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AGGRESSIVE PROSTATE CANCER AND ASSOCIATED RISK FACTORS AMONG PATIENTS ATTENDING ONCOLOGY CLINIC AT THE KORLE-BU TEACHING HOSPITAL, ACCRA-GHANA

BY

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DECLARATION

I, **ODURO PHILIP PIYIM** hereby declare that apart from people's knowledge that has been duly acknowledged, this research work is the result of my hard work under competent supervision, and has not been submitted in whole or in part for another degree in this university or another university.

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ODURO PHILIP PIYIM Date

(STUDENT)

…… .....

DR. REGINALD QUANSAH Date

(SUPERVISOR)

DEDICATION

To my God and my parents

ACKNOWLEDGEMENT

Glory be to God almighty for giving me the strength, sagacity, and grace to complete my dissertation. My sincere appreciation goes to my supervisor and my consultant, Dr. Reginald Quansah and Prof Vanderpuye respectively for their guidance, inspiration, and support, may God reward you abundantly. My gratitude goes to my siblings for their financial support and care. I appreciate the warm reception and support from the health workers at the National Radiotherapy Oncology and Nuclear Medicine department of the Korlebu-Bu Teaching Hospital, especially, and the Biostatistics and the record staffs and my research assistants. I am very grateful to the hospital for allowing me to use the facility for the study, I am grateful for your support. To my family and friends, especially Pharm Adjei and Dr. Ntiamoah, thank you for being there for me. God bless you all. This research would have been impossible to undertake without God and the support from you all.

ABSTRACT

Introduction: Prostate cancer is of increasing public health concern and often predisposed by some risk factors such as age, race, family history of cancer, and dietary. It is one of the leading causes of cancer death among men in Ghana. Men diagnosed with prostate cancer are affected sexually, psychologically, socially and in many forms.

Objectives: The main objective of the study is to examine aggressive prostate cancer and associated factors among patients attending the oncology clinic at the Korle-bu Teaching Hospital.

Methods: A facility-based cross-sectional survey involving a target sample size of 130 patients was carried out at the oncology clinic at the Korle-bu Teaching Hospital. A simple random sampling technique was used. Questionnaires were administered to these patients and data on factors associated with aggressive prostate cancer were collected. The analysis involved the use of chi-square tests to describe simple relationships and multiple logistic regression to quantify associations between aggressive prostate cancer and risk factors.

Results: A total of 130 patients were recruited and used for analysis. The mean age of respondents was 67.5 years. The overall prevalence of aggressive cancer (Gleason score>7) among prostate cancer patients was 66.1%. Patients who belonged to the age group above 60 years (AOR = 5.9, 95% CI = 1.6, 21.8, P<0.05), smoke (AOR= 4.3, 95% CI=1.1, 16.5, P-value<0.05), drink alcohol (AOR = 6.5, 95% CI = 1.8, 23.0, P<0.05), and had history of cancer in the family **(**AOR= 4.0, 95% CI=1.1, 14.0, P-value<0.05) were identified to be significant risk factors influencing aggressive prostate cancer.

Conclusion and Recommendation: The study concludes that the aggressive nature of prostate cancer is a serious public health issue that needs major attention in Ghana. The researcher, therefore, recommends that the health promotion unit of the ministry of health, Ghana health service, NGOs, Advocacy groups and all other health agencies should intensify the campaign and create more awareness on prostate cancer screening. This will help pick the disease at the early onset of it to avoid diagnosing all the aggressive prostate cancer patients at an advanced stage which may not give a good prognosis.

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BMI	Body Mass Index
DRE	Digital Rectal Examination
GLOBOCAN	Global Cancer Incidence, Mortality and Prevalence
GS	Gleason Score
HBM	Health Belief Model
HUM	Health Utilization Model
IARC	International Agency for Research on Cancer
ID	Identity
KBTH	Korle-BU Teaching Hospital
MOH	Ministry of Health
OPD	Out Patient Department
PC	Prostate Cancer
PSA	Prostate Specific Antigen
UTI	Urinary Tract Infection
STC	Scientific and Technical Committee
WHO	World Health Organization

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Prostate cancer (PCa) is one of the most significant non-skin cancer male health concerns (Vaidyanathan et al., 2017) worldwide, with at least one in six PCa patients estimated at being at risk of developing aggressive PCa. It remains one of the commonest forms of non-communicable infections ranked as the fourth most common form of cancer among all cancers and the second most prevalent form among men (Wachira et al., 2018). An estimated 1.1 million men worldwide were diagnosed with prostate cancer in 2012 which accounted for 15% of the cancers diagnosed in men and the fifth cause of mortality among men (WHO, 2015). Approximately, 70% of prostate cancer cases occur more in the developed countries with regions such as Australia, New Zealand, and America recording highest proportion of disease (WHO, 2012; Brawley, 2012). Also, approximately 307,500 deaths in 2012 were attributed to prostate cancer thus, making it the fifth leading cause of cancer deaths among men globally (Ferlay et al., 2015). In Africa, prostate cancer is the number one cancer in both incidences and mortality, constituting 40,000 (13%) of all male cancer incidences and 28,000 (11.3%) of all male cancer-associated mortalities (Ferlay et al., 2015). The incidence of prostate cancer is relatively high in South Africa compared to all other Africa countries (Mofolo et al., 2015).

Statistics from Ghana indicate that prostate cancer is the second most common cancer among men next to liver cancer with an incidence of more than 200 cases per 100,000 of the population per year (Yeboah-Asiamah et al., 2017). Mutua, Pertet & Otieno (2017) stated that the incidence of prostate cancer is more frequent among black men

than their white counterpart. This high prevalence of prostate cancer is due to low awareness of prostate cancer screening with a low level of knowledge, low perception of self-vulnerability, and low socioeconomic status (Wachira, Meng'anyi &Mbugua, 2018; Oladimeji et al., 2010; Mutua, Pertet & Otieno, 2017).

Risk factors identified to influence prostate cancer are increasing age (Adeloye et al., 2016), race (Wiredu & Armah, 2006; Lloyd et al., 2015), and previous history of the disease (Yeboah-Asiamah et al., 2017). Reports indicated that the incidence of prostate cancer tends to increase with age. Others have identified obesity and diabetes as risk factors influencing prostate cancer (Zhang & Geng, 2015; Parikesi et al., 2016). Other basic underlying components that connect these risk factors remain lifestyle and nutrition. With progressing age, lifestyle changes; different individuals across various ethnicities enjoy different kinds of lifestyle; and certain families also have very personalized lifestyle factors, such as the amount and kind of meat eaten.

Men with early-onset prostate cancer are more likely to die of their cancer, with higher cause-specific mortality than all others except those diagnosed over age 80. Also, early-onset prostate cancer has been shown to have a more significant genetic component indicating that this group may benefit more than most from the evaluation of genetic risk. Clinically, although the majority of prostate cancer cases $\leq$ 55 years are diagnosed with low-risk disease, their extended life expectancy exposes them to long-term risk of disease progression resulting in death from prostate cancer, but also to prolonged impact from treatment-related morbidities

1.2 Problem Statement

Prostate cancer is a global public health issue relating to men (Vaidyanathan et al., 2017). It is considered a disease of older men, but recently, new diagnoses occur in men aged 55 years and lesser (Salinas, Tsodikov, Ishak-Howard, & Cooney, 2014). Younger men are particularly at risk of this phenomenon due to the kind of lifestyle such as smoking cigarette/tobacco, alcohol drinking, and eating fatty foods they engage in during their youthful age (Khan, Afaq, & Mukhtar, 2010). The early screening and detection of prostate cancer in men aids in the reduction of the disease (Hayes, & Barry, 2014; Carter et al., 2013). Also, healthy lifestyle behaviors such as healthy diet, weight management, regular exercise, reduction in alcohol consumption and smoking cessation help reduce the risk of prostate cancer (Khan, Afaq, & Mukhtar, 2010; Pacheco et al., 2016; Rogers et al., 2008).

However, in Ghana, the prevalence of aggressive prostate cancer (Gleason score ≥ 7) was 67.7% in 2016 among male adults aged 40 years and above at Korle-Bu Teaching Hospital (Yeboah et al., 2016). Several researchers (Pacheco et al., 2016; Rogers et al., 2008; Khan, Afaq, & Mukhtar, 2010) have shown that family history of cancer and lifestyle factors play a significant role in the general risk and prognosis of this disease. Also, about 75% of prostate cancer cases are reported late at health centers in advanced stages (Yamoah et al., 2013; Chu et al., 2011).

Although information about prostate cancer is well documented, there is limited information about the risk factors affecting aggressive prostate cancer in the world, particularly, Ghana. It is in this light that the research seeks to assess aggressive prostate cancer and associated factors among older male adults in Ghana. This study

is designed to inform future interventions such as large coverage of prostate cancer screening and creating public awareness of the health implications of some lifestyles such as smoking and drinking alcohol as well as measures to be undertaken to promote a healthy lifestyle of men in Ghana.

1.3 Justification

Globally, prostate cancer is ranked the fourth most common cancer and the second most common cancer among men (WHO, 2015). In Africa, prostate cancer is leading cancer in both occurrence and the number of deaths (Rebbeck et al., 2013). Although early detection is an integral component of a successful prostate Cancer therapy, a majority of men present to hospitals with advanced disease due to low awareness and a lack of early screening services. Poor perceptions and attitudes about prostate cancer screening are some reasons for late reporting for prostate cancer screening and treatment. Some areas in Ghana are also deep-rooted in cultural beliefs and values thus, hold misconceptions about prostate cancer screening.

According to Yeboah-Asiamah et al. (2017), understanding perceptions of prostate cancer and how it translates to screening and treatment is important for physicians and public health practitioners as this information clarify existing knowledge and provide valuable information for the design of public health programs to reduce the disease burden of prostate cancer. There is scarcity in such studies in Ghana that investigate the perceptions, beliefs, and level of knowledge of men with prostate cancer. Hence, making it is difficult to develop appropriate interventions that take into consideration an individual's perceptions and level of understanding about the disease. In Ghana, Korle-bu Teaching Hospital is one of the largest hospitals seeing more cases of

prostate cancer. However, evidence of prostate cancer is limited. This explains the reason for the conduct of this study to investigate the determinants of prostate cancer among men in the Korle-bu teaching hospital and also gather information on their knowledge and understanding of prostate cancer.

1.4 Research Questions

1. What is the prevalence of aggressive prostate cancer among patients attending the oncology clinic at Korle-bu Teaching Hospital?

2. What is the relationship between socio-demographic and aggressive prostate cancer among patients attending the oncology clinic at Korle-bu Teaching Hospital?

3. What is the relationship between lifestyle and dietary related factors and aggressive prostate cancer among patients attending the oncology clinic at Korle-bu Teaching Hospital?

4. What is the relationship between health-related factors and aggressive prostate cancer among patients attending the oncology clinic at Korle-bu Teaching Hospital?

1.5 Study Objectives

1.5.1 General Objective

To assess aggressive prostate cancer and associated risk factors among patients attending the oncology clinic at the Korle-bu Teaching Hospital.

1.5.2 Specific Objectives

1. To determine the prevalence of aggressive prostate cancer among patients attending the oncology clinic at the Korle-bu Teaching Hospital.

2. To determine the relationship between socio-demographic and aggressive prostate cancer among patients attending the oncology clinic at Korle-bu Teaching Hospital.

3. To determine the relationship between lifestyle and dietary related factors and aggressive prostate cancer among patients attending the oncology clinic at Korle-bu Teaching Hospital.

4. To determine the relationship between health-related factors and aggressive prostate cancer among patients attending the oncology clinic at Korle-bu Teaching Hospital.

1.6 Conceptual framework

The graphical representation of risk factors of aggressive prostate cancer such as socio-demographic factors, lifestyle and dietary-related factors, and health-related factors and its relationship with aggressive prostate cancer among male adults can be seen in Figure 1.1.

The socio-demographic factors of male adults are age, marital status, employment status, BMI, ethnic group, the highest level of education, and family history of cancer. Generally, studies have shown that socio-demographic factors of male adults such as age, ethnic group, and family history of cancer have a significant association with aggressive prostate cancer (Magalhaes, 2013; De Castillejos-Molina & Gabilondo-Narravo, 2016). The socio-demographic factors of male adults such age, marital status, employment status, BMI, and the highest level of education have an association with lifestyle and dietary related factors such as alcohol intake, smoke cigarette/tobacco, fruits intake, vegetable intake, fats, and oil intake, and salt intake.

Also, lifestyle and dietary related factors such as alcohol intake, smoke cigarette/tobacco, fruits intake, vegetable intake, fats, and oil intake, and salt intake

have a significant association with aggressive prostate cancer. Generally, studies have shown that lifestyle and dietary-related factors such as alcohol intake and smoke cigarette/tobacco have a significant association with aggressive prostate cancer (Zhao et al., 2016; Dickerman, et al., 2016; Giovannucci, Liu, Platz, Stampfer, & Willett, 2007).

Furthermore, health-related factors such as hypertension, diabetes, and diagnosis of UTI have a significant association with aggressive prostate cancer. Generally, studies have shown that health-related factors such as hypertension and diabetes have a significant association with aggressive prostate cancer (Ohwaki, Endo, & Hattori, 2015).

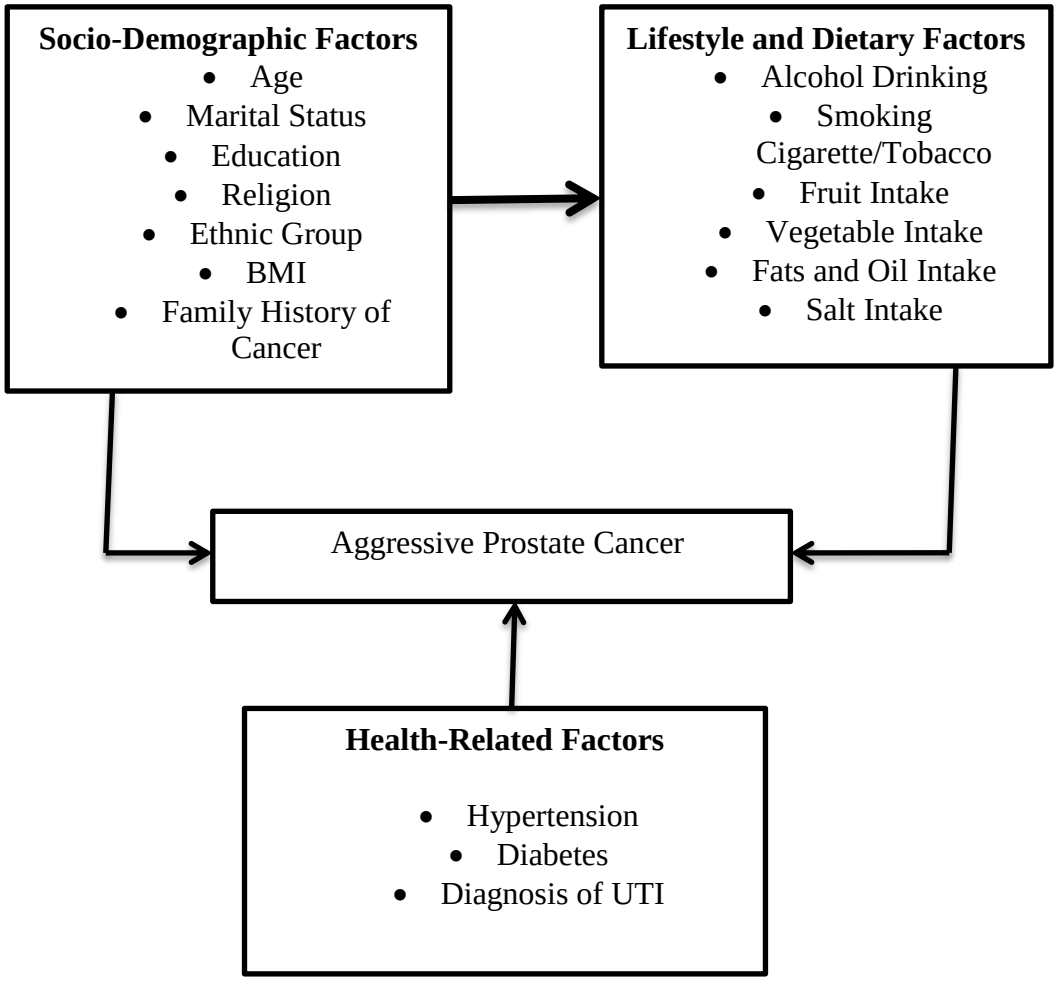

Figure 1.1: Conceptual framework

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This section of the chapter seeks to discuss findings obtained from relevant studies conducted in the area of determinants of prostate cancer in men. The discussion will be under the following headings: the epidemiology of prostate cancer (PC), risk factors associated with prostate cancer, determine the association between the Gleason score and the determinants of prostate cancer and assess the patients' knowledge and attitude on the Prostate Specific Antigen (PSA) as a screening tool.

2.2 Overview of Prostate Cancer

Prostate cancer (PCa) is the most frequently diagnosed malignancy in men in industrialized countries (Jemal et al., 2011) and the sixth leading cause of cancer death worldwide (Siegel, Ward, Brawley, & Jemal, 2011). Globally, almost 2000 men are diagnosed each day and one man is estimated to die from the disease (Fitzpatrick et al., 2009). According to Fitzpatrick et al. (2009), PCa is an already approaching epidemic proportion because three-quarters of all men diagnosed with Prostate cancer are aged 65 years and above, with an aging population in many regions of the world. Several risk factors such as age, ethnic group, and family history of cancer have been identified as risk factors influencing PCa. Also, recent modifiable lifestyle such as alcohol drinking and smoking cigarette/tobacco has been identified as risk factors influencing PCa (Nelson, De Marzo, & Isaacs, 2003).

2.3 Epidemiology of Prostate Cancer

The incidence of PCa differs significantly between geographical areas and with ethnicity (Siegel et al., 2012). Men of African origin are disproportionately affected by PCa (McGinley, Tay, & Moul, 2016). Despite this seemingly disproportionate burden and the prevailing challenges, it is still quite difficult to precisely describe the burden of PCa in Africa due to weak health management information systems (Adeloye et al., 2016). In Africa, PCa cases are reported mostly as cases from hospitals due to lack of population-based cancer reporting systems. However, over the past decades, several reporting systems and cancer registers have been opened, but data on PCa are obtained more often than not from West-Africa (Fitzmaurice et al., 2017).

In developed countries, PCa is recognized as one of the most common cancers and the leading cause of death (Haas et al., 2008). This, however, is a major issue of public health concern in developed countries. It has been estimated that about 8.8 million people died out of prostate cancer in 2015. Meanwhile, about 30-50% of cancers could be prevented (WHO, 2015). Evidence suggests that most new cases of cancers such as prostate cancer are found in Africa, increasing from 15% in 1970, to 56% in 2008, and projected to reach about 70% by 2030. This significant rise can be attributed to the rapid population growth, increasing life expectancy, urbanization with progressively westernized lifestyles, and high prevalence of HIV/AIDS in this region (Adeloye et al., 2016). Bowa (2010) discovered that PCa is occurring among young men in Africa than in developed countries and this makes PCa a major issue of public health concern (Delongchamps et al., 2007).

Age-standardized incidence rates are highest in Australia and New Zealand (111.6 per 100,000 men), North America (97.2), and Western Europe (85.8), and lowest in South (4.5) and Western Asian (10.5) regions. PCa has the highest mortality rates in countries with predominantly black ethnic populations such as the Caribbean (29 per 100,000 males) and Africa (19.9) (Ferlay et al., 2012). Even within the African continent, major and still unexplained variations exist in prostate cancer incidence. For example, the age-standardized incidence rate per 100,000 men is 32 in Zimbabwe, 9.7 in Nigeria, 4.4 in Senegal, and 4.3 in Uganda, compared with 60 in African-American men living in Washington, D.C. (Ben-Shlomo et al., 2008). Mortality rates from PCa have generally decreased globally in the last decade, except for a few Northern European and Asian countries (Wong et al., 2016).

2.4 Prevalence of Prostate Cancer

Worldwide, PCa has been rated the second most common cancer and the sixth leading cause of cancer deaths among men, with over 1.1 million cases and 300,000 deaths estimated in 2012 (Adeloye et al., 2016). It has been reported that 75% of all new PCa cases are diagnosed in developed countries with global prostate cancer occurrence accounting for about 899,000 new cases, and about 258,000 deaths each year (Alotaibi et al., 2017). The incidence of PCa in the world is on the increase across all age groups and particularly among young men (Delongchamps et al., 2007). Also, cancer is projected to rise to 24 million by 2035, with a consequent increase in expected deaths (Alotaibi et al., 2017). In contrast, though in Western Africa the incidence of PCa is lower, mortality rates associated with PCa is high (Globocan, 2012; Hassanipour-Azgomi, 2016).

The prevalence of PCa in Africa is reportedly 300 per 100,000 and purged at 4% by the WHO (Bowa, 2010). PCa incidence in sub-Sahara Africa is said to be on the increase in several countries (Chu et al., 2011; Delongchamps et al., 2007), but the total incidence of PCa is lower than that reported in Africa-Americans (Chu et al., 2011). The rates of PCa vary significantly about 8-times within sub-Sahara Africa with the lowest rate reported in West Africa and the highest rates seen in the East (Chu et al., 2011). In Ghana, 17.35% of male cancer death is related to the prostate (Wiredu, & Armah, 2006). The prevalence of the disease has been reported to be high among Ghanaian men (Yeboah et al., 2016). Reports by Laryae et al., (2014), also indicated that PCa is the second most common cancer cases recording13.2% at the Komfo Anokye Teaching Hospital (KATH).

2.5 Gleason score

Prostate-specific antigen (PSA) has been applied as a useful marker for the early diagnosis and monitoring of PCa. A prostate-specific antigen (PSA) levels or digital rectal exam (DRE) are >4.0 ng/ml then a prostate biopsy is conducted to confirm for prostate cancer. Even though PSA is a useful tool for screening for PCa, PSA screening cannot be accurately measured. However, multiple fundamental prognostic factors for PCa have been considered:

1. PSA determination: men under 40 years with PSA > 1 ng/mL presents a higher PC risk and should be periodically monitored.

2. Disease stage at diagnosis: 70-80% of cases are restricted to the prostate.

3. The Gleason grading system (PCa differentiation grade assessed by prostate biopsy) with 75-80% of tumors are moderately differentiated (Gleason 7) (Castillejos-Molina, & Gabilondo-Narravo, 2016). The Gleason Score is the grading system used

to determine the aggressiveness of prostate cancer. This grading system can be used to choose appropriate treatment options. A population-based study carried out to investigated the degree of concordance between Gleason scores obtained from prostate biopsies and those obtained from prostatectomy specimens showed that, the kappa statistic between biopsy and prostatectomy Gleason score was 0.42 ($p < 0.0001$), with 67% of patients exactly matched, and 26% of patients with Gleason score underestimated by the biopsy (Rapiti et al., 2013). Again the results showed that increasing age, advanced clinical stage, having less than ten biopsy cores, and the long delay between the two procedures, were all independently associated with biopsy under grading (Rapiti et al., 2013). The results of a study showed that Gleason score of 7 showed an overall correlation with the pathological stage (organ-confined, focal extra-prostatic extension, non-focal extra-prostatic extension, seminal vesicle invasion/lymph node metastases) (Amin, Partin, & Epstein, 2011). A Gleason score of 7 and above shows aggressive prostate cancer.

2.6 Prevalence of Aggressive Prostate Cancer

Globally, the prevalence of aggressive prostate cancer is 29.0% in China (Fang et al., 2015). Also, in Africa, the prevalence of aggressive prostate cancer is 74.4% in Nigeria (Ikuerowo et al., 2013). In Ghana, Arthur, Yeboah, Adu-Frimpong, Sedudzi, & Boateng (2006) found that 83.6% of the patients had aggressive prostate cancer in Komfo Anokye Teaching Hospital.

2.7 Factors associated with Prostate Cancer

The exact cause of PCa like other cancers is not known. But certain risk factors are recognized to be linked to the development of PCa (ACS, 2014). The most common risk factors of PCa are aging, hereditary factors (family history) and race or ethnicity (Hevey et al., 2009; ACS, 2014; Alsharef, Kahie, Conradie, Goad & Fourie, 2012). Other predisposing factors include lifestyle factors such as smoking, diet, alcohol, and environmental influence such as ethnicity and occupation (ACS, 2014; Alsharef et al., 2012), and hormonal factors (Crawford, 2003; Alsharef et al., 2012; Ukoli et al., 2008). Furthermore, Lichtenstein et al., (2000), in a study of the risk of cancer among 44,788 pairs of twins in Sweden, Denmark, and Finland, found that a greater percentage of cases of PCa were attributed to inheritance, with the remainder most likely attributable to environmental factors. Epidemiologic evidence also supports a major contribution of environmental factors to the development of PCa.

2.7.1 Age

Lavery et al., (2016) conducted a study and found that age was associated with PCa. It was noted that PCa was commonly diagnosed in men over the age of 65. They also estimated that 6 out of 10 cases of PCa are reported among the age group 65 years (Lavery et al., 2016). Men aged 40 years and below are less frequently diagnosed with prostate cancer, but the probability of developing the disease is higher after age 50 (Barry & Simmons, 2017). PCa risk increases from 0.005% in men below 39 years to 2.2%, that is 1 case in 45 men, among men aged 40 to 59 years and 13.7% (1 case in 7 men) among individuals aged 60 to 79 years and the chance of PCa occurring in a man's lifetime is 16.7%, that is 1 case in 6 men (Crawford, 2003). However, histological evidence shows a higher likelihood of developing PCa along with aging

(Crawford, 2003). PCa incidence relates strongly to age, with age-specific incidence rates rising sharply from the age of 50 years and being highest in men aged 90 and above, according to the Office for National Statistics data from the UK (ONS, 2016). De Castillejos-Molina & Gabilondo-Narravo (2016) identified that age of patients has an association with aggressive prostate cancer. They found that patients who are above 60 years have higher odds of prostate cancer. Also, Oesterling, Jacobsen, & Cooner (1995) found that patients aged more than 60 years have prostate cancer. De Magalhaes (2013) stated that aging increases the risk of prostate cancer.

2.7.2 Education

Calys-Tagoe et al. (2014) studied 364 PCa patients in Ghana to assess the profile of cancer patients' seen at the Korle Bu teaching hospital in Ghana. They found the level of education was related to PCa. It was also realized that more than two-thirds of the population had attained a secondary level of education or higher. This is consistent with the findings of Pampollona et al., (2002) in Switzerland who also showed that education has an association with PCa.

2.7.3 Family history

According to a study conducted by Crawford, (2003), family histories were found to have an association with PCa. Men with family histories of PCa were said to be at risk of the disease. PCa risk is twice among men whose fathers or brothers are diagnosed with the disease (ACS, 2014). The risk of developing PCa increases among men with several of their first-degree relations affected by the disease (Crawford, 2003; ACS, 2014). There is also an indication that men with a family history of the PCa develop the disease on the average of 6 to 7 years earlier than those without family history and

at early ages (Crawford, 2003). An estimated 5% to 10% of all PCa cases and about 40% of PCa been diagnosed at 55 years are suggested to have a genetic origin (Crawford, 2003).

According to Kiciński, Vangronsveld, & Nawrot, (2011), a positive family history of cancer significantly affects a man's risk of PCa. Pooled risk estimates suggest that a man with one first-degree relative (father or brother) with a diagnosis of PCa has a relative risk of 2.48, rising to 4.39 for men with two or more first-degree relatives affected by the disease. The risk of developing prostate cancer doubles for men who have a father or brother affected by prostate cancer and the risk increases further when multiple first-degree relatives are affected (Steinberg et al., 1990; Carter et al., 1992).

2.7.4 Race/ethnicity

African-American men and Caribbean men of Africa ancestry are commonly diagnosed with PCa than in men of other races. PCa incidence in African-Americans is one of the highest in the world (Crawford, 2003; Delongchamps et al., 2007), with nearly 60% higher than reported cases in the white race (Crawford, 2003). African-Americans are diagnosed with PCa at younger ages and advanced stages as compared to their white counterparts (Delongchamps et al., 2007; Bowa et al., 2010). The higher incidence of PCa in African-Americans is yet to be explained but it is suggested that both ecological and hereditary factors working together may account for such occurrences (Delongchamps et al., 2007). However, PCa incidence is less common in men of Asian, Hispanic or Latino lineage (ACS, 2014).

Men from African and Caribbean ethnic backgrounds have the highest PCa incidence and mortality rates compared to other ethnic groups. The lifetime risk of PCa in black UK men is double that of white UK men and three times the risk of men from Asian backgrounds (Lloyd et al., 2015). Relative to white men, men of African or Caribbean descent have a worse prognosis in the USA (Evans, Metcalfe, Ibrahim, Persad, & Ben-Shlomo, 2008) and the UK (Ben-Shlomo et al., 2008).

2.7.5 Smoking

Giovannucci, Liu, Platz, Stampfer, & Willett conducted a cohort study in the United States to determine the risk factors for prostate cancer incidence and progression among 51,529 men in health professionals. Using the cox proportional hazard ratio, the study revealed a statistically significant relationship between smoking and PCa. Most studies have not found a link between smoking and getting PCa. Fachal et al., 2011) has linked smoking to a possible small increase in the risk of dying from PCa.

2.7.6 Diet

Tseng, Breslow, DeVellis, & Ziegler, (2014) conducted a study, which used data from the National Health and Nutrition Examination Survey Epidemiological Follow-up to investigate the association between dietary patterns and risk of PCa. Three dietary patterns were described: ‘‘vegetable-fruit,’’ ‘‘red meat-starch,’’ and a ‘‘Southern’’ pattern, which was characterized by higher intakes of foods such as okra, cornbread, or sweet potatoes. The ‘‘Southern pattern’’ had a suggestive inverse association with prostate cancer risk. Tseng et al. (2014) speculated that the observed association was due to living in the South, which may be related to lower risk of PCa due to higher sunlight (vitamin D) exposure. Similarly, a study in Canada by Walker et al. (2005)

revealed that a ‘‘processed diet’’ was significantly associated with an increased risk of PCa.

Consequently, Oladimeji, Bidemi, Olufisayo, & Sola (2010) in a study showed that PCa risk is suggested to be influenced by diet, even though the role of diet in PCa is not understood (Lavery et al., 2016). Also, a higher PCa risk is identified to be associated particularly with the higher intake of fat, red meat, and dairy products (Crawford, 2003; ACS, 2014; Kheirandish & Chinegwumdoh, 2011). PCa risk with a high level of calcium consumption has also been identified. However, vitamin D, soy and omega-6 fatty acids are said to be protective of PCa (Zhang et al., 2017). On the contrary, Muller et al. (2009) conducted a cohort study to investigate the associations between dietary patterns and prostate cancer risk among 14,627 men of ages 34 to 75 years for an average of13.6 years. Using Cox proportional hazard models, the study found no association between dietary pattern and prostate cancer risk.

2.7.7 Hormonal factors

A study conducted by Etawo et al., (2012) concluded that elevated levels of testosterone and decreased levels of oestradiol in the blood influenced the development of PCa. There is evidence for an association between PCa and heritable germline mutations such as *BRCA1* (Fachal et al., 2011; Leongamornlert et al., 2012) and lynch syndrome (Ryan, Jenkins & Win, 2014). This is similar to a study conducted by Etawo et al., (2012) and Alsharef et al., (2012) who found that sex hormone was associated with the risk of developing PCa. Androgens have also been indicated in the development of PCa. This is contrasted by Alsharef et al., (2012)

whose study showed an association between low serum testosterone level and increased level of prostate-specific antigen (PSA).

2.7.8 Employment Status

Adler et al. (2019) conducted a case-control study of PCa in Ghana among 749 cases and 964 controls to assess the association between occupation and PCa using logistic regression. The study revealed that employment status has an association with PCa among Ghanaian men. They found higher risks for both overall and aggressive PCa among men regularly employed in management occupations as well as among men with military occupations, and inverse associations among men regularly employed in construction trades (both overall and aggressive PCa) and protective service occupations. The study also revealed higher risks for PCa among men who reported military occupations as their longest-held job. This finding is supported by other studies conducted in Canada (Sritharan et al., 2017) and across five Nordic nations (Barry et al., 2017; Pukkala et al., 2009) who found that members of the armed forces had significantly higher risks for PCa.

Reasons for this may be due to exposure to agents occurring during military deployment including metals, pesticides, fuels, solvents, chemical or warfare agents, radiation, or shift-work, some of which have been linked to PCa risk independently (Koutros et al., 2013; Bleise, Danesi, & Burkart, 2003; Clapp et al., 2008; Gan et al., 2018; Krishnadasan et al., 2007; Leavy, Ambrosini, & Fritschi, 2006). For military occupations, associations persist among men with aggressive PCa and among those without medical insurance (Adler et al., 2019). Also, a study conducted by Koutros et al. (2013) revealed an association between farming or pesticides exposure and the risk

of PCa. This is similar with studies conducted by Sauve, Lavoue, & Parent (2016), Sritharan et al. (2017) and Blair & Freeman (2009) which showed that employment has an association with PCa.

2.8 Patient's knowledge level on Prostate Cancer

Knowledge about prostate cancer is defined as having adequate information about the signs, symptoms, causes and health-seeking options for PCa. Knowledge about PCa is said to be an independent predictor of the uptake of prostate screening and positive health-seeking behavior (Lloyd et al., 2013). Despite a report by Watson et al., (2006) that either very low or high (extreme) levels of PCa knowledge could prevent a man's intentions of testing for PCa, Oladimeji et al. (2010) established that extreme levels of PCa knowledge can affect health-seeking behavior.

Arnold-Reed et al. (2008) conducted a study to ascertain the current level of understanding among older men about PCa such as knowledge about treatment options and their potential side effects. The study revealed that about 53% of the participants did not know the treatments for PCa and 53% had no knowledge of the side effects of treatments. Also, Yeboah-Asiamah, Yirenya-Tawiah, Baafi, & Ackumey (2017) studied 160 patients to examine patients' knowledge and perception of PCa in Sunyani. The study showed that high knowledge level was associated with perceptions of PCa. They recommended educational campaigns to improve knowledge, perceptions, and attitudes of PCa patients. According to Yeboah-Asiamah et al. (2017), the impact would improve the uptake of prostate cancer screening and care.

A study was conducted by Nakandi et al. (2013) in Uganda to assess the knowledge, attitudes, and practices among 545 adult males. Regarding awareness, 54.1% had never heard of PCa and a couple of people thought PCa was gonorrhea. Those who were aware of PCa either heard about it through the media (50.1%), friends and relatives (23.3%), health worker (12.5%), all the mentioned sources (11%) or other sources (3.1%). Of all respondents, 37.4% did not know the age at which the risk is highest, 21.1% believed it often affects men above age 50. Knowledge of screening was generally low.

High levels of knowledge on PCa have been reported by previous studies (Adeloye et al., 2016 Oranusi, Mbieri, Oranusi, & Nwofor, 2012). Oranusi et al. (2012) in a study reported that majority of public servants in the Amanba state of Nigeria identified one or more symptoms of PCa correctly with most common symptom identified as the difficulty in urinating, and identified correctly the risk factors associated with PCa. This high level of knowledge is mostly found among men at high risk, especially those with family history of PCa (Zhang et al., 2017; Cormier et al., 2002; Hevey et al., 2009) and men previously been diagnosed of PCa (Allen et al., 2007), and among white men (Rajbabu et al., 2007). It is reported that knowledge about PCa increased among 40% of men after their brothers were diagnosed with PCa (Pruthi et al., 2005). As reported by Comier et al. (2002), older men are more knowledgeable about PCa than younger men. In contrast, a study has found that older men of low income and from the rural areas whose brothers have been diagnosed with PCa had poor knowledge about PCa (Pruthi et al., 2005). High knowledge levels have however been associated with a high level of education as reported by Oladimeji et al., (2010) and Wilkinson, List, Sinner, Dai, & Chodak, (2003).

Jo et al. (2013) have reported a total lack of knowledge about the risk factors, symptoms, screening and treatment of PCa in developing countries. Knowledge about PCa in the general populace is poor (Nakandi et al., 2013; Wilkinson et al., 2003; Pedersen et al., 2012) which is one of the reasons why the majority of PCa cases are presented in advanced stages in the sub-region. Knowledge levels about PCa can, however, be increased through educational programs and/or interventions (Wilkinson et al., 2003; Rajbabu et al., 2007; Watson et al., 2006; Chan et al., 2011).

2.9 Symptoms and Complications of Prostate Cancer

2.9.1 Symptoms of Prostate Cancer

According to the Society Cancer Society (2004), early curable prostate cancer rarely causes symptoms (i.e. it is asymptomatic). Also according to the Cancer Council, this is because the cancer is not large enough to put pressure on the urethra. The Cancer Council notes that if cancer grows and spreads beyond the prostate (advanced prostate cancer), the following symptoms may result: pain or burning when urinating, difficulty in, or increased frequency of, urinating blood in the urine or semen and pain in the lower back, hips or upper thighs. The Society Cancer Society (2004) however cautions that these symptoms are common to many conditions and may not be advanced prostate cancer. In about 5% to 10% of men with prostate cancer, there may be an underlying inherited risk that contributes to cancer development. According to Besada & Ermakov (2008), although many of the cancers found in Africa are preventable or treatable when detected early enough, the grim picture of insufficient resources and a lack of basic infrastructure mean that most Africans have no access to cancer screening, early diagnosis, treatment or palliative care. At the same time, more

than one-third of cancer deaths are a result of preventable causes, such as viral infection, poor nutrition, pollution and widespread tobacco use (Besada & Ermakov 2008).

2.9.2 Complications of Prostate Cancer

There are several complications of prostate cancer. Some of the complications are metastasized, urinary incontinence, and erectile dysfunction. Metastasizes is a cancer that spreads. Prostate cancer can spread to nearby organs, such as the bladder, or travel through the bloodstream or lymphatic system to the bones or other organs. Prostate cancer that spreads to the bones can cause pain and broken bones. Once prostate cancer has spread to other areas of the body, it may still respond to treatment and may be controlled, but it's unlikely to be cured. Also, both prostate cancer and its treatment can cause urinary incontinence. Treatment for incontinence depends on the type, how severe it is and the likelihood it will improve over time. Treatment options may include medications, catheters, and surgery. Erectile dysfunction can result from prostate cancer or its treatment, including surgery, radiation or hormone treatments. Medications, vacuum devices that assist in achieving erection and surgery are available to treat erectile dysfunction.

2.10 Patients' knowledge and attitude on the Prostate-Specific Antigen as a screening tool

The knowledge and attitude of individuals on the use of prostate-specific antigen (PSA) as a screening tool is very important. A cross-sectional study conducted in two primary care clinics in Kingston by Smith & Birtwhistle (2012) revealed that, 54

(95%) knew that using the PSA blood test as a screening tool for prostate cancer was not risky, 39 (68%) knew that the PSA blood test was good or very good at preventing death from prostate cancer, and 45 (79%) knew that the routine use of the PSA blood test was important or very important for their health (Smith, &Birtwhistle, 2012). A study conducted to assess knowledge related to prostate cancer screening showed that, participants' mean knowledge score was 7.4 (range 3 to 12) of 15 (Cronbach's α=0.71). Also, higher knowledge scores were associated with less belief in a mortality benefit from prostate-specific antigen (PSA) testing which was statistically significant. However, participants could be categorized as low, age-selective, and high users of routine PSA screening. High users had lower knowledge scores than age-selective or low users, and they believed much more in mortality benefits from PSA screening (Bell, Hays, Hoffman, Day, Higa, &Wilkes, 2006). The findings from two different Veterans Administration facilities on the knowledge of outpatients regarding PSA as a screening tool revealed that over 50% of men had not heard of the PSA test and were unaware of receiving the test. Higher education level was the only predictor of PSA-test knowledge (Diefenbach, Ganz, Pawlow, & Guthrie, 2008). A cross-sectional study conducted in Malaysia by Firzara & Ng (2016) revealed that 49.5% of the respondents would routinely screen asymptomatic men for prostate cancer of which 94.9% would use PSA to screen (Firzara & Ng, 2016).

2.11 Conclusions and Research Gaps

- The dearth of research on prostate cancer in developing countries, with only 12% of low and middle-income countries covered (only two studies in Ghana).

- Few studies on aggressive prostate cancer conducted in low and middle-income countries, for example only two of the 8 studies of the prevalence of aggressive prostate cancer and two from SSA (only one from Ghana).
- The knowledge gap in risk factors of aggressive prostate cancer worldwide.
- Limited research in identifying the relationship between socio-demographic characteristics such as age, marital status, education, religion, etc. and aggressive prostate cancer in high-income countries with almost non-existence in SSA.
- Limited research in identifying the relationship between lifestyle and dietary related factors such as smoking cigarette/Tobacco, drinking alcohol, fruit intake, vegetable intake, etc. and aggressive prostate cancer in high-income countries with almost non-existence in SSA.
- Limited research in identifying the relationship between health-related factors such as hypertension, diabetes, and diagnosis of UTI and aggressive prostate cancer in high-income countries with almost non-existence in SSA.

CHAPTER THREE

METHODOLOGY

3.1 Study design

This study adopted a descriptive, cross-sectional research design with quantitative research approach. The descriptive study was used to acquire information about patients with prostate cancer. Structured questionnaires were used to collect data on socio-demographic factors, lifestyle and dietary-related factors, health-related factors, and prostate cancer of patients attending the oncology clinic at the Korle Bu Teaching Hospital. The researcher used quantitative research approach to create meaning through objective measurement of the situations and provide a numerical representation of the findings. It was used to collect and convert data into a numerical form to assist the researcher to apply statistical methods when analyzing the data collected.

3.2 Study Area

This study was conducted at the oncology clinic and outpatient department (OPD) of the Korle-Bu Teaching Hospital in Accra. The Korle-Bu teaching hospital is a premier healthcare facility located in Accra. This hospital is a tertiary hospital which is affiliated to the University of Ghana medical school. It was established on the 9th of October 1923. Currently, the hospital has a bed capacity of 2000 and is the third-largest hospital in African and the leading national referral center. The hospital was established to address the health concerns of the indigenes of Cold Coast under the administration of Sir Gordon Guggisberg who was then the Governor of Gold Coast. The hospital's departments include Pharmacy, Finance, Engineering, General Administration, Surgery, Polyclinic, Accident Centre and the Surgical/Medical

Emergency, Medicine, Child Health, Obstetrics and Gynaecology, Pathology, Laboratories, Radiology and Anesthesia, Plastics, Cardio-thoracic, and Radiotherapy Oncology center. The hospital records an average daily outpatient attendance of 1500 patients and about 250 in-patient admissions in 2018.

Specifically, the National Radiotherapy Oncology and Nuclear Medicine department where the participants for the study were identified and recruited mainly treat and manages all solid tumors as their core mandate. The department records approximately 1200 new cases annually. Out of this, about 145 cases are prostate cancer. Prostate cancer cases are seen only once in a week that is on Thursdays. The department has an appreciable staff such as Oncologists, Medical doctors, Pharmacists, Biostatisticians, Physicists, Radiation Therapists, Nurses, Technicians and other support staff that manage the department.

3.3 Study population

The study was conducted among male patients treated for prostate cancer between January 2018 and December 2018 at the Oncology clinic at the Korle Bu Teaching Hospital. The total number of patients treated for prostate cancer in 2018 was 180.

3.3.1 Inclusion criteria

Eligible for inclusion in this study were all prostate cancer patients pathologically confirmed and were referred for treatment between January 2018 and December 2018 at the National Radiotherapy oncology and Nuclear Medicine department of the Korle-Bu Teaching Hospital.

3.3.2 Exclusion criteria

All prostate cancer patients that were referred before to the department before January 2018 and after December 2018 were excluded from the study. Also, prostate cancer patients with evidence of metastasis were excluded. Furthermore, prostate cancer patients with evidence of other cancers (double cancers) were excluded.

3.4 Operationalization of Variables Used in the Study

The dependent and independent variables for this study have been summarised in Table 3.1.

Table 3.1: Operationalization of Variables Used in this Study

Variable Type	Operationalization	Scale of Measurement
Dependent Variable		
Aggressive Prostate cancer	No, Yes	Binary
Independent Variable		
Socio-Demographic factors		
Age	Years	Continuous
Religious Affiliation	Christianity, Islam, Traditional	Nominal
Ethnic Group	Akan, Ewe, Ga/Dangme, Mole-Dagbani/Grusi/Gurma	Nominal
Marital Status	Single, Married	Nominal
Employment Status	Unemployed, Employed, Retired	Nominal
Lived in a Mining Area	No, Yes	Binary
History of cancer in the family	No, Yes	Binary
BMI	Kilogram per squared meters	Continuous
Life-Style and Dietary Related Factors		
Smoking Status	Smoke, Never smoke	Binary
Alcohol drinking Status	Drinker, Never drunk	Binary
Fruit Intake	Not Every day, Everyday	Binary
Vegetable Intake	Not Every day, Everyday	Binary
Fats and Oil Intake	Not Every day, Everyday	Binary
Salts Intake	Not Every day, Everyday	Binary
Health-Related Factors		
Diabetes	No, Yes	Binary
Hypertension	No, Yes	Binary
Diagnosed with UTI	No, Yes	Binary

3.5 Sample Method and Sample Size Determination

All the accessible records of the population of the patients referred to the National Radiotherapy oncology department between January 2018 and December 2018 were all reviewed and considered for inclusion. Only histologically confirmed prostate cancer cases were included in this study. At the end of the review, 130 patients were eligible for participation. With the help of their ID numbers, the researcher compared these participants with the list of patients booked for reviews, to identify those who were due for review. The portion or sections on the questionnaires which were not found in the medical case note were handed to the patients to fill. The number of respondents was selected through systematic sampling. The systematic sampling method was chosen to sample the patients referred to the National Radiotherapy oncology department at Korle-Bu Teaching Hospital. The systematic sampling allows a population to be sampled at a set interval called the sampling interval. Sampling interval (k) was determined by dividing the number of units in the population by the desired sample size. That is, $k = \frac{N}{n}$. Thus, with a sample of 130 participants from a population of 180, every other 2 patients file or health folder referred to the National Radiotherapy oncology department at Korle-Bu Teaching Hospital arranged in alphabetical order was selected as a participant.

3.6 Sample Size Determination

Yamane's (1967) formula for the population in a cross-sectional survey was used to calculate the sample size for this study.

The sample size was calculated as;

$$n = \frac{N}{1 + Ne^2}$$

Where n= the minimum sample size

N =population

e = margin of error or precision = 5%

Sample size computation using Yamane's (1977) is given as;

$$n = \frac{180}{1 + 180(0.05^2)} = 124.1 \approx 124$$

Accounting for 5% non-response rate, the total number of participants was calculated as follows: 124 + (0.05 × 124) = 130. Therefore, the required total sample size of 130 patients was recruited for the study.

3.7 Data collection tools and techniques

The primary data was collected from patients through the data extraction sheet and a structured questionnaire. The data extraction sheet was used to extract clinical and oncological information from the patients' case note files. The data collection was initiated by extracting data from oncology records including the Gleason score and the morphology of the disease. After this was done, the next clinic day for cases that were identified during the record review was determined. The principal investigator collected the primary data with the help of one nurse from the participants using a structured questionnaire. The first part of the structured questionnaire was on socio-demographic characteristics of the participants. These comprise of the age, religion, ethnicity, highest level of education, marital status, employment status, and family history of cancer. Researchers have shown in their studies that these socio-demographic factors are risk factors influencing aggressive prostate cancer. The

second part of the questionnaire was based on lifestyle and dietary-related factors. The third part of the instrument was based on health-related factors.

3.8 Data Quality Control

To ensure data quality, the data collection tools to be used in this study was validated via pre-testing. This pre-testing was done at the 37 Military Hospitals. This was done to avoid misinterpretation and allow for modification of ambiguous questions furthermore, the information provided by study participants during and after the period of data collection was kept private. Also, to ensure data quality, research assistants used in this study were trained a week before the data collection to ensure they are conversant with the data collection tool. Also, at the end of each data collection session, the questionnaires were validated, and all errors were corrected. After data collection, there was the double entry of data by two different data entry clerks to ensure validity. The template for data entry was coded to prevent typographical errors associated with data entry.

3.9 Data Analysis

After data collection, the data was sorted, coded and entered into Microsoft Excel Version 10. Accuracy of the entered data was checked, and the clean database was imported into Stata version 15.0 file (Stata Corporation, Texas, USA) for data analysis.

Percentages, frequency tables, pie chart, and cross-tabulations were the statistical tools used in describing the data while multiple logistic regression and Pearson chi-square test or Fisher Exact (where required) were used for statistical analysis. Cross-tabulation is a tool used to explain the association between two categorical variables. The cross-tabulation was used to find the relationship between socio-demographics of patients and aggressive prostate cancer; the relationship between lifestyle and dietary

related factors and aggressive prostate cancer; and the relationship between health-related factors and aggressive prostate cancer. The significant variables (less than 5% significance) from the chi-square test were used in the multiple logistic regression model for analysis.

3.10 Ethical consideration

Ethical clearance was sought from the KBTH- STC, IRB. Also, written consent was sought from eligible participants after explaining the benefits and risks involved in participation. Also, participants were made to understand that, participation is purely voluntary and can opt-out at any time and this will not affect service delivery at the facility. They were also made to understand that, there is compensation involved in participating in the study. Data collected was kept under lock and key, with only the principal investigator having access. In ensuring anonymity, participants were only identified with codes and numbers instead of their actual names during and after data collection.

3.11 Confidentiality

The participants were given assurance that any information they provided would be treated with strict confidentiality and that they would not be identified by names but only their identity numbers.

3.12 Voluntary

The participants were told the participation was voluntary and that they could withdraw any time they deem fit.

CHAPTER FOUR

RESULTS

4.0 Introduction

This chapter presents the findings of the study. This study used primary data collected from patients attending the oncology clinic at the Korle-bu Teaching Hospital to assess the determinants of aggressive prostate cancer.

4.1 Socio-demographic characteristics of study participants

A total of 130 patients fulfilled inclusion criteria and had completed the questionnaire making a response rate of 100%. Table 4.1 shows the socio-demographic characteristics of the participants. The mean age of participants was 67.5 (± 8.0) years, with the minimum of 54 years and the maximum of 83 years. Approximately two-thirds 88 (67.7%) of the participants were above 60 years. Out of the total participants, more than three-quarters of the participants 99 (76.2%) were married and more than one-third of the participants 53 (40.8%) were employed. Almost two-thirds of the participants 83 (63.9%) were Christians and more than one-third of the participants 53 (40.8%) belonged to the Ga/Dangme ethnic group.

Concerning highest educational level attained, more than one-third of the participants 48 (36.9%) had attained secondary education and more than half of the participants 72 (55.4%) had lived in a mining area. Approximately two-thirds of the participants 87 (66.9%) had reported a history of cancer in the family. Overall, more than one-third of the participants 45 (34.6%) were underweight with a mean BMI of the participants being 21.4 (5.7) kg/m^2.

Table 4.1 Socio-demographic characteristics of study participants

Variables	Frequency (N = 130)	Percentage (%)
Age Mean (± SD)	67.5 (± 8.0)	
≤60 years	42	32.3
>60 years	88	67.7
Marital status		
Single	31	23.8
married	99	76.2
Educational level		
No formal education	24	18.5
primary education	20	15.4
Middle/JHS/JSS	12	9.2
Secondary (SSS/SHS/Tech./Vocational)	48	36.9
Tertiary	26	20
Employment Status		
Unemployed	33	25.4
Employed	53	40.8
Retired	44	33.9
Ethnic group		
Ewe	25	19.2
Akan	39	30.0
Ga/Dangme	53	40.8
Mole-Dagbani/Grusi/Gurma	13	10.0
Religion		
Christian	83	63.9
Muslim	35	26.9
Traditional/Spiritualist	12	9.2
Lived in a Mining Area		
No	58	44.6
Yes	72	55.4
History of cancer in the family		
No	43	33.1
Yes	87	66.9
BMI Mean (± SD) 21.4 (±5.7)		
Underweight (<18.5 kg/m^2)	45	34.6
Normal (18.5-24.9 kg/m^2)	37	28.5
Overweight (25-29.9 kg/m^2)	25	19.2
Obese (≥30kg/m^2)	23	17.7

4.2 Lifestyle and dietary related factors of study participants

Table 4.2 shows the lifestyle and dietary related factors of respondents. Almost two-thirds of the participants 85 (65.4%) were smokers and 80 (61.5%) of the participants were alcohol drinkers. More than three-fourth of the participants 108 (83.1%) take fruits every day, more than half of the participants 77 (59.2%) do not take in vegetables every day, 82 (63.1%) of the participants have fats and oil intake every day, and more than half of the participants 76 (58.5%) have salt intake every day.

Table 4.2 Lifestyle-related factors of participants

Variables	Frequency (N=130)	Percentage (%)
Smoking status		
Never smoke	45	34.6
Smoker	85	65.4
Alcohol drinking status		
Never drink	50	38.5
Drinker	80	61.5
Fruit intake		
Not Everyday	22	16.9
Everyday	108	83.1
Vegetable intake		
Not Everyday	77	59.2
Everyday	53	40.8
Fats and Oil intake		
Not Everyday	48	36.9
Everyday	82	63.1
Salt intake		
Not Everyday	54	41.5
Everyday	76	58.5

4.3 Health-related factors of participants

Table 4.3 shows the health-related factors of participants. More than half of the participants 79 (60.8%) had hypertension. Also, more than half of the participants 73 (56.2%) had diabetes and almost two- thirds of the participants 84 (64.6%) were diagnosed with Prostatitis/UTI.

Table 4.3: Health-related factors of participants

Variables	Frequency (N=130)	Percentage (%)
Hypertension		
No	51	39.2
Yes	79	60.8
Diabetes		
No	57	43.9
Yes	73	56.2
Diagnosed with Prostatitis/UTI		
No	46	35.4
Yes	84	64.6

4.4 Prevalence of Aggressive Prostate Cancer

The prevalence of aggressive prostate cancer among patients is shown in Figure 4.1.

Out of 130 study participants, 86 (66.1%) have aggressive prostate cancer.

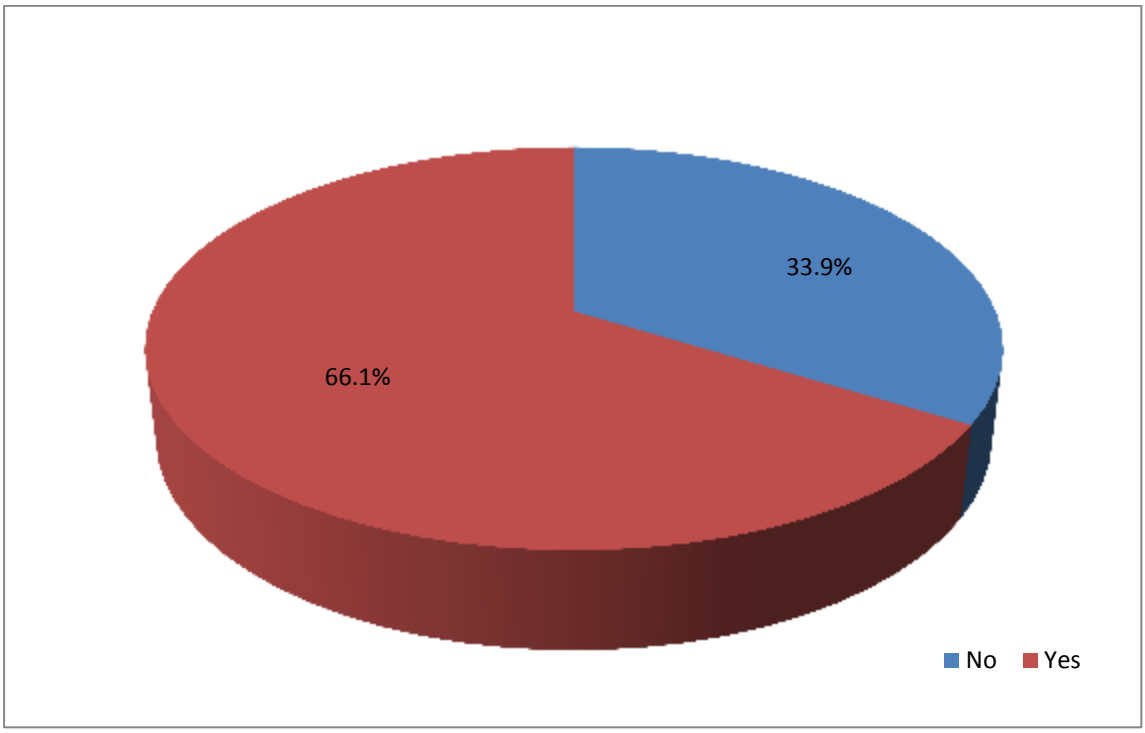

Figure 4.1: Prevalence of aggressive prostate cancer among study participants

4.5 Test of associations between variables of interest and aggressive prostate cancer.

4.5.1 Test of association between Socio-Demographic Factors and Aggressive Prostate Cancer

Table 4.4 shows the relationship between socio-demographic factors and prostate cancer. There is a likelihood that the age of the participants was related to aggressive prostate cancer ($p = <0.001$). Thus, 77.9% of the participants belonging to the age group above 60 years had aggressive prostate cancer compared with 22.1% of the participants who had aggressive prostate cancer among the age group 60 years and below.

Also, there is a likelihood that the employment status of the participants was related to aggressive prostate cancer ($p = 0.004$). Whereas 41.9% of the participants who had aggressive prostate cancer were retired, only 17.4% of the participants who had aggressive prostate cancer were unemployed.

Furthermore, there is a likelihood that lived in a mining area was related to aggressive prostate cancer ($p = 0.045$). Whereas 61.6% of the participants who lived in a mining area had aggressive prostate cancer, only 38.4% of the participants who had aggressive prostate cancer did not live in a mining area. Furthermore, there is a likelihood that living in a mining area was related to aggressive prostate cancer ($p = 0.045$). Whereas 61.6% of the participants who lived in a mining area had aggressive prostate cancer, only 38.4% of the participants who had aggressive prostate cancer did not live in a mining area.

Table 4.4: Test of association between Socio-demographic and aggressive prostate cancer

	Prostate Cancer				
	Non-Aggressive N (%)	Aggressive N (%)	Total N (%)	χ^2	p-value
Age Mean(± SD)					
≤60 years	23(52.3)	19(22.1)	42(32.3)	**12.1225**	**<0.001***
>60 years	21(47.7)	67(77.9)	88(67.7)		
Marital status					
Single	11(25.0)	20(23.3)	31(23.9)	0.0488	0.825
married	33(75.0)	66(76.7)	99(76.1)		
Educational level					
No formal education	7(15.9)	17(19.8)	24(18.5)	3.1592	0.532
primary education	9(20.4)	11(12.8)	20(15.4)		
Middle/JHS/JSS	4(9.1)	8(9.3)	12(9.2)		
SSS/SHS/Tech/Voc	13(29.6)	35(40.7)	48(36.9)		
Tertiary	11(25.0)	15(17.4)	26(20.0)		
Employment Status					
Unemployed	18(40.9)	15(17.4)	33(25.4)	**11.1370**	**0.004***
Employed	18(40.9)	35(40.7)	53(40.8)		
Retired	8(18.2)	36(41.9)	44(33.8)		
Ethnic group					
Ewe	12(27.3)	13(15.1)	25(19.2)	4.6056	0.203
Akan	10(22.7)	29(33.7)	39(30.0)		
Ga/Dangme	16(36.4)	37(43.0)	53(40.8)		
Mole-Dagbani/Grusi/Gurma	6(13.6)	7(8.1)	13(10.0)		
Religion					
Christian	25(56.8)	58(67.4)	83(63.9)	1.7852	0.410
Muslim	15(34.1)	20(23.3)	35(26.9)		
Traditional/Spiritualist	4(9.1)	8(9.3)	12(9.2)		
Lived in Mining Area					
No	25(56.8)	33(38.4)	58(44.6)	**4.0081**	**0.045***
Yes	19(43.2)	53(61.6)	72(55.4)		
History of cancer					
No	24(54.6)	19(22.1)	43(33.1)	**13.8485**	**<0.001***
Yes	20(45.5)	67(77.9)	87(66.9)		
BMI					
Underweight	20(45.5)	25 (29.1)	45(34.6)	**8.0597**	**0.045***
Normal	15(34.1)	22 (25.6)	37(28.5)		
Overweight	4(9.1)	21(24.4)	25(19.2)		
Obese	5(11.4)	18 (20.9)	23(17.7)		

*p<0.05

Moreover, there is a likelihood that a history of cancer in the family was related to aggressive prostate cancer (p = <0.001). For instance, 77.9% of the participants who reported a history of a family member having cancer had aggressive prostate cancer compared with 22.1% of the participants who reported no history of a family member having cancer had aggressive prostate cancer.

Finally, there is a likelihood that the BMI of the participants was related to aggressive prostate cancer (p = 0.045). Thus, 29.1% of the underweight participants had aggressive prostate cancer compared with 25.1% of the participants who had aggressive prostate cancer classified as normal. However, socio-demographic factors such as marital status, educational level, place of residence, ethnic group, and religion had no relationship with aggressive prostate cancer.

4.5.2 Test of association between Lifestyle and Dietary Factors and Aggressive Prostate Cancer

Table 4.5 shows the relationship between lifestyle and dietary related factors and aggressive prostate cancer. There is a likelihood that the smoking status of the participants was related to aggressive prostate cancer (p = 0.025). Thus, 72.1% of the participants who smoke had aggressive prostate cancer compared with 27.9% of the participants who had aggressive prostate cancer but do not smoke. Also, there is a likelihood that alcohol drinking status of the participants was related to aggressive prostate cancer (p = 0.002). Whereas 70.9% of the participants who had aggressive prostate cancer were alcohol drinkers, only 29.1% of the participants who had aggressive prostate cancer were not alcohol drinkers.

Table 4.5: Test of association between lifestyle and dietary factors and prostate cancer

	Prostate Cancer				
	Non-Aggressive N (%)	Aggressive N (%)	Total N (%)	χ^2	p-value
Smoking status					
Never smoke	21(47.7)	24(27.9)	45(34.6)	**5.0522**	**0.025***
[+]Smoker	23(52.3)	62(72.1)	85(65.4)		
Alcohol drinking status					
Never drink	25(56.8)	25(29.1)	50(38.5)	**9.4691**	**0.002***
[#]Drinker	19(43.2)	61(70.9)	80(61.5)		
Fruit intake					
Not Every day (<7days)	11(25.0)	11(12.8)	22(16.9)	3.0862	0.079
Every day (7 day)	33(75.0)	75(87.2)	108(83.1)		
Vegetable intake					
Not Every day (<7days)	29(65.9)	48(55.8)	77(59.2)	1.2284	0.268
Every day (7 day)	15(34.1)	38(44.2)	53(40.8)		
Fats and Oil intake					
Not Every day (<7days)	20(45.5)	28(32.6)	48(36.9)	2.0786	0.149
Every day (7 day)	24(54.5)	58(67.4)	82(63.1)		
Salt intake					
Not Every day (<7days)	23(52.3)	31(36.1)	54(41.5)	3.1559	0.076
Every day (7 day)	21(47.7)	55(63.9)	76(58.5)		

*p<0.05, [+]current or ex-smoker, [#]current or ex drinker

4.5.3 Test of association between health-related factors and Aggressive Prostate Cancer

Table 4.6 shows the relationship between the history of non-communicable disease factors and aggressive prostate cancer. There is a likelihood that the hypertension status of the participants was related to aggressive prostate cancer (p = <0.001). Thus, 72.1% of the participants who were suffering from hypertension had aggressive prostate cancer compared with 27.9% of the participants who had aggressive prostate cancer was not suffering from hypertension. Also, there is a likelihood that diagnosed with prostatitis/UTI was related to aggressive prostate cancer (p = 0.001). Whereas 74.4% of the participants who had aggressive prostate cancer were diagnosed with

prostatitis/UTI, only 25.6% of the participants who had aggressive prostate cancer were not diagnosed with prostatitis/UTI.

Table 4.6: Test of association between health-related factors and prostate cancer

	Aggressive Prostate Cancer				
	Non-aggressive N (%)	Aggressive N (%)	Total N (%)	χ^2	p-value
Hypertension					
No	27(61.4)	24(27.9)	51(39.2)	**13.6667**	**<0.001***
Yes	17(38.6)	62(72.1)	79(60.8)		
Diabetes					
No	17 (38.6)	40 (46.5)	57(43.9)		
Yes	27 (61.4)	46 (53.5)	73 (56.1)	0.7332	0.392
Diagnosed with Prostatitis/UTI					
No	24 (54.6)	22 (25.6)	46 (35.4)		
Yes	20 (45.4)	64 (74.4)	84 (64.6)	**10.7**	**0.001***

*p<0.05

4.6 Multiple Logistic Regression Analysis of Factors Influencing Aggressive Prostate Cancer

A multiple logistic regression model was used to test the strength and direction of the association between the outcome variable (aggressive prostate cancer) and independent variables (socio-demographic factors, lifestyle-related factors, and health-related factors). The model was also used to control for confounders all the socio-demographic factors, lifestyle-related factors, and health-related factors that were significant at p<0.05 during the chi-square test were included. Table 4.7 shows the multiple logistic regression analysis of the socio-demographic factors, lifestyle-related factors, and health-related factors having an association with aggressive prostate cancer among patients attending oncology clinic at the Korle-bu Teaching Hospital. The Wald Chi-squared value is 78.65 with a P-value of 0.000. This shows

the overall significance of the logistic regression model that was used to explain the factors that influence aggressive prostate cancer. Hence the multiple logistic regression model is appropriate. The multiple logistic regression analysis shows that age, employment status, history of cancer in the family, alcohol drinking status, smoking status, and hypertension and diagnosed of prostatitis/UTI status of the participant were significantly associated with aggressive prostate cancer.

Accordingly, participants who belonged to the age group above 60 years had 5.9 (AOR = 5.9, 95% CI = 1.6, 21.8, P<0.05) higher odds of aggressive prostate cancer than participants who belonged to the age group 60 years and below. Participants who were retired had 8.1 (AOR = 8.1, 95% CI = 1.6, 40.0, P<0.05) higher odds of aggressive prostate cancer than unemployed participants. The odds of aggressive prostate cancer was 4.0 (AOR= 4.0, 95% CI=1.1, 14.0, P-value<0.05) higher among those who had a history of cancer in the family compared to those who did not have a history of cancer in the family.

Participants who drink alcohol had 6.5 (AOR = 6.5, 95% CI = 1.8, 23.0, P<0.05) higher odds of aggressive prostate cancer than participants who did not drink alcohol. The odds of aggressive prostate cancer was 4.3 (AOR= 4.3, 95% CI=1.1, 16.5, P-value<0.05) higher among those who smoke compared to those who did not smoke. Participants who were diagnosed of Prostatitis/ UTI had 8.3 (AOR = 8.3, 95% CI = 2.3, 29.9, P-value<0.05) higher odds of aggressive prostate cancer than participants who were not diagnosed of Prostatitis/ UTI. Finally, the odds of aggressive prostate cancer was 8.4 (AOR= 8.4, 95% CI=2.1, 33.5, P-value<0.05) higher among those who had hypertension compared to those who had no hypertension.

Table 4.7: Multiple logistic regression analysis of factors associated with aggressive prostate cancer

Variables	COR (95% CI)	p-value	AOR (95% CI)	p-value
Age Mean(± SD)				
≤60 years	1 (Ref)		1 (Ref)	
>60 years	3.9 (1.8, 8.4)	0.001*	**5.9 (1.6, 21.8)**	**0.008***
Employment Status				
Unemployed	1 (Ref)		1 (Ref)	
Employed	2.3 (1.0, 5.7)	0.062	3.7 (0.9, 15.5)	0.069
Retired	5.4 (1.9, 15.1)	0.001*	**8.1 (1.6, 40.0)**	**0.010***
History of cancer in the family				
No	1 (Ref)		1 (Ref)	
Yes	4.2 (1.9, 9.3)	0.000*	**4.0 (1.1, 14.0)**	**0.032***
Alcohol drinking status				
Never drink	1 (Ref)		1 (Ref)	
#Drinker	3.2 (1.5, 6.8)	0.003*	**6.5 (1.8, 23.0)**	**0.004***
Smoking status				
Never smoke	1 (Ref)		1 (Ref)	
+Smoker	2.4 (1.1, 5.0)	0.026*	**4.3 (1.1, 16.5)**	**0.036***
Diagnosed of Prostatitis/ UTI				
No	1 (Ref)		1(Ref)	
Yes	3.5 (1.6, 7.5)	0.001*	**8.3 (2.3, 29.9)**	**0.001***
Hypertension				
No	1 (Ref)		1(Ref)	
Yes	4.1 (1.9, 8.8)	0.000*	**8.4 (2.1, 33.5)**	**0.003***
Lived in a mining area				
No	1 (Ref)		1(Ref)	
Yes	2.1 (1.0, 4.4)	0.047*	2.4 (0.8, 7.8)	0.134
BMI				
Underweight	1 (Ref)		1 (Ref)	
Normal	1.2 (0.5, 2.8)	0.722	2.8 (0.7, 10.8)	0.147
Overweight	4.2 (1.2, 14.2)	0.021*	1.3 (0.2, 7.9)	0.769
Obese	2.9 (0.9, 9.1)	0.072	2.7 (0.5, 14.5)	0.252

p*<0.05, +current or ex-smoker, #current or ex drinker

CHAPTER FIVE

DISCUSSION

5.1 Main Findings

This cross-sectional study investigated aggressive prostate cancer and its associated risk factors among patients attending the oncology clinic at the Korle-bu Teaching Hospital. The prevalence of aggressive prostate cancer was 66.1%. With respect to socio-demographic factors, patients who belonged to the age group above 60 years were more likely to have aggressive prostate cancer than participants who belonged to the age group 60 years and below. Also, patients who were retired were more likely to have aggressive prostate cancer than unemployed participants. Finally, patients who had a history of cancer in the family were more likely to have aggressive prostate cancer than those who did not have a history of cancer in the family.

With respect to lifestyle and dietary related factors, patients who drink alcohol were more likely to have aggressive prostate cancer than patients who did not drink alcohol. Also, patients who smoke cigarette/tobacco were more likely to have aggressive prostate cancer than patients who did not smoke.

With respect to health-related factors, patients who had history of Prostatitis/ UTI were more likely to have aggressive prostate cancer than patients who had history of Prostatitis/ UTI. Also, the patients who had hypertension were more likely to have aggressive prostate cancer than patients who had no hypertension.

5.2 Methodological Validity

This study has several merits. To the best of my knowledge, it is the first to investigate aggressive prostate cancer and its risk factors (socio-demographic,

lifestyle and dietary related factors, health related factors) among male patients worldwide and Ghana to be particular.

The participants were recruited from the study area and were 130 in all. There are high participation rate and the effect of selection and information bias was less. Information bias was not possible because the principal investigator obtained data from self-reported participants.

However, there were a few limitations that need to be uncovered. The source of the data was solely dependent on prostate cancer patients. As such, the findings cannot be transferable since the study is not representative of the entire patients suffering from cancer. A minor limitation is that some questions were not answered properly due to recall bias.

5.3 Comparison with Previous Studies

5.3.1 Prevalence of aggressive prostate cancer

Prostate cancer is leading cancer in both occurrence and the number of deaths in Africa (Rebbeck et al., 2013) and the second most common cancer among men in the world (WHO, 2015), therefore, an investigation of the risk factors that influence aggressive prostate cancer is important for public health benefit. In this study, the prevalence of aggressive prostate cancer was 66.1% among patients attending the oncology clinic at the Korle-bu Teaching Hospital. This prevalence is slightly lower than the prevalence in a study in Ghana conducted more than a decade ago by Arthur, Yeboah, Adu-Frimpong, Sedudzi, and Boateng (2006) who found that 83.6% of the patients had aggressive prostate cancer in Komfo Anokye Teaching Hospital. Also, in Africa, this prevalence is lower than the prevalence of 74.4% in Nigeria (Ikuerowo et al., 2013). Also, globally, this prevalence is far higher than the prevalence of 29.0% in

China (Fang et al., 2015). This high prevalence is because prostate cancer screening is not a common practice in Ghana in spite of prostate cancer being the most commonly diagnosed cancer in Ghana. Also, this high prevalence is due to low awareness of prostate cancer which results in the majority of the patients usually visiting the hospital with the disease in the advanced stage.

5.3.2 Association between socio-demographic characteristics and aggressive prostate cancer

The socio-demographic characteristics found in this study are similar to other studies. This study found that age, employment status and history of cancer in the family have an association with aggressive prostate cancer. Male patients within the age group above 60 years were more likely to have aggressive prostate cancer (77.9%) compared with male patients within the age group 60 years and below (22.1%). This study finds that age has a direct relationship with aggressive prostate cancer. This is consistent with the study by De Castillejos-Molina and Gabilondo-Narravo (2016) who identified that age of patients has an association with aggressive prostate cancer. The study found that patients who are above 60 years have higher odds of aggressive prostate cancer. Aging increases the risk of prostate cancer (De Magalhaes, 2013). According to Oesterling, Jacobsen, and Cooner (1995), patients aged more than 60 years have prostate cancer.

Also, from the study, 41.9% of the participants who had aggressive prostate cancer were retired compared to only 17.4% of patients who had aggressive prostate cancer being unemployed. This is consistent with the study by Lehto, Song, Stein, and Coleman-Burns (2010) that identified that employment status has an association with

aggressive prostate cancer. The study found that patients who are retired have higher odds of aggressive prostate cancer.

Finally, this study found that 77.9% of the patients who reported a history of a family member having cancer had aggressive prostate cancer compared with 22.1% of the participants who reported no history of a family member having cancer had aggressive prostate cancer. This is consistent with the study by Goh et al. (2012), Bashir et al. (2014), and Nemesure et al. (2012) who identified that history of a family member having cancer has an association with aggressive prostate cancer. The study found that patients whose family had a history of cancer have higher odds of aggressive prostate cancer. According to Nemesure et al. (2012), male patients whose fathers or brothers had prostate cancer were more likely of having aggressive prostate cancer.

5.3.3 Association between Lifestyle and dietary related factors and Aggressive Prostate Cancer

This study found that lifestyle and dietary related factors such as drinking of alcohol and smoking cigarette/tobacco have an association with aggressive prostate cancer. From this study, 72.1% of the male patients who smoke had aggressive prostate cancer compared with 27.9% of the participants who had aggressive prostate cancer but do not smoke. This is consistent with the study by Giovannucci, Liu, Platz, Stampfer, and Willett (2007) who identified that smoking cigarette/tobacco has an association with aggressive prostate cancer. Also, 70.9% of the male patients who had aggressive prostate cancer were alcohol drinkers compared with 29.1% of the male patients who had aggressive prostate cancer but were not alcohol drinkers. This is

consistent with the study by Zhao et al. (2016) and Dickerman, et al. (2016) who identified that drinking of alcohol has an association with aggressive prostate cancer.

5.3.4 Association between health-related factors and aggressive prostate cancer

The health-related factors such as hypertension and diagnosed with Prostatitis/ UTI were identified in the study to have an association with aggressive prostate cancer. This study found that 72.1% of the male patients who were suffering from hypertension had aggressive prostate cancer compared with 27.9% of the participants who had aggressive prostate cancer was not suffering from hypertension. This is consistent with the study by Ohwaki, Endo, and Hattori, (2015) who identified that hypertension status has an association with aggressive prostate cancer. Also, from this study, 74.4% of the patients who had aggressive prostate cancer were diagnosed of prostatitis/UTI compared with only 25.6% of the patients who had aggressive prostate cancer but were not diagnosed of prostatitis/UTI. This is consistent with the study by Collin et al. (2008) who identified that diagnosed with prostatitis/UTI has an association with aggressive prostate cancer.

CHAPTER SIX

CONCLUSION AND RECOMMENDATION

6.0 Introduction

This chapter presents a summary, conclusions, recommendations, and future research.

6.1 Conclusion

The study concludes that aggressive prostate cancer is prevalent among adult males in Ghana. Also, the author concludes that risk factors such as age, family history of cancer, alcohol drinking, smoking cigarette/tobacco, hypertension, diagnosed with Prostatitis/ UTI are associated with aggressive prostate cancer.

6.2 Recommendations

Korle-Bu Teaching Hospital

- The study found a high prevalence of aggressive prostate cancer among patients attending the National Radiotherapy Oncology and Nuclear Medicine department of Korle-Bu Teaching Hospital. Therefore the researcher recommends that Sponsorship and funding packages for oncology specialization course should be made available. This will motivate and encourage more medical officers to specialize in oncology to increase the number of the specialists so that as and when the patients are referred, they are seen immediately to avoid further delay which tends to spread so quickly.
- Also, the researcher recommends that when appointments for consultations and treatment schedules are being given, patients with the aggressive disease (Gleason score>7) should be given priority by given them an earlier date for

consultations and treatments. This will help reduce the time-delayed which affects the rapid progression of the disease.

Ghana Health Service

- The study concluded that alcohol drinking and smoking cigarette/tobacco are risk factors influencing aggressive prostate cancer. The researcher recommends that the Ghana Health service should advocate and educate the public on the health implication of smoking of cigarette/tobacco and alcohol drinking. This will help reduce the risk factor of alcohol and smoking causing aggressive prostate cancer.
- The public needs to be encouraged to undertake regular exercise, reduction of excessive salt intake, and practice healthy living and lifestyle modification including eating balance diet to help reduce hypertension.
- The study found a high prevalence of aggressive prostate cancer among patients visiting the oncology department of the Korle-Bu Teaching Hospital. The researcher, therefore, recommends that the health promotion unit of the ministry of health should intensify the campaign and create more awareness on prostate cancer screening. This will help pick the disease at the early onset of it to avoid diagnosing the patients at an advanced stage which may not give a good prognosis.

6.3 Recommendation for Further Research

The study recommends that future studies use rigorous designs such as cohort or case-control studies to be better able to measure causal associations between socio-demographic characteristics, lifestyle and dietary related factors, health-related factors, and aggressive prostate cancer.

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APPENDICE I (INFORMED CONSENT FORM (ICF) FOR PATIENTS)

This informed consent form is for patients who are the participants for the study.

The form has two parts:

A. Information sheet (to share the information about the study the participant)

B. Certificate of consent (for signatures if patient choose to participate)

You will be given a copy of the full informed consent form.

Part I: Information sheet

Introduction

You are invited to participate in a research project entitled: - Determinants of aggressive prostate cancer among the patients attending oncology clinic at the Korle-Bu Teaching Hospital, Accra-Ghana.

The study is being conducted by Oduro Philip Piyim of the University of Ghana, as part of requirements for the award of the Master of Public Health degree.

Purpose of the Study

We want to know the determinants of aggression prostate cancer

Procedure

This research will involve your participation in an interview session that is expected to last not more than 10 minutes. You will provide some personal details and answer some few questions by ticking your choices from a range of possible responses. No one else but the interviewer will be present unless you would like someone else to be there. The information recorded is confidential, and no one else except the researcher will have access to the information documented during your interview.

Risk

There is a risk that you ay share some personal information by chance, or that you may feel uncomfortable talking about some of the topics. However, we do not wish for this to happen. You do have to answer any question if you feel the questions are too personal or if talking about them makes you uncomfortable.

Benefits

There may not be direct benefit to you, but your participation is likely to help us know some information especially determinants of aggressive prostate cancer.

Incentives

You may not be provided any incentive to take part in the study apart from the transportation you will be given.

Confidentiality and Information Dissemination

Information you provide will be treated as confidential and nothing will be attributed to you by name. However, information obtained from the entire research will be presented to the faculty members at a seminar or VIVA of the University of Ghana, School of Public Health. I may then publish the results so that other people may benefit from the study.

Right to Refuse or Withdraw

You may stop participating in the study at any time you wish to.

Who to Contact

If you have any questions, you can ask them now or later. If you wish to ask questions later, you can contact any of the following:

The Chairman, KBTH-STC

THRO Mr. Victor Nortey

Administrator

KBTH Ethical Review Commitee

0277743365

Dr. Reginald Quansah

0272620401

Yaw121@yahoo.co.uk

Oduro Philip Piyim

0242851050

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Part II: Certificate of consent

Participant Declaration

By signing this form it means the following:

1. I have read this form thoroughly and understand it.
2. I know my rights have not been waived by signing.
3. I have had all of my questions answered and i know who to contact if i have more questions to ask.
4. I want to join the study.
5. I know I can opt out from the study any time and do not have to give any reasons.
6. I know the interviewer will have access to my medical records.

....

Signature of the participant Date

Researcher Declaration

I confirm that the potential participant has thoroughly received that fact sheet and has given consent voluntarily to participate in the study. A copy of this ICF has been provided to the participant.

....

Signature of the researcher Date

Thank you for participating in this research.

APPENIX II (QUESTIONNAIRE)

Dear Sir/Madam,

You are invited to participate in a researcher study. The study is being conducted byOduro Philip Piyim of the University of Ghana, School of Public Health, as part of the requirements for the award of the Master of Public Health (MPH) degree. Completion of this questionnaire will take you about 10 to 15 minutes. You are invited to be part of this study because you are a patient at the oncology clinic and we are interested in information related to the study. Your information will be coded and will remain confidential.

ID [ ]

Name of the Interviewer: ……..
Date of interview: ……

SECTION A: DEMOGRAPHIC DATA
Please tick where appropriate [√]

1. **What is your place of residence?** 1= Rural [ ] 2= Urban [ ]
2. **Age in years?** [ ]
3. **What is your marital status?**
   1= Single [ ] 2= Married/Co-habiting [ ] 3= Separated/Divorced [ ] 4= Widowed [ ]
4. **What is your educational level?**
   1= None [ ] 2= Primary [ ] 3= JHS [ ] 4= SHS [ ] 5= Tertiary [ ]
5. **What is your employment status?**
   1=Unemployed [ ] 2=Employed [ ] 3=Retired [ ] 4= others (specify) …….
6. **What is your ethnic group?**
   1= Akans [ ] 2=Ewes [ ] 3= Ga/Dangme [ ] 4 = Mole-Dagbani/Grusi/Gurma 5=others (specify) ……
7. **What is your religion?**

1= Christian [ ] 2= Islam [ ] 3= Traditional/Spiritualist [ ] 4= others (specify)……

8. Height measurement: centimetres (cm) _____

9. Weight measurement: Kilogram _____

10. Have you lived in a mining area before?
1=Yes [ ] 2=No [ ]

11. If yes to Question 10, for how long? _____

SECTION B: LIFESTYLE RELATED FACTORS

12. Which of the following best describes your smoking status?
1=Never smoke [ ] 2=Smoker [ ]

13. If Yes to Questions 8, did you smoke any of the tobacco products such as pipes or cigarettes daily?
1=Yes [ ] 2=No[ ]

14. If yes to Question 8, what is the average number of cigarettes/pipes smoked per day? _____

15. Which of the following best describes your alcohol drinking status?
1=Never drink [ ] 2=drunkard [ ]

16. If yes to Question 11, how many times in a day do you drink?
1=Once [ ] 2=Twice [ ] 3=Thrice [ ] 4=More than thrice [ ]

17. In a typical week, how many days did you eat fruits? _____

18. In a typical week, on how many days did you eat Vegetables? _____

19. What type of oils or fat of cholesterol content is most often used for meal preparation in your household?
1=Low [ ] 2=Moderate [ ] 3=High [ ]

20. Which of the following best describes your salt intake ability?
1=Low [ ] 2=Moderate [ ] 3=High [ ]

21. In a typical week, on how many days do you walk or bicycle for at least 10 minutes continuously to get to and from places? _____

SECTION C: HISTORY OF PROSTRATE CANCER

22. Date diagnosed of Prostate Cancer ____/____/_____

23. Gleason score? _____ (b). Stage----------

24. Morphology _____

25. Is there any history of cancer in your family?
1=Yes [ ] 2=No [ ] 3=Do not know [ ]

26. If yes, cancer type---------- (b) Relative----------

SECTION D: HISTORY OF NCDs BEFORE DIAGNOSIS

27. Did you have hypertension? 1=Yes [ ] 2=No [ ] 3=Do not know [ ]

28. If yes, how many years now? ----------

29. Did you have diabetes?
1=Yes [ ] 2=No [ ] 3=Do not know [ ]

(b). Did you have any other non-communicable disease? If yes, ----------
30. Have you been diagnosed for Prostatitis/UTI before your current diagnosis?
1=Yes [ ] 2=No [ ]

SECTION E: KNOWLEDGE ON RISK FACTORS

31. Do you know any risk factors associated with prostate cancer
1=Yes [ ] 2=No [ ]

32. If yes to Question 28, what are some of these risk factors?
_____
_____

33. Did you know that the following are risk factors that exposes an individual to prostate cancer

Factors	**No**	**Yes**
Multiple sexual partners		
Other cancers		
Pre-marital sexual activities		
Frequency of sexual intercourse		
Alcohol consumption		
Chronic diseases		
Obesity		
Smoking		