation or withdrawal due to uncomforting situation of a participant at any time was to affect this study in any way.

Compensation

Folders of patients was used hence no compensation was assured due to non-involvement of voluntary participants**.**

Declaration of conflict of interest

There was no conflict of interest as the study was funded solely by the Principal Investigator.

3.9 Training

A two day training session for the research assistants was organised. The aim of the training was to equip them with the pre-requisite skills needed to perform their task. The training was organised by the researcher. The content of the training included discussions of the purpose of the study, ethical issues and data collection using the data extraction forms.

CHAPTER FOUR

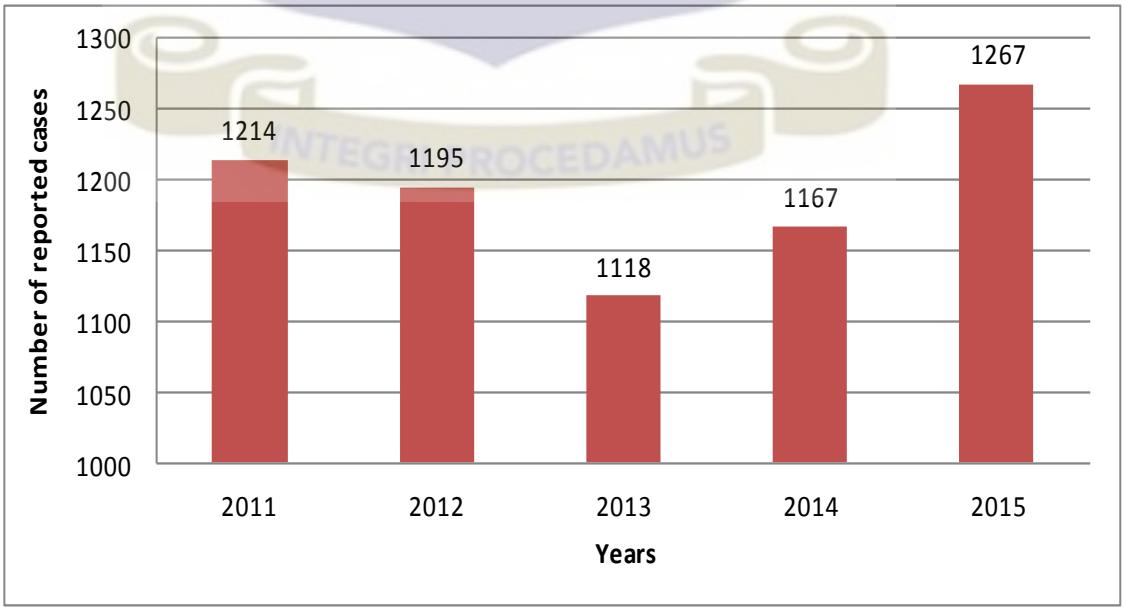
RESULTS

4.1 Reported cancer cases at the KBTH

The total number of cancer patients which visited the National Radiotherapy and Nuclear Medicine Centre of the Korle-Bu Teaching hospital over the 5 year period were captured from the cancer registry. For the year 2011- 1,214 patients were recorded, then for year 2012 - 1,195 patients were seen, also in the year 2013 -1,118 patients were captured whilst in year 2014 - 1,167 patients were recorded then lastly, for the year 2015 -1,267 patients were recorded.

Figure 4. Shows trends in reported cancer cases in each year over the 5 year period. The highest number of cases 1267 was recorded in 2015 whilst the lowest cases 1118 were recorded in 2013. There was a decline in the reported cases from 2011 to 2013 but began to increase from 2014 to 2015. The sharpest decrease in cases began from 2012 to 2013 whilst the sharpest increase was from 2014 to 2015.

Figure 4- Reported cancer cases at the National Radiotherapy and Nuclear Medicine centre-KBTH from 2011 to 2015.



4.2 Age distribution of reported cancer cases for KBTH

Out of the 1000 folders that were randomly sampled from the total of 5961 reported cancer cases reviewed from 2011 to 2015, the minimum and maximum ages of these cancer cases were one and 95 years respectively with a mean of 52.34 years and standard deviation of 16.65 (Table 3).

Table 3 - Total reported cancer cases stratified according to the age categories.

Age group (Yrs)	Years of the reported cancer cases				
	2011	**2012**	**2013**	**2014**	**2015**
0-20yrs	9	6	7	8	11
21-41yrs	51	28	42	42	34
>41yrs	140	166	151	150	155
Total	**200**	**200**	**200**	**200**	**200**

The age group with the most reported cases was the >41yrs. This age category began to increase from 140 in 2011 to 166 in 2012 and began declining from 151 in 2013 to 150 in 2014 but began to increase to 155 in 2015. The second most reported cases occurred in the age group between 21-41yrs. It had a highest record of cancer cases of 51 in 2011 but declined sharply to 28 in 2012. However, it began to increase to 42 in 2013 where it maintained the same steady level till 2014 and dropped sharply to 34 in 2015. Finally, the least reported cases occurred in the age category of 0-20yrs, which had 9 cases reported in 2011 and then decreased sharply to 6 in 2012. It began to increase from 7 in 2013 to 11 in 2015.

Table 4- Sex distribution of reported cancer cases at KBTH

AGE	GENDER		TOTAL
	Male	Female	
0-20yrs	19	22	**41**
21-41yrs	54	143	**197**
>41yrs	259	503	**762**
TOTAL	**332**	**668**	**1000**

From table 4, out of the total 1000 folders reviewed, 33.2% were made up of males and 66.8% of females. In all the three age groups, females formed the highest number of patients who had reported cancer over the period under review.

4.3 Per capita morphine consumption of reported cancer cases at KBTH

Figure 5 – Per capita morphine consumption of cancer reported cases from 2011 to 2015

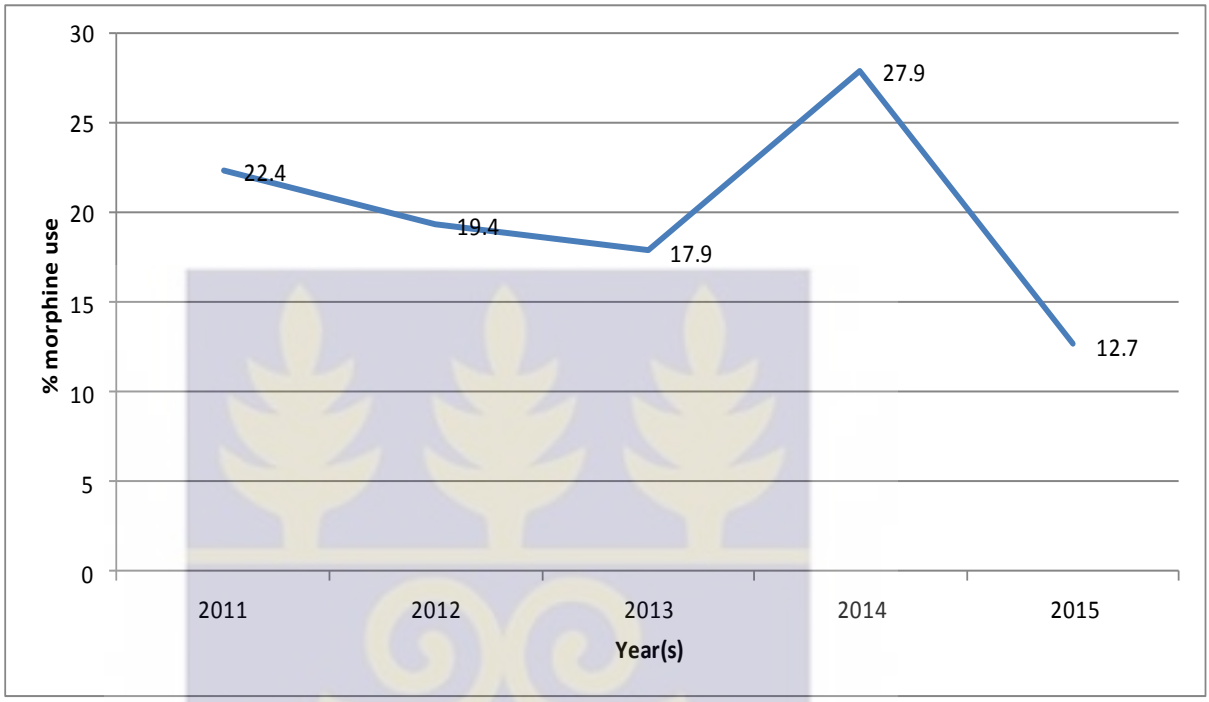


Figure 5 shows trends in per capita morphine consumption of reported cancer cases at the National Radiotherapy and Nuclear Medicine Centre of the Korle-Bu Teaching hospital over the 5 year period. A steady decline is seen in the prevalence of morphine use from 22.4% in 2011 to 17.9% in 2013 but there was a sharp increase to 27.9% in 2014 which represents a higher prevalence of morphine use for that particular year. However, it dropped sharply to 12.7% in 2015 representing the lowest percentage in the prevalence of morphine use during the whole 5 year period.

Table 5- Per capita morphine consumption for various types of cancer from 2011 to 2015

Type of Cancer	Morphine use		Total
	Frequency	Percentage	
Breast	35	13.21	265
Head & Neck	19	13.38	142
Others	16	17.39	92
Rectum & Colon	12	19.67	61
Cervix	9	5.63	160
Prostate	9	7.44	121
Gastric & Stomach	8	32.00	25
Ovary & Uterus	7	9.46	74
Bladder	6	50.00	12
Multiple Myeloma	5	45.45	11
Vulva & Vagina	4	40.00	10
Lung	2	33.33	6
Kidney & Wilms	2	11.76	17
General Sarcoma	0	0.00	2
Pancreas	0	0.00	2
Total	134	13.40	1000

Pearson chi2 (14) = 56.2259 Pr=0.001

In Table 5, per capita of morphine consumption is presented for the various types of cancer cases for both sexes seen at the Centre over the 5 year period (i.e. 2011-2015). Breast cancer cases recorded the higher prevalence of morphine use, followed by Head & Neck cancers. Other(s) cancers including Rectum & Colon also showed some

higher prevalence of morphine use over the 5 year period. General Sarcoma's and Pancreas cancers had no records of the prevalence of morphine use whiles Lung, Kidney & Wilms cancers had a lower prevalence of morphine use for the period under review.

Tables 6 and 7, show the relationship between morphine use and the socio demographic characteristics of the patients, the stage and type of cancers. These reached significance of morphine use for the various stages and types of cancers that presented at the Centre. The multivariate analyses show an increased tendency of morphine treatment during Stages 3 and 4 of the cancer (Odds Ratio (OR) =7.87, 95% confidence interval (CI):1.05, 58.99 and Odds Ratio (OR) =20.40, 95% confidence interval (CI):2.72, 152.80) (Table 7).

From table 7, the adjusted odds ratio analyses showed that holding all other variables in the model constant, the odds of morphine being prescribed for a multiple myeloma cancer patient was 5.5 times more compared to a patient suffering from breast cancer.

Table 6- Logistic regression: The effect of morphine use on the various types of cancer and stages of cancer (Unadjusted odds ratio)

Independent variables	n	Morphine Use		OR	95% CI	P value
		Frequency	Percentage			
Gender/Sex						
Male	334	52	38.81	Ref		
Female	666	82	61.19	0.76	0.52-1.11	0.155
Age in Years						
0-20	41	3	2.24	Ref		
21-41	197	29	21.64	2.19	0.633-7.554	0.216
> 41	762	102	76.12	1.96	0.593-26.459	0.270
Stage of Cancer						
1	59	1	0.84	Ref		
2	257	14	11.76	3.34	0.431-25.928	0.248
3	301	41	34.45	9.15	1.233-67.855	0.030*
4	201	63	52.94	26.48	3.587-195.478	0.001*
Type of Cancer						
Breast	265	35	26.12	Ref		
Cervix	160	9	6.72	0.39	0.183-0.838	0.016*
Prostate	121	9	6.72	0.53	0.245-1.137	0.103
Head & Neck	142	19	14.18	1.02	0.557-1.849	0.961
Ovary & Uterus	74	7	5.22	0.69	0.292-1.616	0.389
Rectum & Colon	61	12	8.96	1.61	0.780-3.321	1.198
Lung	6	2	1.49	3.29	0.580-18.612	0.179
Multiple Myeloma	11	5	3.73	5.48	1.586-18.904	0.009*
General Sarcoma	2	0	0.00	1		
Bladder	12	6	4.48	6.57	2.007-21.518	0.002*
Pancreas	2	0	0.00	1		
Kidney & Wilms	17	2	1.49	0.88	0.192-3.999	0.864
Gastric & Stomach	25	8	5.97	3.09	1.242-7.702	0.015*
Vulva & Vagina	10	4	2.99	4.38	1.177-16.305	0.028*
Others	92	16	11.94	1.38	0.107-0.217	0.325

Key: Ref, reference; OR, Odds ratio; CI, Confidence interval; * means p value is significant ($p<0.05$) and n is the total number of cancer patients.

Table 7: Logistic regression: The effect of morphine use on the various types of cancer and stages of cancer (Adjusted odds ratio)

Independent variables	n	Morphine Use		OR	95% CI	P value
		Frequency	Percentage			
Gender						
Male	334	52	38.81	Ref		
Female	666	82	61.19	1.039	0.568-1.899	0.902
Age in Years						
0-20	41	3	2.24	Ref		
21-41	197	29	21.64	1.46	0.334-6.401	0.614
> 41	762	102	76.12	1.32	0.317-5.492	0.704
Stage of Cancer						
1	59	1	0.84	Ref		
2	257	14	11.76	2.95	0.376-23.157	0.304
3	301	41	34.45	7.87	1.049-58.999	0.045*
4	201	63	52.94	20.40	2.721-152.801	0.003*
Type of Cancer						
Breast	265	35	26.12	Ref		
Cervix	160	9	6.72	0.49	0.225-1.087	0.080
Prostate	121	9	6.72	0.73	0.267-1.982	0.533
Head & Neck	142	19	14.18	0.92	0.426-1.999	0.961
Ovary & Uterus	74	7	5.22	0.74	0.303-1.829	0.520
Rectum & Colon	61	12	8.96	1.57	0.674-3.660	0.296
Lung	6	2	1.49	1.63	0.251-10.550	0.609
Multiple Myeloma	11	5	3.73	5.48	1.265-24.726	0.023*
General Sarcoma	2	0	0.00	1		
Bladder	12	6	4.48	6.57	2.007-21.518	0.274
Pancreas	2	0	0.00	1		
Kidney & Wilms	17	2	1.49	0.84	0.149-4.735	0.844
Gastric & Stomach	25	8	5.97	2.49	0.825-7.520	0.105
Vulva & Vagina	10	4	2.99	4.82	1.177-16.305	0.052
Others	92	16	11.94	1.59	0.660-3.812	0.302

Key: Ref, reference; OR, Odds ratio; CI, Confidence interval; * means p value is significant ($p<0.05$) and n is the total number of cancer patients.

CHAPTER FIVE

DISCUSSION

The current study was undertaken to describe the trends of cancer cases and morphine prescriptions reported at the National Radiotherapy and Nuclear Medicine Centre of the Korle-Bu Teaching hospital from 2011 to 2015. A total of 1000 records of cancer patients were reviewed with breast (26.5%) and cervical (16%) cancers being the most diagnosed cancers, while lung (0.6%) cancers were found to be among the least diagnosed cancers.

According to the 2012 Global Burden of Cancer Study (GLOBOCAN), approximately 16,000 cases of cancer occur annually in Ghana, with the five most common diagnosed cancers consisting of the liver, breast, cervix, prostate, and stomach cancers (Stefan et al., 2013). During this study, the Centre recorded at most 1,I95 cancer cases in a year i.e 2012.This represented approximately 7% of cancer cases occurring at the Nuclear Radiotherapy and Nuclear Medicine Centre of KBTH alone, out from the approximated 16,000 (100%) cancer cases GLOBOCAN reported to be occurring annually at the oncology centres in Ghana (Stefan et al., 2013).

Additionally, WHO 2014 cancer profile indicated that Ghana recorded 10,600 new cases of cancer in that year alone. This pre-supposes that the 1,167 cancer cases recorded in 2014 at the National Radiotherapy and Nuclear Medicine Centre of the Korle-Bu Teaching represents 11% out of the total 10,600 (100%) cases recorded by the WHO 2014 cancer profile report in Ghana. The year gap between the two reports i.e GLOBOCAN 2012 report and WHO 2014 cancer profile has shown a decrease in the incidence of reported cancer cases recorded in Ghana.

However from this study, there seem to be sharp increase of the reported cancer cases from 2014 to 2015 and this might be attributable to some risk factors which the study could not consider.

Also from this study, out of the 1000 cancer folders reviewed, the most common diagnosed cancers seen among the females at the Centre were breast (25.3%), cervical (16%) and ovary & uterus (7.4%) cancers. Amongst the males, prostate cancer was seen to be the most commonly diagnosed and it was recorded to be 12.1%. Interestingly among the males, 1.2% of them were also diagnosed with breast cancer. Generally, the five most commonly diagnosed cancers seen for both sexes in this study were head & neck (14.2%), others i.e the rare cancers (9.2%), rectum & colon (6.1%), kidney & wilms (1.7%) and bladder (1.2%).

Additionally, this study showed that females reported more cases of breast cancer has compared to the literature that more African women had been noted to have the greatest incidence rate of breast cancer in the region. The literature also indicated that it could be attributed probably due to elevated prevalence of reproductive risk factors with early menarche and late childbearing (Jemal et al., 2012). However in this study, the possible risk factors that could have attributed to this finding were not considered.

With regards to the age group from this study, most of the patients diagnosed with cancer fell within the ages of 41 to 95years. The highest numbers of this age group were recorded in 2012. The sharp increasing trend of reported cancer cases from 2014 to 2015 was also seen to have increased from 2014 to 2015 in this same age group category (i.e >41).

From one study it was revealed that the populace of Africa between 2010 and 2030 is anticipated to increase by 50% overall i.e. from 1.03 billion to 1.52 billion. During

this period, about 90% of the aged i.e. 60 years and over (usually the prime age cancer most frequently occurs) would have recorded new cases of cancer ranging from 55 million to 105 million (Jemal et al., 2012).

From this study, it was observed that majority of the cancer cases reported were diagnosed in more females as compared to males.

Also from the study, majority of the cases reported at the advanced stages, the highest being at Stage 3 (36.80%, 301/818) followed by Stage 2 (31.42%, 257/818) then to Stage 4 (24.57%, 201/818). Staging helps physicians to know the prognosis and the right kind of treatment to be given to the patients ("US National Cancer Institute," 2004).

Morphine, the WHO recommended opioid analgesic in the management of cancer cases was prescribed to these patients. This relieves moderate to severe pains in these patients so they can have better lives free from pain.

The current study revealed that the tendency of cancer patients being treated with morphine at Stages 3 and 4 was very significant ($P<0.05$). This showed that morphine was more prescribed to the patients who had been diagnosed at the advanced stages of their cancers.

However, there was no effect of significance for morphine use on the sex of the cancer patients either being a male or female and also the age of the cancer patients (socio-demographic factors) under the 5 year period.

The trend of the per capita morphine consumption in the study indicated that 2014 recorded the highest number of morphine consumption among the diagnosed cancer patients and the least recorded in 2015.

From the current study, the per capita morphine consumption among the reported cancer patients over the 5 year review was virtually low yet literature revealed that

from 2010 to 2013, the records of morphine consumption rose from 0.071mg/capita to 0.1383mg/capita in Ghana. This shows an increment in the use of morphine in the management of pain for patients (Group, 2015). But the current study showed a low prevalence of morphine use among cancer patients from 22.4% in 2011 to 17.9% in 2013.

Patients with advanced stages of cancer were more likely have a significant effect on morphine use for the treatment of pain ($P<0.05$). This is because those stages are usually the period in which patients sought for care at the hospital. Usually during these stages, it turns out to be the terminal stage where pain managements are fairly the last resort to manage after they undergo surgery, chemotherapy or radiotherapy till they die.

From literature, Ghana was seen to have a bit higher consumption compared to the other neighbouring countries in West Africa (Helena & Rica, 2015). However from this study, there is more room for physicians to be prescribing morphine to patients suffering from cancer.

Furthermore, per capita morphine consumption at the Centre was generally low except in 2014 which shot up higher than the rest of the years. The possible reason for the high peak in 2014 was that, Stage 4 was recorded more in 2014 (27.86%, 56/163) compared to the other years. Hence, the possibility of patients complaining of severe pain could be responsible for the high peak. Even though the highest records of Stage 3 was seen in 2015 (25.25%, 76/185), it had the least per capita morphine consumptions. Other possible factors which could affect this result could be that, during that particular year, the pharmacy might have had inadequate stocks available. This was because some of the patient folders had comments written as, “morphine run

out of stock". Literature revealed that the rate of prescriptions made by Korle Bu doctors alone for all medicines in general was 2000 prescription per day, making KBTH probably the single largest provider in terms of prescription volume in Ghana (Seiter et al., 2009). Analysis from the current study revealed that morphine prescriptions usually given by doctors at the National Radiotherapy and Nuclear Medicine Centre of the Korle-Bu Teaching hospital were generally low.

5.1 Limitations

The legibility of some of the physicians' writings in the patient folders was difficult during the review. This resulted in the inadequacy of extracting the relevant information into the data extraction form. Hence there was incompleteness of data in some of the data extraction forms and resulted as missing numbers during analysis therefore a limitation to the study. There were 182 cancer patient folders that did not have the stages of their cancers stated in the folders.

Another limitation was as a result of time constraints, data collection for the original sample size was reduced from 1078 folders to 1000 folders. This could have altered the results either by increasing or decreasing, therefore was a limitation to the study.

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.1 CONCLUSION

A retrospective cross-sectional study was undertaken to describe the trends in cancer cases and morphine prescriptions at the National Radiotherapy and Nuclear Medicine Centre of the Korle-Bu Teaching hospital between 2011 and 2015. The cancer cases reviewed from 2011 to 2013 basically declined but the trend from 2014 to 2015 rather began increasing which could indicate that the burden of cancer might be increasing more and more for some years to come. The most common diagnosed cancers detected were breast, cervix, head & neck, prostate, rectum & colon, gastric & stomach, ovary & uterus, multiple myeloma, bladder, lung, vulva & vagina, kidney & wilms and others. The age group most of these cases were diagnosed from was those above age 41 years. This really points a public health challenge for the reproductive ages and the aged as a whole. The next age group of concern was those who fell between 21 to 41 years and followed by 0 to 20 years.

The trend in per capita morphine consumptions from 2011 to 2015 showed that there was a low prevalence of morphine use among cancer patients. This ranged from 22.4% at the beginning of the study to 13% at the end of the study. The year 2014 only showed a high peak of morphine use among the patients and declined sharply in 2015 resulting to be the lowest rate of the morphine consumption. Generally, there was a low rate of morphine prescriptions at the National Radiotherapy and Nuclear Medicine Centre, KBTH. There is a significant effect of morphine to be prescribed for diagnosed cancers at their advanced stages. The findings from this study show the need to increase the use of morphine among cancer patients to relieve them of pain.

This is because most of the cases presented at the health facility were at their advanced stages.

6.2 RECOMMENDATIONS

To National Radiotherapy and Nuclear Medicine Centre-KBTH:

1. There should be an increase in prescription and usage of morphine in the advanced stages of cancer cases.

To the Ministry of Health:

2. Adequate training must be given to qualified health personnel in pain management of cancer patients especially in the prescriptions of morphine.

To Research Institutions:

3. More research should be conducted to establish reasons for the low rate of morphine prescriptions at KBTH where there seem to be an increasing trend in cancer cases.

REFERENCES

Parala-Metz A. and Davis M., 'Cancer Pain clevelandclinic Center for continuing education. (n.d.)'.

Cancer Pain clevelandclinic Center for continuing education. (n.d.).

cancer pain relief WHO 2nd edition.pdf. (n.d.).

Cleary, J., Powell, R. A., Munene, G., Luyirika, E., Kiyange, F., Merriman, A., … Cherny, N. I. (2013). research article Formulary availability and regulatory barriers to accessibility of opioids for cancer pain in Africa : a report from the Global Opioid Policy Initiative (GOPI) research article, *24*(Supplement 11). http://doi.org/10.1093/annonc/mdt499

Cochran, W. G. (2007). Sampling Techniques. *Technometrics*. http://doi.org/10.2307/1268167

Évaluations, T. a, & Cuadro, a. (2013). Annex II . Estimated requirements of narcotic drugs Annexe II . Évaluations des besoins Anexo II . Previsiones de las necesidades de estupefacients, 2008–2013.

Frcpc, M. S. S., Kattan, M., Frcpc, M., & Frcpc, D. E. M. (2014). Initial pain management plans in response to severe pain indicators on oncology clinic previsit questionnaires, *19*(6), 309–312.

Führungskräfte - Monitor 2015. (2015).

Ghana Essential Medicines list. (2010).

Group, P. S. (2015). 2013 AFRO Consumption of Morphine (mg / capita) 2013

AFRO Regional Morphine Consumption (mg / capita):

Helena, S., & Rica, C. (2015). 2013 Global Consumption of Morphine (mg / capita) Global Morphine Consumption , 2013 : (mg / capita).

Jemal, A., Bray, F., Forman, D., O'Brien, M., Ferlay, J., Center, M., & Parkin, D. M. (2012). Cancer burden in Africa and opportunities for prevention. *Cancer*, *118*(18), 4372–4384. http://doi.org/10.1002/cncr.27410

Kingham, T. P., Alatise, O. I., Vanderpuye, V., Casper, C., Abantanga, F. a, Kamara, T. B., … Denny, L. (2013). Treatment of cancer in sub-Saharan Africa. *The Lancet Oncology*, *14*(4), e158–e167. http://doi.org/http://dx.doi.org/10.1016/S1470-2045(12)70472-2

Medicine, P. (2004). Editorial The World Health Organization three-step analgesic ladder comes of age, 175–176.

Ministry of Health and GHS, G. (2012). REPUBLIC OF GHANA Strategy for the Management , Prevention and Control of Chronic Non- Communicable Diseases in Ghana.

National Cancer Institute-NIH. (2010). What Is Cancer?, http://www.cancer.gov/cancertopics/cancerlibrary/w. Retrieved from http://www.cancer.gov/cancertopics/cancerlibrary/what-is-cancer

Nations, U. (2011). Ensuring balance in national policies on controlled substances, *2010*(January), 1–8.

O'Brien, M., Mwangi-Powell, F., Adewole, I. F., Soyannwo, O., Amandua, J., Ogaja,

E., … Merriman, A. (2013). Improving access to analgesic drugs for patients with cancer in sub-Saharan Africa. *The Lancet Oncology*, *14*(4), e176–e182. http://doi.org/10.1016/S1470-2045(12)70343-1

P, S. N., Sorge, L., & Scholten, W. (2011). WHO ' s Efforts to Improve Availability and Accessibility of Controlled Medicines , Including Opioid Analgesics , Around the World, 2011.

Pain & Pain Studies group, U. of W. (n.d.). 2011 Global National opioid consumption data.

Profile, C. (2011). Pharmaceutical Country Profile Netherlands. Retrieved from http://www.who.int/medicines/areas/coordination/netherlands_pharmaceutical_profile.pdf

Seiter, A., Bank, W., Gyansa-lutterodt, M., & Drugs, N. (2009). Policy Note : The Pharmaceutical Sector in Ghana November 2009, (November), 1–36.

Society, A. & I. cancer. (2010). What is cancer ? *Cancer*, (011355).

Stefan, D. C., Elzawawy, A. M., Khaled, H. M., Ntaganda, F., Asiimwe, A., Addai, B. W., … Adewole, I. F. (2013). Developing cancer control plans in Africa: Examples from five countries. *The Lancet Oncology*, *14*(4), e189–e195. http://doi.org/10.1016/S1470-2045(13)70100-1

United Nations Children's Fund-World Health Organization- report. (2012). *Child Malnutrition*. Geneva.

US National Cancer Institute. (2004).

Vento, S. (2013). Cancer control in Africa: which priorities? *The Lancet Oncology*, *14*(4), 277–279. http://doi.org/10.1016/S1470-2045(13)70022-6

Who. (2014). World cancer factsheet. *World Health Organization*, *2012*(2012), 4. http://doi.org/10.1002/ijc.27711.

WHO, cancer pain relief experts 2ND E. (2014). Cancer pain relief. *Cancer Pain Relief*. Retrieved from papers://d30f2a22-a1cf-4822-9292-0ad49fba75fc/Paper/p1288

APPENDICES

Appendix A: Data extraction form

DATA EXTRACTION FORM/TOOL FOR STUDY ON MORPHINE PRESCRIPTION AND TRENDS OF REPORTED CANCER CASES AT THE NATIONAL CENTRE FOR RADIOTHERAPY AND NUCLEAR MEDICINE-KBTH, ACCRA.

Form number:

Date:

Extraction and validated by:

Name of department:

Folder number						
Code						
Age of patient						
Sex						
Year of Visit						
Type of cancer						
Stage of cancer (0,1,2,3,4)						
Morphine prescribed						
Dosage						
Other medications Prescribed						

Appendix B: Ghana Health Service Ethical Clearance Approval

GHANA HEALTH SERVICE ETHICS REVIEW COMMITTEE

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

My Ref. GHS/RDD/ERC/Admin/App/
Your Ref. No.

Research & Development Division
Ghana Health Service
P. O. Box MB 190
Accra
Tel: +233-302-681109
Fax + 233-302-685424
Email: Hannah. Frimpong@ghsmail.org

Amankwah Marfo Juliana
University of Ghana
School of Public Health
Legon, Accra

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

GHS-ERC Number	**GHS-ERC 10/12/15**
Project Title	"Trends in Cancer Cases and Morphine Prescriptions at the Korle-Bu Teaching Hospital: 2011-2015"
Approval Date	18th April, 2016
Expiry Date	17th April, 2017
GHS-ERC Decision	**Approved**

This approval requires the following from the Principal Investigator

- Submission of yearly progress report of the study to the Ethics Review Committee (ERC)
- Renewal of ethical approval if the study lasts for more than 12 months,
- Reporting of all serious adverse events related to this study to the ERC within three days verbally and seven days in writing.
- Submission of a final report **after completion** of the study
- Informing ERC if study cannot be implemented or is discontinued and reasons why
- Informing the ERC and your sponsor (where applicable) before any publication of the research findings.

Please note that any modification of the study without ERC approval of the amendment is invalid.

The ERC may observe or cause to be observed procedures and records of the study during and after implementation.

Kindly 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

Appendix C: Scientific and Technical Committee Approval-KBTH

In case of reply the number
And the date of this
Letter should be quoted
My Ref. No. KBTH/MS/23/16
Your Ref. No.....

KORLE BU TEACHING HOSI
P. O. BOX KB 77,
KORLE BU, ACCRA.

Tel: +233 302 667759/673034-(
Fax: +233 302 667759
Email: Info@kbth.gov.gh
pr@kbth.gov.gh
Website: www.kbth.gov.gh

21st June, 2016

JULIANA AMANKWAH-MARFO
SCHOOL OF PUBLIC HEALTH
UNIVERSITY OF GHANA
LEGON

SCIENTIFIC AND TECHNICAL COMMITTEE APPROVAL
PROTOCOL IDENTIFICATION NUMBER: **KBTH-STC 00017/2016**

The Korle Bu Teaching Hospital Scientific and Technical Committee (KBTH-STC), on 21st June, 2016 approved your submitted study protocol.

TITLE OF PROTOCOL: **"Trends in Cancer Cases and Morphine Presentations at the Korle Bu Teaching Hospital: 2011-2015"**

PRINCIPAL INVESTIGATOR: Juliana Amankwah-Marfo

This approval requires that you **forward your approved document to Korle Bu Teaching Hospital – Institutional Review Board (KBTH-IRB) for the ethical aspect of the proposal to be assessed before the project can be initiated.**

This STC approval is valid till 31st October, 2016.
You may, however, request extension of the approval period, or renewal as the case may be, should the study extend beyond the stated period.

Upon completion, you are required to submit a final report on the study to the STC. This is to enable the STC ensure among others that, the project has been implemented as per the approved protocol. You are also required to inform the KBTH-STC and Research Directorate of any publications that may emanate from the research findings.

Kindly note that, should the need arise, the KBTH-STC or IRB may institute appropriate measures to satisfy itself that study is being conducted according to the highest scientific and ethical standards.

Please note that any modification to the study protocol without Scientific Technical Committee (STC) approval renders this approval invalid.

Sincere regards,

Prof. G. Obeng Adjei
Chairman, KBTH-STC

Cc: The Chairman, KBTH-IRB

Appendix D: Letter of Introduction to the National Radiotherapy and Nuclear Medicine Centre-KBTH

UNIVERSITY OF GHANA
DEPARTMENT OF EPIDEMIOLOGY AND DISEASE CONTROL
SCHOOL OF PUBLIC HEALTH

Ref. No.: *STUD/ID/10552103* 22nd June, 2016

The Director,
National Radiotherapy & Nuclear Medicine Centre,
Korle-Bu Teaching Hospital,
P. O. Box KB77,
Accra, Ghana

Dear Sir,

LETTER OF INTRODUCTION – JULIANA AMANKWAH-MARFO

We wish to introduce to you, ***Juliana Amankwah-Marfo***, a Master of Public Health student in the Department of Epidemiology and Disease Control of the School of Public Health, College of Health Sciences, University of Ghana, Legon.

Mrs. Amankwah-Marfo is conducting her research on ***"Trends in Cancer Cases and Morphine Prescriptions at the Korle-Bu Teaching Hospital: 2011-2015"*** and she is being supervised by **Dr. Francis Anto,** a Senior Lecturer at the School of Public Health.

It will be appreciated if you could provide her with the necessary support to undertake her research work in your institution.

Counting on your cooperation, Sir.

Yours faithfully,

Dr. Patricia Akweongo
Head

CC: School Administrator, SPH
Dr. Francis Anto, SPH

COLLEGE OF HEALTH SCIENCES
P. O. Box LG 13, Legon, Accra, Ghana.
• **Telephone:** +233 (0) 289 109 008 • **Email:** sph-epdc@ug.edu.gh • **Website:** www.publichealth.ug.edu.gh