OBESITY AS A RISK FACTOR FOR PROSTATE CANCER AGGRESSION AMONG CANCER PATIENTS IN SELECTED HOSPITALS IN KIAMBU COUNTY, KENYA.

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IN EPIDEMIOLOGY AND DISEASE CONTROL OF

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DECLARATION AND APPROVAL

DECLARATION AND RECOMMENDATION

Declaration

This research thesis is my original work and has not been presented for award of any master or conferment of a degree in this or any other institution.

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DEDICATION

This thesis is dedicated to my beloved family and my parents whose unwavering love and support have been the foundation of my academic journey.

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ABSTRACT

In the World, it is a growing concern as one third people is obese or overweight. Obesity is seen in all age groups, both genders and all ethnicities at variable rates and the

prevalence of which has more than doubled since 1980. The purpose of this study was to determine obesity as a risk factor for the aggressiveness of prostate cancer among male patients in some hospitals within Kiambu County, that is, Gatundu Level 5 Hospital, Kiambu Level 5 Hospital, and Thika Level 5 Hospital. This was study on the prostate cancer patients in the chosen hospitals. Primary information on the clinical history of PC patients was obtained with use of clinical records. A purposive sampling method was taken to target a sample size of 256 respondents from the 3 selected hospitals. This research was made by purposive sampling and convenience sampling technique. Since the retrospective aspect of obesity on PC was being analyzed, an analytical retrospective research design was used. Structured questionnaires were used to collect data from PC patients through follow up by phone call interviews and In depth interview guide to get open ended information from the healthcare professional's view on PC and obesity. The collected data was then cleaned, analyzed using SPSS version 28 and inferential statistics such as multinomial logistic regression analysis, and Chi-square tests of association at 0.05 level of significance were done to establish a relationship between the variables. It was also established from the findings that men in Kiambu County had a high level of prostate cancer aggression (cumulative of 52.9). The findings showed that, with more than 40 per cent of those with PC above 45 years, the other factors used in the study (age, marital status, length of diagnosis and stage of cancer) significantly affects the aggression of prostate cancer ($p < 0.05$). Prostate cancer aggression was significantly associated with obesity with the association between PC aggression with ever been obese ($p=0.018$), unfortunately still obese ($p=0.0111$), related PC symptoms with obesity ($p=0.003$), difficulty managing PC with obesity ($p=0.017$) and deaths from obesity ($p=0.000$). Specifically, age, tumor characteristics, family history, diet and lifestyle of PC patients were all further found to be confounding factors which lead to PC aggression. This study had a key conclusion: understanding how high aggression affects this cancer can assist with clinical decision making and patient education to promote personalized approach in the care of this prostate cancer. Recommendation: The health sector should lead a regular monitoring of the weight, body composition, etc. health indicators (blood pressure, cholesterol levels, etc.) in order to assess progress and recommend these to patients should they be necessary.

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List of Abbreviations and Acronyms

BMI – Body Mass Index

HBC – Home-based care

IARC - International Association for Research on Cancer

MOH – Ministry of Health

OR - Odds Ratio

PC – Prostate Cancer

SWGA- Southwest Georgia

Operational Definition of Terms

Cancer Control Strategies: Programs organized to reduce cancer incidence, morbidity and mortality and to improve quality of life of cancer patients are referred to as Cancer Control Strategies. In the prevention, early detection, diagnosis, treatment and palliative care, this is done through evidence based approaches.

Obesity: Abnormal or excessive fat accumulation that presents a risk to health the obesity. It is usually defined as a Body Mass Index, or BMI, of over 25 which is labeled as overweight, and over 30, which is defined as obese.

Prostate Cancer: A cancer that arises from the epithelial cells of the prostate gland.

Confounding Factors: These are third variables which can distort or bias the relationship between an exposure and heath outcome by an extraneous influence (i.e. three or more factors that could influence our ability to measure an association).

Body Mass Index (BMI): A calculation of whether a person is a healthy weight (work out by dividing a person's weight in kilograms or pounds by the square of their height in metres or feet). However, a higher BMI does not confirm the presence of fat, or a fat disease.

CHAPTER ONE: INTRODUCTION

1.0 Introduction

Generally speaking, this chapter tends to present a broad overview of the topic that then narrows the scope in new pieces to the specific research questions or hypotheses the study will attempt to investigate. This chapter also gives the context of provided by reviewing the relevant background information and any gaps in the existing literature this research seeks to fill. Additionally, it defines the objectives, scope and the contribution of the study, gives direction to the chapters coming after, and provides a clear roadmap for the reader to follow.

1.1 Background of Study

The problem of obesity is a global one: an estimated one third of the world's people are obese or overweight. Since 1980, prevalence rates of this condition doubled and obesity has been on the rise affecting people of all ages, genders and ethnicities (Choi et al., 2019). The research about how obesity affect cancer has been done (Ye et al., 2020; Kim & Scherer, 2021; Pappachan, 2021) but it seems like there are too many research studying how cancer affect the patients who are obese and how it is in turn affecting those patients. Obesity is defined as excessive accumulation of fatty tissue in the body; and Body Mass Index (BMI) is commonly used for the purpose of adiposity indication (Dal & Ulutas, 2021). According to Slawinski et al. (2020), a BMI ranging from 25 up to 29 is overweight, and over 30 is obese. Being obese puts a person at higher risk of not only several diseases like type 2 diabetes, hypertension, cardiovascular diseases, respiratory diseases, and several different cancers (Apovian, 2016). They go further still, mentioning

that, when it comes to cancer risk after smoking, there is nothing that can be compared to obesity itself.

At the global scale, obesity affects 11.9% of men and 13.1% of women associated with at least 13 types of cancer (Avgerinos et al., 2019). The International Association for Research on Cancer (IARC), confirmed to Lauby-Secretan et al. (2016), that obesity is associated to the cancer risk of the ovarian, breast, gallbladder, liver, kidney and pancreatic tissues, … The mechanisms between obesity and cancer are hormonal imbalance, insulin resistance, oxidative stress and gut microbiota (Talib et al., 2023).

Prostate cancer (PC) is the second most prevalent cancer in men globally and secondly most cause of cancer related mortality (GLOBOCAN; 2018). As has been shown for other parts of Asia, incidence and mortality from prostate cancer have also been rising but rates are less in Asian Americans than among other Asian countries (Ito, 2014). Lots is researched regarding prostate cancer prevalence among different races and place, but there's little research on African countries. Hematuria and acute urinary retention study in Ghana revealed the benign prostatic hyperplasia (BPH) responsible for 60% of the cases of acute urinary retention was 28.6% hematuria. It is reported that the prevalence of prostate cancer amongst the men older than 50 years is up to 6 - 10 % in Ghana and Trinidad and Tobago, but prevalence appears to be lower in most African region, probably due to underreporting, inadequate cancer registries and non screening practices (Hsing et al., 2014).

Prostate cancer screening rates in Kenya are very low at 4.4%. The possibility of screening is higher among men aged 50–54 years and those in Eastern, Nyanza and Nairobi regions (Okyere et al., 2023). Wambalaba et al (2019) states that prostate cancer is second most occurring cancer among the Kenyan men. For instance in Gatundu North

in Kiambu County, low level of awareness at 57.3 % was 5 % to screen in which area (Mbugua et al., 2021). Prostate cancer remains the most common type of cancer among men in Nairobi County; however Nairobi County registers slightly higher screening rates for Prostate cancer at 6.8% when compared to Kiambu County where it is 4.2%. Again, the screening rates for this cancer among men in Kiambu County are slightly higher (Kamita et al., 2023).

Prostate cancer is a major public health problem in Kenya, with high mortality rate, and is gender related. Gender (Talib et al., 2023) very much affects obesity and cancer outcomes. The age standardised incidence of prostate cancer in Kenya is 40.6 per 100.000 (Mbugua et al., 2020). Urbanization, population growth and lifestyle changes are factors that help in the escalating rate of TB in Africa (Brown et al., 2018). Prostate cancer is often manifested late when it is already asymptomatic, and the prognosis is so poor as well as treatment options are limited. Screening is still an important way of detection, early with an intention to reduce mortality (MOH, 2017; MOH, 2018). According to KIPPRA (2018), that men of age 40 to 69 are given informed decisions.

Prostate cancer is more aggressive and progresses biologically in an earlier stage with citalopram indications (e.g. obesity), by its association in epidemiology, using mechanisms such as hormonal imbalances and metabolic dysregulation (Ye et al., 2020; Kim & Scherer, 2021; Pappachan, 2021). On the other hand, obesity shows possibly more adverse effects on prostate cancer prognosis and higher mortality due to cancer (Wilson et al., 2022). Research on 950,000 Norwegian men over 21 years found that only 9 percent more risk of prostate cancer was associated with a BMI of more than 30 kg/m^2. However, the later was higher in men of 50–59 years of age, yet it demonstrated that age was associated with the increased risk of prostate cancer in obesity (Bandini et al., 2017).

According to Rawla (2019), nearly 1 in 4 cancer diagnoses in the US involve cancer, and among the men, the aggressiveness of prostate cancer is higher in women as well.

Prostate cancer risk factors include endogenous, and exogenous. The dietary habits, environmental exposures and disparities in healthcare access, while family history, androgen levels and genetic predispositions are endogenous factors, including exercise, diet and Body Mass Index (BMI); stress level, menopause, and fertility factors, smoking, alcohol, and hormone replacement therapy (HRT); alcohol consumption, diet and family history; alcohol use and family history, among other factors (Rebbeck et al., 2023). For instance, African American men are among the words with the highest incidence rates of prostate cancer in the world, and a part of this may be genetic and a part of this may be social, like healthcare access, for example. Selenium, vitamin E, and lycopene (Antonelli et al. 2023) are possible to have protective effect in prostate cancer. Some dietary factors such as high fat intake and vitamin D deficiency are also associated with increasing prostate cancer risk.

The goal of this study is to examine whether prostate cancer involves obesity and if prostate cancer cases were obese before they developed the disease, and to identify whether obesity is related to the disease's severity and progressiveness.

1.2 Problem Statement

Both obesity and prostate cancer are serious disease burdens worldwide, and immediate attention is needed. These include escalating obesity rates reported by the World Health Organization (WHO) and prostate cancer being the number one cause of cancers that are causing deaths of men. This is a case of convergence in Africa, where rising obesity trends are occurring simultaneously with increasing prostate cancer incidence. Prostate

cancer is a leading public health issue in Kenya, is often diagnosed at advanced stages and prevalence of obesity is also increasing, particularly in urban areas. In Kiambu County, Kenya, there is another trend of increased urbanization and the accompanying lifestyle changes associated with obesity through other challenges in prostate cancer diagnosis and treatment.

Out of all cancer types, prostate cancer was the 2nd most common in men globally in 2018 followed by lung cancer, both with around 1.3 million cases (14.5%) respectively. Africa and Asia report the highest mortality rates, prostate cancer is the leading cancer type in Kenya among men. The problem is also expected to worsen with urbanization and expansion of urban area. This has contributed to increased cases and mortality in prostate cancer in Kiambu County where low screening rates to prostate cancer have been recorded.

Much of this is concerning yet there is limited knowledge of the exact mechanisms linking obesity to aggressive prostate cancer in African populations, particularly in Kenya. These findings need to be confirmed via research and such mediating factors need to be determined. For this reason, our goal in this study is to identify what connection exists between obesity, as measured by BMI and possibly other factors, and aggressiveness of prostate cancer as verified by Gleason score, in a population of Kenyans, to assist in understanding what weight status does with the aggressiveness of the disease as a modifiable risk factor and recommending targeted prevention efforts in such a high risk setting.

1.3 Research Objectives

1.3.1 General Objective

To evaluate obesity as a risk factor for the aggressiveness of prostate cancer among male patients in hospitals, in Kiambu County.

1.3.2 Specific Objectives

The study seeks to achieve the following objectives to clarify the research inquiries presented:

i. To determine the level of prostate cancer aggression among men in selected hospitals in Kiambu County.
ii. To assess the influence of demographic characteristics on prostate cancer aggression in selected hospitals in Kiambu County.
iii. To determine the association between obesity and aggression of prostate cancer among men in selected hospitals in Kiambu County.
iv. To determine the confounding factors leading to obesity and prostate cancer aggression among men in selected hospitals in Kiambu County.

1.4 Research Questions

i. What is the level of prostate cancer aggression among men in selected hospitals in Kiambu County?
ii. What influence do demographic characteristics have on prostate cancer aggression among men in selected hospitals within Kiambu County?
iii. What is the association between obesity and aggression of prostate cancer among men in selected hospitals in Kiambu County?
iv. What are the confounding factors leading to prostate cancer aggression among men in selected hospitals in Kiambu County?

1.5 Justification of the study

Prostate cancer has continued to rise in prevalence in Kiambu County and this calls for such examination of the extensive impacts the disease has on factors such as cancer progression.

The apparent link between obesity and poor health outcomes in prostate cancer is supported by several studies. Although some studies associate obesity and prostate cancer risk, very little research has been performed to determine how obesity affects the progression of prostate cancer. The purpose of this study is to establish this relationship and to learn about possible mechanisms.

Prostate cancer is the most commonly diagnosed cancer for men and leading cause of cancer deaths among men. Knowing the modifiable risk factors such as obesity would have strong implications for patient management, prevention strategies and cost efficiency in healthcare delivery systems.

A breakthrough in prevention and treatment strategies may come from investigating an association between obesity and prostate cancer progression. The proper programme of treatment would consist if a clear association is established, of targeted weight management programs that could make the difference in clinical outcomes for patients.

1.6 Significance of the Study

The results of this study are expected to play a vital role in coming up with interventions to manage obesity through weight management programs that would see a reduction in mortality rates due to prostate cancer in Kiambu County and nationwide. By informing and enhancing national cancer control strategies from 2023 to 2028, these findings have the potential to mitigate the projected increase in cancer cases in the future. Moreover, the insights gained from the study are poised to deepen understanding of how prostate

cancer patients, especially those affected by obesity, present and respond to screening. This understanding can facilitate early detection and diagnosis of prostate cancer in obese individuals, enabling timely intervention to prolong life expectancy, improve post-diagnosis quality of life, and establish effective survivorship care planning and rehabilitation programs.

Additionally, the findings shall contribute to the delivery of comprehensive palliative care for cancer patients, addressing their physical symptoms, and psychosocial needs, and providing supportive services from the moment of diagnosis onward. Furthermore, the implications of the study align with the objectives outlined in the Kenya Health Sector Strategic Plan 2018-2033 (KHSSP). By identifying contributing factors that exacerbate the aggressiveness of prostate cancer among men in Kiambu County, the study can inform the development of targeted strategies for early screening, diagnosis, and awareness campaigns. This initiative aims to motivate men to seek timely treatment, thereby reducing preventable fatalities and fostering overall community well-being.

1.7 Limitations and delimitations of the Study

The study's limitations involved recall bias, wherein participants might inaccurately recall or report past events or experiences. This is because primary data obtained from the respondents used to back secondary data were not reliable.

To alleviate this issue, the researcher explored all available data collection alternatives to capture information as comprehensively as possible. Additionally, the anonymity of the respondents was ensured, questionnaires underwent pre-testing, and clear and unbiased language was employed.

Moreover, the study heavily relies on clinical data from patients, which might not accurately predict future trends, potentially limiting the generalizability of findings to

future periods. However, to address this concern, both historical data and current data from hospital records and patients admitted with prostate cancer were utilized to enhance the reliability of the study. Historical data was cross-validated and subjected to quality control measures to minimize uncertainty.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter explores academic research on the link between prostate cancer and obesity, focusing particularly on demographic factors and other relevant confounding variables. It delves into significant theories pertinent to cancer management and control, particularly addressing obesity and other risk factors. Additionally, the chapter identifies gaps in the existing literature on prostate cancer management and its associated risk factors. It is organized into three primary sections: empirical literature, theoretical literature, and conceptual framework.

2.2 Empirical Literature

Several studies in the empirical literature have investigated the variables relevant to this study and their correlation with prostate cancer.

2.2.1 Prostate Cancer Aggression

This passage is focused on clinical features, the means of diagnosis, genetic factors and future research direction of Aggressive prostate carcinoma (ACPC). Molecular analyses of prostate cancer aggressiveness are additionally based on several clinical parameters such as the Gleason score, disease stage and PSA levels. Based on the work of Donald

Gleason in the 1960s, the original Gleason score and its refinement are now used in a 5 tier ‘Grade Group’ (GG) system. It is also this system that provides the means for a more fine grain classification of prostate cancer for better prognosis and treatment planning. In fact, for clinical decision making with which to tailor the treatment to the extent of disease, Epstein et al. (2016) differentiate Gleason 3 + 4 (Grade Group 2) from Gleason 4 + 3 (Grade Group 3), with Gleason 3 + 4 being more meaningful.

But besides genetic factors, the force of prostate cancer aggression is influenced by other factors. The disease has also been linked to mutations in genes such as TP53, PTEN, and SPOP; these more aggressive kinds of the disease. Nevertheless, certain TP53 mutations are associated with higher probability of metastasis and worse prognosis. Also, knockout of PTEN led to increased tumor growth and survival. As with severe races BRCA1 and BRCA 2 genes, prostate cancer also has been linked to.

The second important factor is the tumor microenvironment (TME) of aggressive prostate cancer. Such conditions as hypoxia, inflammation, and extracellular matrix composition affect the behaviour of a tumor. Prostate cancer cells can also turn up the kill switch molecules, such as PD-L1, which keeps the immune system at bay, and fend off an immune attack, which further adds to the complexity. This immune evasion is more aggressive and harder to treat some prostate cancers.

Wide usage is also made of Gleason scores and PSA levels in clinical assessment of patients, though they are not ideal markers to use. Some may never perfectly mirror the disease complexity or most accurately determine a result. For this reason, genomic and molecular studies taking place on an ongoing basis seek higher diagnostic precision and offer new treatment options, especially for aggressive prostate cancer (Ilic et al., 2018).

This research will help genetic data to be integrated with clinical and pathological findings in order to propose a more personalised treatment strategy. As we better understand the tumor microenvironment, and recognize the promise of genomic studies and immunotherapy, there potentially is more to make more effective diagnostic tools and therapies for treating aggressive prostate cancer. Finally, these may lead to more specific patient treatment options, that may allow for better patient treatment, first in the patient with most aggressive disease.

2.2.2 Age, obesity, and prostate cancer aggression

In recent years more and more studies have attacked the longstanding dogma that age is an important ‘red flag ‘ in deciding whether to treat a man for prostate cancer. Hermans et al. (2021) compared men aged up to 75 years of age with a low risk of prostate cancer (Gleason scores 5–7) and men aged up to 80 years of age with intermediate or high risk prostate cancer (Gleason scores 8–10) treated with radical prostatectomy, radiotherapy, and observed that in these groups of men life expectancy and quality adjusted rice years (QALY) was the same as in men aged younger than 75 years of age. Accordingly, the finding implies that the cancer’s risk characteristics, rather than patient age, may dictate treatment shoes or outcome.

Sridhar et al. (2020) study the relation between age with age at diagnosis of prostate cancer and risk characteristics, treatment choice and cancer specific survival. The study also found that age is used to determine whether to offer treatment rather than cancer risk, and that differences in observed survival rates may be partly due to this. Although, they showed that both age and cancer risk affected which treatment options were used, the variance was greater at age at diagnosis versus cancer risk.

What makes the studies particularly telling is the way that age can change preferences for treatment. The exposure to monotherapy therapy (> primary androgen deprivation therapy [PADT]) regardless of LVI risk status was more pronounced among patients over 65. Similarly, old men with high risk disease were more often treated with PADT than old men low risk of the same age group. Intriguingly, men began to lessen their inclination to any kind of neighborhood therapy, like prostatectomy, no matter whether their prostate malignant growth danger was low risk or high risk, and the more seasoned the men, the more inclined they were to have high risk prostate malignant growth, however less likely to get it.

Incidence of prostate is about 20-30% in men 40 50 years and detection of PSA prostate cancer men under 55 years are usually of low stage (Albertsen, 2020). African American men are particularly prone to having aggressive early onset prostate cancer, but are losing ground in efforts to equally win an equal battle on clinics that should lead to the best survival among all races. Second, young age prostate cancer is strongly associated with increased risk among first degree relatives (Hussein et al., 2015).

In fact, other studies have cited the unusual high rate of mortality among men in the group diagnosed with prostate cancer before the age of 55. In these cases, these cancers are more proaggressive, and the delay of diagnosis also occurs on prostate cancer because prostate cancer is less suspected in younger men, as mentioned by Barr (2020), Wu et al. (2020) and Simforoosh (2023). Nevertheless, ageing men over 65 years have the highest incidence of prostate cancer and sharp increase in the mortality rates in the same age group (Ferlay et al., 2018). The great complexity of prostate cancer progression is further confirmed by the fact that cases and mortalities increase with age and by further genetic and environmental determinants or individual patient factors.

While age remains a key factor in prostate cancer diagnosis and treatment, in general, these recent studies open the door to part of the future of considering these cancer risk characteristic and genetic predisposition in treatment planning, leading to a more personalized and more effective manner in which to fight the disease.

2.2.3 Marital status and prostate cancer aggression

Marital status has now been found to be a strong predictor of survival from a number of lymph and solid types of cancer, but its effect on prostate cancer survival rates has yet to be resolved. But now there are data that prove that in prostate cancer diagnosed men, marital status is an independent predictor of both prostate cancer specific survival, as well as overall survival. In a study like this, marital status was being tried to be investigated as a predictor of survival in these patients based on survival data with its marital status coefficients estimating Cox regression models to relate to prostate cancer specific and overall mortality. Results showed an association of prostate cancer specific mortality with being unmarried, increased by age, race, cancer stage or Gleason score, and independent of marriage (Tyson et al., 2013).

The Tyson and colleagues study showed that unmarried men were 40%% relative risk greater to die from prostate cancer specific mortality, and 51%% relative risk greater to die from all cause mortality, when compared to married men. Second, they presented exceptionally much better disease specific survival of 89.1% vs 80.5% for unmarried men. For many cancer types, this negative effect of not getting married on stage and survival outcomes has replicated. As in the case of population based cohort studies, such as from the Surveillance, Epidemiology, and End Results (SEER) database, patients who are separated, divorced or widowed have a higher rate of advanced stage cancer and a

higher risk of cancer specific and all cause mortality as compared to married individuals (Huang et al., 2018).

Thus, in the Italian population, the NOR/COMPRI study also studied possible correlations between such matters as the sexual behavior and prostate cancer. In an area where 271 patients with histologically confirmed prostate cancer and 685 age and sex matched controls were admitted to hospitals with acute non neoplastic, non genital and non urological conditions, the study was conducted. The authors showed that in Italy (Franceschi et al., 2013) there was a relationship between prostate cancer risk and some aspects of sexual lifestyle.

Finally it is found that marital status is the main predictor of mortality in prostate cancer patients. The mortality among unmarried men with prostate cancer is more than twice that for matched married men aged, racially, staged and graded. It means that epilectic status, in other words the social and emotional support that this implies, can have major bearing on how fast a patient moves along the prostate cancer show, and for how long thereafter they live after they are found with the malignancy.

2.2.4 Residence and Prostate Cancer

As you can see, this research stresses that environment makes a huge influence on prostate cancer patients, especially they have differences to be screened, to pick different therapies and get kinds of treatment. A study such as the one done by Steenland et al. (2013) in which 516 men under the age of 75 who had been infected with prostate cancer in 33 counties of Southwest Georgia (SWGA) is a relevant study. Combination of external radiation and brachytherapy (34%), external radiation alone (28%) and surgery (18%) were most commonly used treatments of the region. These results support our second hypothesis as men in SWGA were more likely to receive external radiation

therapy than surgical options (especially, they were more likely than men in Atlanta) than men in Atlanta.

This also found that African American men with prostate cancer were less likely to have surgery than White men with the disease. It might not be only racial but a differnt income disparity. Additionally, persons residing in rural areas were more likely to utilize external radiation therapy, while rural people were more likely to utilize brachytherapy and surgical treatment than the urban people.

Studies in Nigeria also suggest men in urban areas are usually younger than those in the rural areas who tend to have prostate cancer. Typically, the underlying reason behind this discrepancy has been attributed to cityites' tendency to live better lifestyles, have better access to health care, and live in better environments. One of the major factors to the higher aggressiveness of prostate cancer in the rural is late, diagnosis as a result, not enough healthcare facility for early detection (Kolapo et al., 2023).

The main target group for which this study was limited to include male patients of Black African provenance from rural and urban areas and foreigners visiting selected secondary health facilities for cancer treatment. These demographics are researched here too, to confirm that apposite environmental factors that will influence the management and the result of prostate cancer patients require that the screening and treatment access for these patients are tailored by different settings.

2.2.5 Obesity and Prostate Cancer

Over the years, these repeated studies are that overweight men have a higher chance of getting prostate cancer then normal or underweight men. For example, Tazanios et al. utilized Newcastle-Ottawa checklist scale and Review Manager 5.3 statistics of software

to find out whether BMI can influence prostate cancer. Males who are obese have a 54 percent higher chance of dying from prostate cancer compared to their counterparts in the normal weight category (Tazanios et al., 2022).

The relationship between obesity and a prostate cancer, however, is at times unclear. Other types of health professionals have also compared different sub types of the disease such as localized prostate cancer to serious kinds of prostate cancer like advanced prostate cancer. Moreover, Orsini et al. reported that there was a statistically inverse relationship of BMI and localized prostate cancer, but positively linear relationship with metastatic prostate cancer (Orsini et al., 2012).

Epidemiological data also suggest that on the basis of weight status obese men are more prone to developing aggressive prostate cancer and that their prognosis is poor. Obesity is one of thetabs that can promote tumor progression through its involvement with inflammatory cells and thus, body inflammation (systemic inflammation). In addition, obesity influences the systemic and local immune cell milieu and promotes cancer growth (Hayashi et al., 2019).

Diet and physical activity are other factors that determine prostate development and prognosis of the disease. Other research indicates that dietary choices are associated with a variety of rates of prostate cancer within different populations and races. Though obesity is not the only predictor of biochemical failure following radical prostatectomy, studies in patients who've had prostatectomy have never before suggested obesity as a unique predictor prior to any other factor. Thus, rather than for the incidence of prostate cancer in general (Digrazia, 2017), the association between being obese and prostate cancer is predominantly related to aggressiveness of the so-called locally advanced disease.

2.3 Theoretical Framework

Under theoretical review, theories surrounding behavioral health in prostate cancer are explored.

2.3.1 Health Belief Model Theory

The Health Belief Model (HBM) was developed in the 1950s by social psychologists working with US Public Health Service as part of a series of investigations aimed at understanding why individuals accepted or rejected preventive health services from health departments (Becker, 1974; Hochbaum, 1958; Rosenstock, 1960, 1974). As the model has matured, it has been used for multiple health concerns of prevention and early detection, including mammography, flu vaccines, sexual risk, and injury prevention.

The HBM states that a person's willingness to take action is influenced by his or her perception of risk (perceived susceptibility and perceived benefits). Perceived risk is one of the core constructs which is an individual's perception of the likelihood of being diagnosed with prostate cancer. Similarly, those who perceive extra vulnerability are more likely to be protective by screening or lifestyle changes. Personal or family history of problems with prostate specific antigen (PSA) and age may help predict that you may perceive yourself to be more vulnerable. A family history of prostate cancer can severely influence an individual's perception of risk, for instance men with an immediate male relative (father or brother) who has been diagnosed for example, often feel they are at a greater risk. Furthermore, it has also been established that the risk of prostate cancer increases with age and men of more than 50 years are susceptible to it (Rawla, 2019).

Perceived severity, as defined above, refers to attitudes regarding the seriousness of prostate cancer and what it produces and how it would result. Therefore, when the realization of prostate cancer as a major threat to their health comes to the fore, people

tend to take measures aimed at preventing that from happening. Perceived severity is influenced by the knowledge about the disease, recognition of some infections' complications and personal experience or that of others. Knowing the nature of prostate cancer, how it progresses, and what some of the potential side effects of treatment are (surgery, radiation, or hormone therapy) can, therefore, affect how severe a person perceives prostate cancer to be. These perceptions may be further increased by hearing stories of friends or relatives who have had prostate cancer, or information from support or advocacy groups. In addition to the impact that media coverage lowers, through documentaries, news articles and educational material other opinions about the seriousness of disease process are formed.

An individual's perceived benefits are their beliefs regarding whether a particular behaviour will help prevent or minimise prostate cancer. An example is when a person can believe that screening tests or nutritional changes can decrease his or her likelihood of getting the disease. This increases motivation to control the disease because it is aware that early diagnosis and intervention can reduce complications. In most cases prostate cancer is most treatable early, so those benefits can prompt men to make routine checkups. An early identification enables more treatment options, therefore, often less invasive, and it preserves the patient's quality of life, thus decreasing the probability of complications from treatment to become severe. This can also be done by educated men to encourage their peers to take note of the early signs to address prostate cancer (Rahimi & Faryabi, 2022).

Perceived barriers construct deals with the perceived obstacles individuals believe may prevent them from trying to eliminate prostate cancer. Economic (such as how much it costs to screen), psychological (such as the fear of the disease or treatment) or access based (such as making them where they can get medical care) along with knowledge (that

prostate cancer is even present) are examples of barriers. It is important to find out these barriers to perform preventive action.

Stimuli such as cues to action provide cues to action that prompt individuals to do health promoting behavior. In terms of prostate cancer, these cues may include screening messages, awareness campaigns, stories about friends and family that have been diagnosed, and messages from a healthcare provider. Text messages or emails could serve as reminders for men to go in for screenings in keeping with guidelines about checking for them according to age and risk factors. And awareness can be enhanced through collaboration with media to produce health promotion messages, workshops, brochures and online resources among others. Firstly, the decisions of undergoing screening for cervical cancer are greatly influenced by recommendations from primary care physicians and specialists.

Finally, self-efficacy is an individual's belief in the ability to take action with respect to prostate cancer prevention or treatment. Self efficacy enhances such preventive behaviors as adherence to screening and health promoting activities. Individuals with high levels of self efficacy for prostate cancer screening tend to be more likely to search and use healthcare services. In addition, people are more likely to take part in screening if they believe that they have the ability to talk with a physician about the screening process or if they understand the screening process. The relationship between motivation for lifestyle changes such as better diet and more exercise, or less risky behaviors like tobacco use or excessive alcohol use, and enhanced self-efficacy is a positive one.

Pucha (2022) points to the fact that health issues of prevention of asymptomatic diseases (including early cancer detection and hypertension) are among the best suitable cases for the HBM due to the importance of individual beliefs on behavior. Furthermore, the model

is applicable in other such interventions as cancer screening and HIV prevention aside from disease risk reduction. It serves as an aid to researchers in refining the strategic constructs and thus to enrich and strengthening the theoretical frameworks in health interventions. On the positive side, however, it is simple, but simplicity means that it does not take into account the emotional dimension of behavior.

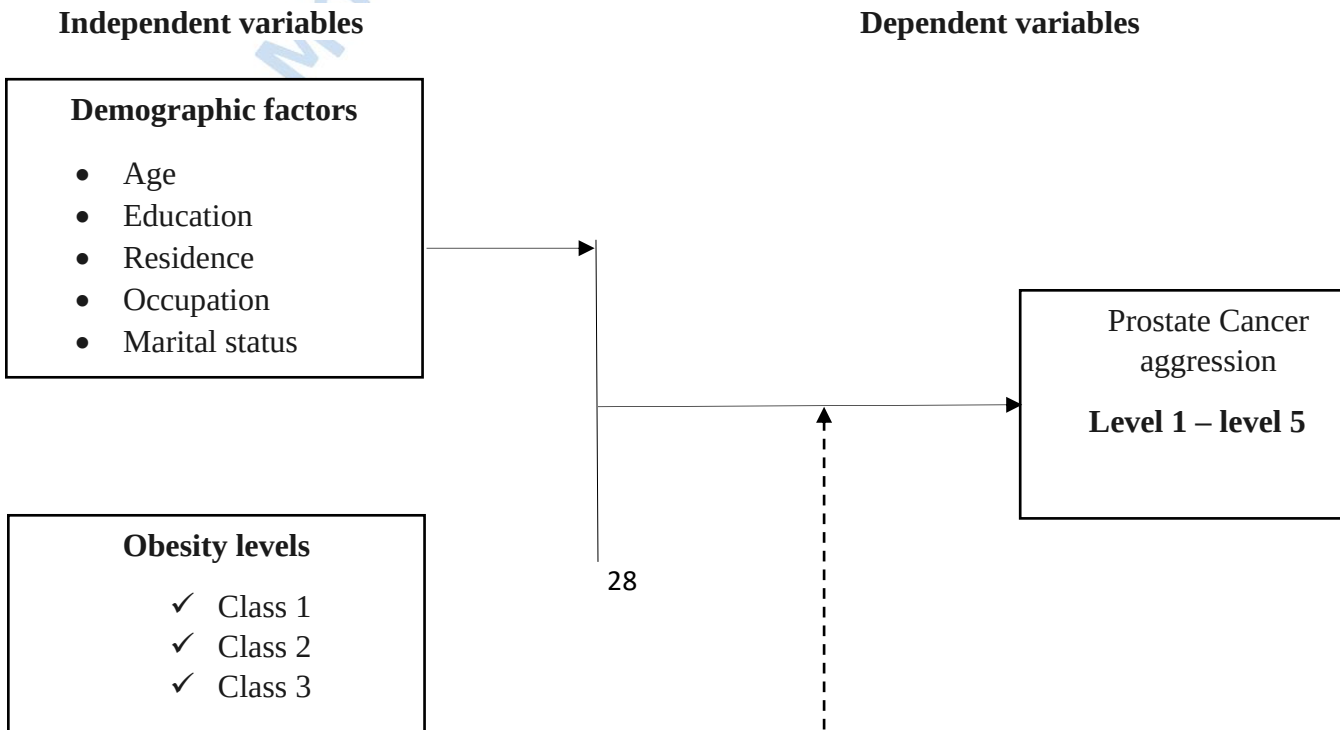
2.4 Conceptual Framework

The conceptual framework offers a graphical depiction and elucidation of how the independent and dependent variables interact within the study. It offers a system of linked concepts and principles that aid in analyzing and comprehending the study's variables. This investigation explores demographic factors, key aspects of cancer screening, and how obesity influences the advancement of prostate cancer.

2.4.1 Variables in the study

Independent variables – demographic factors (age, occupation, residence, marital status), confounding factors (overweight, ethnicity).

Dependent variable – the aggression of prostate cancer (based on the severity of PC)



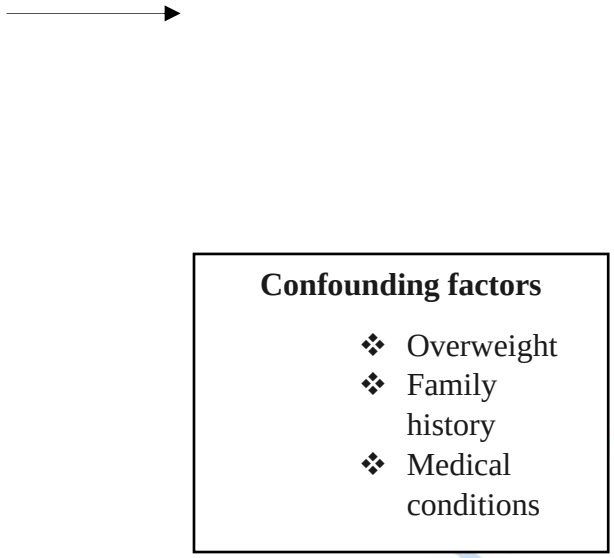


Figure 1: Conceptual framework

Prostate cancer aggression is typically measured using the Gleason score, which assesses the differentiation of cancer cells under a microscope. A higher Gleason score indicates more aggressive, poorly differentiated cancer. Other factors, like PSA levels, tumor stage (TNM staging), and genomic testing, also contribute to determining aggression.

CHAPTER THREE: RESEARCH METHODOLOGY

3.0 Introduction

This chapter describes the research design, the participants or data sources used (e.g., participants of study, survey respondents, interviewees), the instruments or tools of data collection (e.g., a questionnaire, interview questions), and the methods for analyzing data (e.g., statistical analysis, thematic analysis).

3.1 Location of the Study

Located in Kenya, Kiambu County serves patients from various locations of the county and its neighbouring counties. It shares borders with Nairobi and Kajiado Counties to the south, Machakos to the east, Murang'a to the northeast, Nyandarua to the northwest, and Nakuru to the west. The study focused on three hospitals in Kiambu County: Thika Level 5 Hospital, Gatundu Level 5 Hospital, and Kiambu Sub-County Level 5 Hospital. These hospitals were chosen because they actively participate in cancer screening programs and are strategically located for cancer patients. They play a vital role in managing cancer cases not only within Kiambu County but also nationally. As Level 5 hospitals, they serve a diverse range of patients, including both affluent individuals and those with limited financial resources. Moreover, these hospitals have established a commendable reputation for their expertise in cancer management, attracting a substantial number of referrals for prostate cancer cases.

3.2 Research Design

An analytical retrospective survey was conducted at Thika, Kiambu, and Gatundu Level 5 hospitals to explore the relationship between obesity and prostate cancer aggression

among men in Kiambu County. This research design was chosen due to its retrospective nature, aiming to assess whether obesity influenced the aggressiveness and severity of prostate cancer as reflected in patients' medical histories.

Data collection involved multiple sources, including clinical records such as diagnostic records, medical files, patient records, and admission books. Administrative databases, including claims data, discharge summaries, and billing records, were also utilized. Access to public health data from epidemiological databases within the hospitals enriched the dataset. Both physical and electronic patient record-keeping systems were employed to ensure comprehensive data collection.

The survey involved several hospital departments: pathology, prostate cancer clinic, nutrition, palliative care, and surgery. The pathology department provided a list of patients whose samples were processed and diagnosed with carcinoma, allowing for a thorough review of their files to confirm prostate cancer diagnoses and extract relevant data. Records from the palliative care unit documented all cancer patients visiting the hospitals for chemotherapy, symptom management, or other treatments. The surgery department’s database facilitated the extraction of records for patients who underwent surgical procedures related to prostate cancer. Additionally, the prostate cancer clinic contributed data on reported cases of prostate cancer during the study period.

Data retrieval was facilitated using the Smart Care electronic system, covering the timeframe from January 2022 to January 2024. Unique identifiers, including hospital numbers and associated telephone details, enabled effective follow-up. The extracted data was consolidated into an Excel spreadsheet, allowing for duplicate checking and further analysis. Key extracted information included patient demographics, cancer

primary site and histology, year of diagnosis or first encounter, and details regarding obesity as a potential risk factor for prostate cancer aggression.

3.3 Target Population

This involved individuals who are the primary subjects of the study, to explore and derive conclusions regarding the link between obesity and prostate cancer aggression. These prostate cancer patients possess distinct characteristics that enable broader inferences to be drawn from the findings. The study encompassed all prostate cancer patients residing in the Kiambu, Thika, and Gatundu sub-counties who have sought medical attention for diagnosis in the three hospitals Thika level 5, Kiambu level 5, and Gatundu level 5, including those receiving hospice care.

3.4 Sampling Technique and Sample Size Calculation

For the purpose of collecting data, this study used the purposive sampling method, from several of prostate cancer patients at the selected healthcare facilities, i.e. the cancer care departments' heads/physicians. Prostate cancer patients who were selected purposively were also based on the records in the hospitals. All the records based on the inclusive criteria have been selected with a sample size of 256 participants. Prostate cancer patients and healthcare heads/physician were purposively sampled as they have specific knowledge and experiences regarding the study of obesity and aggressive prostate cancer given the focus of the study. The disease is described from the perspective of patients and healthcare professionals provide our expert perspectives on diagnosis, treatment and risk factors.

Sample size calculation

The sample size required for this study was calculated using the Taro Yamane formula (Yamane, 1967) as shown below;

$$n = \frac{N}{1+Ne^2} = \frac{3847}{1+(3847)0.05^2} = 285$$

Where N is the population size, e is the precision level.

The targeted sample size was 285 patients with prostate cancer. However, 256 patient records were successfully obtained and followed up on phone call interview.

Table 3.1 Sample distribution per facility

Facility	**Sample collected**	**Percentage**
Thika Level 5	110	42.97
Kiambu Level 5	86	33.59
Gatundu Level 5	60	23.44
Total	**256**	**100**

3.4.1 Inclusion Criteria

The study encompassed all male patients aged 18 years and above who underwent treatment for prostate cancer throughout the entire study duration, encompassing both new diagnoses and recurrent cases. All relevant records, whether in physical or electronic format, were assessed to ascertain if patients met the study's inclusion criteria.

Patients with high MUAC levels above 30 were considered obese and thus included in the study. The study relied on records from January 2015 to December 2023 to back up

data collected from patients. This data was obtained from the nutrition department at the hospital where the health status of obesity was assessed and the cancer departments.

The study included patient files obtained from the hospital records with a history of obesity and prostate cancer.

3.4.2 Exclusion Criteria

Patients whose MUAC measurement is below 30 were excluded from the study assuming they are not obese. Individuals with MUAC below 30cm were excluded because the study aimed to specifically investigate obesity as a risk factor. Including non-obese participants would dilute the sample and potentially obscure the relationship between obesity and prostate cancer aggression.

3.5 Research Instruments

The study employed a checklist and data extraction form to gather historical secondary data from the patients' database within the selected hospitals in the study area. For primary data collection, scheduled phone call interviews were conducted to follow up with patients using a guided questionnaire. Structured questionnaires were selected for this purpose, as they facilitate straightforward analysis of information (Greener, 2008). According to Kothari (2008), questionnaires provide unbiased information that is unaffected by researchers' influence, ensuring the collection of accurate and valid data.

In addition to quantitative data, data extraction forms or checklists were utilized to guide in-depth interviews aimed at gathering qualitative data. This qualitative data included textual information extracted from written hospital summaries detailing patients' conditions, as well as visual data such as photographs (e.g., X-ray scans), narratives, and thematic content. The qualitative approach is based on the understanding that reality

varies across individuals and contexts, indicating that a single scale cannot adequately capture measurements (Holmes et al., 2023). This multi-faceted data collection method allowed for a comprehensive understanding of the relationship between obesity and prostate cancer aggression, incorporating both quantitative and qualitative dimensions.

3.5.1 Piloting

The pilot study is a preliminary study tested the method and procedures that will be used in a bigger research project (Arain et al., 2010). The main goal of this pilot study is to determine whether the experience provided by the methods and procedures in this study are suitable for the main study (Polit, Beck, 2017). In this spirit, a pilot study was done to figure out the effectiveness and reliability of such data collection tools as the checklist and questionnaire. In this case, it was carried out with the purpose of evaluating some characteristics of levels such as comprehension, logic flow, and relevance.

Accordingly, the pilot study should involve some 10 percent of sample size (Cooper and Schindler, 2011). Randomly, pre-test questionnaires were distributed at Murang'a Level 5 Hospital as it is near the researcher. To avoid including a respondent that may be in the target population for the main study, careful selection was made of the respondents to the pre-test questionnaires. The credibility of the data collection process also was good, additional, the names of the pre-test respondents were cross checked to avoid duplication. That is, it allowed refinement of the data collection tools before large scale main study, thus improving the overall reliability and validity for the methods.

3.5.2 Validity

Validity is a major part of research which means that before an instrument is used, it is essential that it is proved its intended measurement is measured accurately (Orodho,

2003). Various means of assessment are made possible through content validity, construct validity and criterion validity (Messick, 1995). Content validity involves checking what the instrument is measuring and how adequately it includes all the aspects that are part of the topic under investigation. The construct validity examines the degree to which the measure correlates as theorized, hence confirming the instrument for capturing the intended constructs. Criterion validity assesses the ability of the instrument to predict outcomes or to estimate presence of current conditions.

The researcher also did a comparative analysis between the used research instrument and the instruments used in previous studies to ensure the validity of the research instrument. In this comparison it gave us an idea whether it matches with other measurements as to make the instrument credible. The researcher could confidently argue for validity of instrument used in the study and it would show that the instrument is consistent and accurately measures what primary was intended to measure. The process of validating the instrument is seriously scrutinized and the practice contributes immensely to ensuring the reliability and robustness of the research findings.

3.5.3 Reliability

The reliability refers to how much a research tool gives the same results when used in the second time (Mugenda & Mugenda, 2003; Orodho, 2004). Reliability can be checked by doing the test again later, by using different versions, or by splitting it in half. The internal consistency is what we will discuss in this study. This uses the fact that all of the questions in the tool should be measuring the same thing (Drost, 2012). Cronbach's alpha will be used to check reliability. Thus, if the data is 0.70 or greater, it indicates that the data is reliable, or we can trust the opinions of all of the people we have asked (Orodho, 2009).

3.6 Data Collection Procedure

The research was done by collecting both primary and secondary data. Primary data involves gathering information directly from the source through methods like surveys or interviews, in this case, a questionnaire was used, while secondary data was obtained from existing sources such as databases or literature reviews. In-depth Interviews were employed to gather qualitative insights from healthcare professionals within the healthcare facilities. These interviews involved healthcare providers from various cancer care departments, such as diagnosis, palliative care, and surgery departments. The interviews served to fill out the data extraction form and structured questionnaire. Data on patient diagnosis, Gleason score, treatment history, and relevant risk factors were collected from healthcare professionals.

3.7 Data Analysis

Data analysis comprised several key steps: coding, categorizing, entering, manipulating, and summarizing the collected data. After the data was gathered, it underwent a coding process, followed by cleaning and organizing based on the items outlined in the questionnaires. Descriptive and inferential statistics were conducted using SPSS version 28. To ensure the accuracy of the data input and to prevent duplicates, stringent quality control measures were implemented.

The analysis included estimating cumulative cases of all-cause mortality and specific prostate cancer cases by year of diagnosis. A multivariate analysis was performed using multinomial logistic regression to investigate the relationship between demographic factors, levels of obesity, and the aggressiveness of prostate cancer. Assumptions for this analysis included assessing the linearity between independent variables and the log-odds of the dependent variable, as well as ensuring that the dependent variable was measured

at the nominal level (categorical with no inherent order). This approach was vital for understanding how demographic factors relate to prostate cancer patients with obesity.

Additionally, a chi-square test was conducted to examine the association between prostate cancer aggression and obesity levels. This statistical analysis provided insight into the potential connections between these variables, contributing to a more comprehensive understanding of the factors influencing prostate cancer aggressiveness in the study population.

For objective 1, the following multinomial logistic regression model was developed:

$$\frac{Y_i}{Y_0} = \beta 0 + \beta 1X1 + \beta 2X2 + \beta 3X3 + \varepsilon \ (1)$$

Where Y_i is the category of the dependent variable, prostate cancer aggression levels.

The prostate cancer aggression levels measured using the Gleason score range from, 1= non-aggressive, 2= slightly aggressive, 3=moderately aggressive, 4=aggressive, and 5-highly aggressive.

Y_0 represents the reference category, in this case, our reference category is 1, which is nonaggressive.

Where: β0: A constant representing the predicted value of the dependent variable Y when all the predictors in the model are zero. β1, β2, β3: Coefficients of X1, X2, and X3 respectively, indicating the sensitivity of the dependent variable Y explained by the independent variables X1, X2, and X3, (demographic factors, obesity levels, and confounding factors). The analyzed data was then presented into tables to provide further insights.

Qualitative data was analyzed using thematic analysis, capturing important themes from the In-depth Interviews.

3.8 Ethical Consideration

Permission from the Ethics Review Committee at the Mount Kenya University was first sought by the researcher (see appendix VI, ref: 2806) and this was followed up with an authorization from the National Commission for Science, Technology and Innovation (Appendix VI, ref: 320933). Having academic integrity at heart, all of the work that was borrowed was properly cited to ward off plagiarism. Also, the researcher was given and sought approval from the relevant hospitals in order to collect data from the relevant departments and patients.

In order to protect the confidentiality of hospital data, strict measures were put in place to prevent the sensitive data from being accessible to the unauthorised personnel. Participants were given very thorough information on the purpose, potential benefits and risks of the study, as well as their right to withdraw or begin withdrawals at any time without penalty. The research report was reported with accuracy so as to favour no particular hypotheses. All of the participants were treated with respect equitably throughout research process and strict principles of fairness and non discrimination were upheld in an ethical research environment.

CHAPTER FOUR: RESULTS AND DISCUSSIONS

4.0 Introduction

This chapter centers on the presentation and analysis of the data collected during the research process. It begins with a comprehensive overview of the methods employed for data collection, detailing the various approaches used to gather information relevant to the study's objectives. The data is then organized and presented systematically, utilizing tables, graphs, and charts to enhance clarity and facilitate understanding. The analysis of the data is conducted to derive meaningful conclusions that align with the research goals. This includes interpreting the results and examining patterns and relationships within the data. Overall, Chapter Four is essential for showcasing the evidence and findings that underpin the research objectives, providing a robust foundation for the discussions and conclusions that follow in subsequent chapters.

4.1 Questionnaire Response Rate

The questionnaire response rate represents the percentage of individuals who completed and returned a survey or questionnaire relative to the total number contacted or invited to participate. This metric is significant in research studies utilizing surveys for data collection, as it reflects the level of engagement and willingness of participants to respond to the questions posed. A higher response rate typically indicates greater participant involvement and can enhance the reliability of the findings. Conversely, a low response rate may raise concerns about potential biases and the generalizability of the results. Factors influencing response rates include the length of the questionnaire, the number of questions, and the overall clarity and relevance of the content (Sharma, 2022). Therefore, understanding and analyzing the response rate is crucial for evaluating the quality of the survey outcomes and their applicability to the broader population.

Table 4.1 Questionnaire Return Rate

	Valid	Percentage
Responded calls	256	89.8
Not responded	29	10.2
Total	**285**	**100%**

Source: primary

According to Sharma (2022), our response rate in this study was much more at an acceptable rate of 89.9%. This response is significant enough to provide a basis for valid and reliable conclusions according to Babbie (2007).

4.2 Prostate Cancer Aggression Levels

Prostate cancer aggression was determined using the Gleason score and the grade of the tumor. A scale of 1 to 5 was used where 1 indicated Prostate cancer was not aggressive and 5 indicated that the prostate cancer was highly aggressive.

Table 4.2 Frequency distribution of prostate cancer aggression levels.

PC Aggression (based on Gleason score)	Frequency	Percentage
Not Aggressive	42	16.4
Slightly aggressive	48	18.8
Moderately aggressive	31	12.1
Aggressive	34	13.3
Highly aggressive	101	39.5
Total	**256**	**100.0**

Source: primary

Table 4.2 findings indicate that the majority of the prostate cancer cases were highly aggressive 39.5%, 13.3% were aggressive, 12.1% were moderately aggressive, 18.8% were slightly aggressive and 16.4 of the cases were not aggressive. The research question on what is the level of prostate cancer aggression among men in selected hospitals in Kiambu County is thus answered. The level of aggression of prostate cancer among men in Kiambu County is high.

4.3 Demographic characteristics

Demographic characteristics are traits and attributes that describe a population or group of people. These characteristics include factors such as age, gender, education level, income, marital status, occupation, and geographic location/residence.

Table 4.3 Demographic characteristics of prostate cancer patients

Category	Frequency	Percentage
Age		
18-24 yrs	36	14.1
25-30yrs	38	14.8
31-35 yrs	18	7.0
41-45 yrs	48	18.8
46-50 yrs	48	18.8
above 50 yrs	68	26.6
Residence		
Urban	185	72.3
Rural	71	27.7

Availability of means of transport		
Yes	229	89.5
No	27	10.5
The family member providing HBC.		
Yes	195	76.2
No	61	23.8
Who provides HBC		
Spouse	119	46.5
Sibling	60	23.4
Parent	10	3.9
Neighbor	10	3.9
Marital Status		
Married	97	37.9
Single	89	34.8
Cohabiting	51	19.9
Widowed/divorced	19	7.4
Highest level of education		
None	41	16.0
Primary	71	27.7
Secondary	72	28.1
University/college	69	27.0
Postgraduate	3	1.2

Source: primary

Of the 256 prostate cancer patients selected for the study, 26.6% were aged above 50 years, 37.6% were aged 41 to 45 years, and 46 to 50 years cumulatively being the majority. Most of the PC patients were old.

Prostate cancer primarily affects older men, with the risk increasing significantly with age. The majority of cases occur in men over the age of 50, and the risk continues to rise as they get older as evident in this case scenario. Men aged 65 and older are at the highest risk of developing prostate cancer. It is relatively rare in men under 45, just as observed in this study with low percentages of below 15%, however, screening and early detection are still important, especially for those with a family history of the disease.

Of the patients sampled for this study, 72.3% lived in the urban settlements and had better access to the healthcare systems than 27.7% who were situated in the rural areas. Most of the patients were married according to the findings in this study, 37.9%, those who were single were 34.8%, cohabiting were 19.9%, and those who were widowed/divorced accounting for 7.4% due to frustrations from their partners as a result of their illness.

A follow-up phone call interview was done where key information on the education status of the patient was obtained. On the highest level of education attained by the patients, 28.1% had attained secondary education, 27.7% had attained up to primary education, 27% had achieved a university/college education and only 1.2% had attained post-graduate education. However, 16% reported to have not attended any formal education forum.

Table 4.4 Multinomial Regression Analysis for Relationship between demographic characteristics and Prostate cancer aggression

Model Fitting Information				
Model	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood	**Chi-Square**	**df**	**Sig.**
Intercept Only	760.259			
Final	499.212	261.047	124	.000

Likelihood Ratio Tests				
Effect	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood of Reduced Model	**Chi-Square**	**df**	**Sig.**
Intercept	512.911	63.035	4	0.000
Age	466.161	16.285	4	0.003
Length of Diagnosis	464.771	14.895	4	0.005
Residence	457.610	7.734	4	0.102
Marital Status	459.791	9.915	4	0.042
Education	450.216	.339	4	0.987
Cancer Stage	617.171	167.294	4	0.000

Source: primary

Table 4.5 Parameter Estimates

PC aggression (Gleason score)		**B**	**Wald**	**Sig.**	**Exp (B)**
Slightly aggressive	Intercept	-3.586	6.272	0.012	
	Age	-0.446	10.007	0.002	0.640

	Length Diagnosis	0.133	8.595	0.003	1.142
	Residence	0.715	1.802	0.179	2.044
	Marital Status	0.845	8.286	0.004	2.328
	Education	0.022	0.009	0.923	1.022
	Cancer Stage	0.747	4.001	0.045	2.111
Moderately aggressive	Intercept	-2.780	3.099	0.078	
	Age	-0.196	1.845	0.174	0.822
	Length Diagnosis	0.139	8.677	0.003	1.149
	Residence	-0.836	1.487	0.223	0.433
	Marital Status	0.605	3.703	0.054	1.832
	Education	-0.035	0.019	0.890	0.966
	Cancer Stage	1.010	6.995	0.008	2.745
Aggressive	Intercept	-8.885	17.691	0.000	
	Age	-0.390	4.976	0.026	0.677
	Length Diagnosis	0.116	4.190	0.041	1.123
	Residence	0.470	0.479	0.489	1.600
	Marital Status	0.711	3.500	0.061	2.035
	Education	-0.010	0.001	0.976	0.990
	Cancer Stage	3.085	32.551	0.000	21.877
Highly aggressive	Intercept	-16.458	37.832	0.000	
	Age	-0.060	0.090	0.764	0.942
	Length Diagnosis	0.162	7.641	0.006	1.176
	Residence	-0.052	0.005	0.943	0.949
	Marital Status	0.859	4.250	0.039	2.362
	Education	0.128	0.129	0.719	1.136

	Cancer Stage	4.928	57.079	0.000	138.070

Reference category: Not aggressive

Source: primary

Results of Table 4.5 show that demographic factors are associated with prostate cancer aggression. After intercept alone with no variables added; the demographic factors statistically improved the model fitting information. Looking at the "Sig." column we can see this in the fact that p = .000 thus indicating that the full model is statistically significantly better at predicting the dependent variable than simply the intercept only model.

In likelihood ratio tests the table shows which of the demographic factor was statistically significant. The difference in the -2 log likelihoods of the final model and a reduced model is taken to be the chi-square statistic. The final model is formed by an effect that is omitted from the reduced model. The p value suggests that the age (p=0.0003), the length of diagnosis (p=0.005), marital status (p=0.042) and cancer stage (p=0.000) are statistically significant to predict the aggression of prostate cancer ($p<0.05$). Also, the p value was > 0.05 for the residence and education of the respondents on the assailment aggression of prostate cancer. What demographic factors have been found or exhibited to influence or are associated with PC aggression among men in hospitals that were selected in Kiambu County? Demographic factors; age, length of diagnosis, marital status and cancer stage all had significant influence on the aggression of PC among men in selected hospitals in Kiambu County. It was found that PC aggression was associated with age, length of diagnosis, marital status and cancer stage.

The parameter estimates for multivariate logistic regression using a reference category of no aggressive are shown in Table 4.5.

4.4 Obesity and Prostate Cancer Aggression

However, obesity has also been linked to greater risk of developing aggressive prostate cancer. This association may be the result of mechanisms that include incentives for inflammation, alteration in hormonal factor concentrations (insulin and insulin like growth factor 1), as well as change in the secretion of adipokines, which may influence cancer cell growth and progression.

Table 4.6 Obesity and PC Aggression Frequencies

Category	Frequency	Percentage
Ever been declared obese.		
Yes	201	78.5
No	55	21.5
Did it lead to aggression		
Yes	151	59.0
No	50	16.4
PC symptoms		
Inflammation	114	44.5
Hormonal imbalance	32	12.5
Insulin resistance	33	12.9
Difficulty in treatments	77	30.1
Times admitted to hospital due to severity of symptoms.		
Once	109	42.6

Occasionally	101	39.5
Severally	46	18.0
Still Obese		
Yes	146	57.0
No	110	43.0
Ever been enrolled in palliative care for PC		
Yes	214	83.6
No	42	16.4
WHO Cancer staging		
Stage 1	65	25.4
Stage 2	39	15.2
Stage 3	59	23.0
Stage 4	93	36.3

Source: primary

Table 4.6 shows that 78.5% of the PC patients have since been declared as obese as compared to 21.5% who had no history of obesity. 59% of the obese recorded agreed that obesity brought about the aggression of PC which most of them experienced severe symptoms. The PC patients also have the experience of inflammation which they all blamed on prostatitis. The sharp pain in their pelvic area, difficulty urinating, discomfort were due to the inflammation. Hormonal imbalance was reported by some PC patients 12.5% and insulin resistance symptoms 12.9%.

Results revealed that admissions to hospital among all categories of patients was mostly the result of the severity of the disease, the first time to the hospital, and that the bulk (42.6%) of the PC patients had only one entrance at admission. 39.5% of those in the

hospital were occasionally admitted and 18% were admitted several times to the hospital for the PC due to the severity of the symptoms of the PC.

The results of this study showed that 36.2% of the PC patients were at the stage 4 in WHO cancer staging, the stage 1 cancer patients comprised 25.4%, the stage 3 cancer patients accounted for 23%, while 15.2% of patients complained stage 2 of cancer. We also observed that the majority of persons with PC stage 4 were men aged 50 years and above with those in the range of 40 years and 50 years being closely behind them.

Table 4.7 Chi-square test of association between obesity and prostate cancer aggression

Association	**Chi-square value**	**P-value**	**Phi &Cramer's V**
PC aggression * Ever Been obese	11.889	0.018	0.216
PC aggression * Still Obese	11.818	0.0111	0.841
PC aggression * Obesity contributing to severe PC symptoms	15.579	0.003	0.609
PC aggression * Difficult to manage PC with obesity	30.238	0.017	0.344
PC aggression * Mortality due to obesity	39.182	0.000	0.451

Source: primary

Table 4.7 displays the findings of this study on the associations between obesity factors and PC aggression factors. To begin with the first association between PC aggression and being obese and one point in life was found to be statistically significant in the association ($\chi 2 = 3.998$, $p=0.0262<0.05$). A patient's cancer staging can be influenced by

obesity at some point. Obesity has been identified as a risk factor that can impact the staging of prostate cancer. However, once a patient is no longer obese, then the risk to influence prostate cancer staging is thus eliminated thus there is no association found in this case study scenario of ever being obese based on the patients' health history. There was a statistically significant strong association between the stage of cancer and the patient still being obese, ($\chi 2$ = 11.818, p=0.0111<0.05,). Aggression of PC which was also attributed to the staging of PC also had a strong statistically significant association with obesity contributing to severe symptoms, difficulty in managing PC for patients with obesity, and mortality due to obesity, (p=0.000<0.05). The p-values < 0.05 hence we reject a null hypothesis that there is no significant association between obesity and PC aggression. This is to say that there is a strong association between obesity and PC aggression

4.5 Confounding Factors to Prostate Cancer Aggression

There are several confounding factors apart from obesity that can contribute to the aggression of prostate cancer among men. These factors can complicate the assessment of the relationship between certain variables and the aggressiveness of prostate cancer. Some of the confounding factors identified in this study were the family history of the patients, diet and lifestyle, and tumor characteristics.

Table4.8 Confounding Factors Affecting Aggression of Prostate Cancer

Confounding Factor	Frequency	Percentage
Family History	40	15.63
Diet & Lifestyle	80	31.25
Tumor Characteristics	16	6.25

Total	**256**	**100**

Source: primary

Of the 256 patients sampled, 46.88% responded to age being the most-linked non-modifiable factor leading to the aggression of prostate cancer, 31.25% attributed to their diet and lifestyle and thus some were admitting to having a history of obesity and/or were obese. Some of the patients alluded to family history as a confounding factor, 15.63%. Their fathers and close relatives had a history of PC and were suspected to have inherited the genes from them resulting in their woes. Tumor characteristics were not much of a risk factor according to these results and were least reported at 6.25%. In their argument, they asserted that once they had the cancer, it was difficult to attribute the size of the tumor and other characteristics to the aggression of the cancer. The confounding factors were identified and the respondents' assertions strengthened them as risk factors.

4.6 In-depth Interview Findings and Discussion

Table 4. 9 Key themes from the In-depth Interview (thematic analysis)

Key themes	**Outcomes**
Average BMI index	34
Personal Experiences with Diagnosis	shock and denial, fear and anxiety
Perceptions of Obesity as a Risk Factor	Awareness, personal reflection, inflammation, treatment concerns, weight loss desire.
Impact of Lifestyle Changes	Weight management, enhanced physical fitness, adhere to treatment plans.

Awareness and Education	Risk factor awareness, informed decision-making, influence mechanisms and support for side effects management
Influence of Healthcare Providers	Trust, emotional and psychological support.
Barriers to Weight Management	Challenges, supportive network
Coping Strategies	Seeking support, counseling, therapy, research on their condition, diet changes, and physical exercise.
Suggestions for Improved Care	Regular updates, access to nutritionists, educational workshops, and patient feedback mechanisms.

Source: primary

Table 4.9 presents the key themes obtained from the In-depth Interview guide. The themes were analyzed using the thematic analysis approach to draw important conclusions about the study. The findings indicate that for the patients followed up on telephone interview, the average BMI index was 34 meaning that they were obese. The personal experiences of the patients with the diagnosis encountered were shock, denial, fear, and anxiety.

Many individuals experienced shock upon receiving a prostate cancer diagnosis, often struggling to accept the reality of the situation. Some even denied the seriousness of the diagnosis, especially since they did not exhibit significant symptoms. Concerns about the future, potential treatments, and the implications for health and life expectancy created

feelings of fear and anxiety. Many were worried about how the diagnosis would affect their quality of life and family dynamics.

Centre of obesity-related beliefs – the vast majority of patients had various beliefs or perceived obesity in some way, as a risk factor associated with their disease. These perceptions had a huge impact on health control and the way they treated their conditions, respectively. For example, several patients understood that obesity increases one's chances of developing prostate cancer. Such respondents could recall conversations had with healthcare providers associating obesity with a higher probability of aggressive disease. Given this, some of the respondents may have given an account of their weight history and noted that they were obese which may have contributed to the incidence as well as the stage at which it was diagnosed. Some seem to know that obesity causes chronic inflammation, which also could spur cancer growth and make cancer more dangerous. Obesity was identified as a concern prominent among the patients as it caused apprehension that its presence might worsen plans for surgery or decrease the efficacy of the applied therapy. Most patients had the desire to lose weight as a comprehensive approach to better their health and/or better their prostate cancer therapy results.

Lack of self-motivation for weight loss was the other theme derived from the interviews under the broader theme of Barriers to weight management. Some of the actual ambivalence that emerged from the patients included issues to do with; lifestyle, food habits, and stress eating. They may feel some stress towards the idea of weight management during their cancer treatments. Most consider it necessary to have a supportive network such as physicians, parents, and friends among other community members to achieve their weight loss goals.

Psychological and emotional which gave some of the clients' feelings of guilt to their obesity believing it caused their cancer. This however resulted in shame or anxiety about their health decisions. On the other hand, some took a more passive view insisting they could not do much about it because they have cancer anyway, though they knew obesity is a risk factor.

Other receptionists that were also involved were the Healthcare Providers who also had a great influence on patients' perceptions. The present study indicates that patients who receive perceived social support are in a better position to practice weight management behaviors. Prostate cancer patients especially those with obesity are often at the mercy of their healthcare providers. Through teaching clients behavioral modification strategies, including social support, practitioners can help patients achieve better results from therapies as well as live happier and longer lives. They need to be the guiding force that will help this patient population make quality strides towards changes in clinical practice that embrace health and wholesome living.

Coping strategies by patients – patients developed strategies to cope with the disease such as seeking Support, many patients found comfort in discussing their feelings and experiences with family, friends, or support groups. Sharing their journey with others who understand their situation provided emotional relief and connection.

Professional mental health support also helped patients process their diagnosis, manage anxiety and depression, and develop effective coping skills tailored to their individual needs. Many patients took an active role in learning about prostate cancer and obesity. Understanding the disease empowers them and reduces feelings of uncertainty, helping them make informed decisions about their treatment and lifestyle choices. Most patients implemented dietary changes aimed at weight management and overall health

improvement. This included increasing the intake of fruits and vegetables, reducing processed foods, and controlling portion sizes. Further, engaging in regular physical activity, whether through structured exercise programs or everyday physical tasks, helped patients manage weight, improve mood, and enhance overall well-being.

Lifestyle changes had a significant impact on prostate cancer patients with obesity, influencing both their overall health and the management of their cancer. For instance, achieving and maintaining a healthy weight reduces bodily stress, potentially improving overall health and reducing the risk of cancer progression or recurrence. Regular physical activity improves cardiovascular health, increases muscle strength, and boosts energy levels. This can enhance the patient's ability to tolerate cancer treatments and improve quality of life. Those who maintained a healthy lifestyle were more motivated to adhere to treatment regimens, attend follow-up appointments, and engage with healthcare providers.

Some of the suggestions from patients on improved care were as follows, feedback from patients provides valuable insights into improving healthcare delivery and support for prostate cancer patients with obesity. Maintaining open lines of communication, particularly regarding treatment progress, side effects, and any changes in their condition, can help patients feel more involved in their care. Providing access to registered dietitians who specialize in oncology can help patients develop effective dietary plans that support weight management and cancer care. Patients recommend hosting workshops or seminars on healthy cooking, meal planning, and nutrition tailored to the specific needs of cancer patients. Establishing systems to gather ongoing feedback from patients regarding their experiences, preferences, and challenges can foster continuous improvement in care delivery.

Awareness and education are critical components in the management of prostate cancer for patients with obesity. Enhancing knowledge and understanding among these patients can empower them to make informed decisions about their health, improve their treatment outcomes, and promote overall well-being. Educating patients about how obesity can influence the risk of developing aggressive prostate cancer can help them recognize the importance of weight management in their health journey. Providing information on how obesity affects hormonal balance, inflammation, and metabolic processes can help patients understand the biological connections between obesity and cancer progression. Providing information about treatment options and how obesity may affect these choices (e.g., surgery, radiation therapy) can empower patients to participate actively in their care plans. Understanding potential side effects and how they may interact with obesity can guide decisions. Educating patients about strategies to manage the side effects of treatment, including those that may be exacerbated by obesity, can improve their quality of life during treatment.

4.7 DISCUSSION

4.7.1 Prostate Cancer Aggression

The study reported that the men in Kiambu County had a high level of prostate cancer aggression because of obesity. However, Vidal et al, (2014) had previously shown the similar findings that obesity is linked to an enhanced risk of high grade prostate cancer which these finding echo.

The Gleason scoring system assesses tissue in the prostate cancer as to how it appears. It is in the range of 2 to 10, where higher numbers mean more aggressive disease. A score of 7 or higher (especially 8 and 10) is usually considered aggressive cancer that is more likely to spread and grow faster. Aggression was also also determined at the stage of the

tumor at the time of diagnosis. Stages higher (e.g., Stage III and Stage IV) implied that the cancer extended beyond the prostate to surrounding tissues or distant portions. Prostate cancer with high aggressiveness therefore has a number of critical aspects concerning the disease's nature and progression as well as treatment.

High aggression prostate cancer usually has a poorer survival outcome than that of less aggressive forms. It also significantly increases the risk of a cancer recurrence after treatment. Since aggressive prostate cancer is more aggressive, more aggressive treatment strategies are required, including surgery, radiation therapy, and systemic therapy. Significant symptoms of pain, fatigue, urinary issues and psychological distress can result from advanced prostate cancer. More often than not, there is a deg?lated correlation of aggression with a greater symptom burden. This is because patients with aggressive prostate cancer typically require more frequent follow ups and monitoring to watch disease progression and treatment response so the right intervention can be done timely. Prostate cancer high aggression has clinical implication since prostate cancer with high aggression is associated with poorer long-term outcomes, increased risk of progression and metastasis. Tailored treatment approaches and intense monitoring are required to facilitate the best resources and equilibrium patient outcomes as well as symptoms management.

4.7.2 Demographic characteristics and PC aggression

Sexual partners can potentially have an impact on a person's experience with prostate cancer and their experience in developing prostate cancer that is more aggressive, on demographic characteristics. In this study, the sexual men were cohabiting or married. They were 19.9 per cent when the person of 58 or over was cohabiting with their partner and 37.9 when married. This offers emotional, practical and social support for people with cancer such as being married or being in a committed relationship. It has been shown

that social support has a positive effect on overall psychological well-being as well as adherence to treatment and quality of life in general in cancer patients. A potential benefit of having someone with cancer, especially one that can be affected by aggression, would be this support network that can help people cope better with the challenges of the cancer diagnosis and treatment and, as a result, potentially impact the aggressiveness of a patient's prostate cancer. Also, Married people are more likely to engage in healthy behaviour, e.g. of going for regular medical check ups, following through with the prescribed treatment, and healthy living. They may contribute to better health outcomes as a whole and even help potentially reduce the aggressiveness of prostate cancer. People who are married may have a person they can count on to set an appointment, get to medical facilities, identify the way to the healthcare system. This may help ensure that such access to medical care is timely and might influence the management of prostate cancer including decisions regarding treatment aggressiveness. The findings of this study are consistent with the findings of Rosenblatt et al, (2012) who confirmed that there is a positive direct relation between the number of lifetime female sexual partners and the risk of prostate cancer. Another study that confirmed ours was that of Khan et al (2024) that reported that the odds of high aggressive tumors were increased as a function of the absence of marriage (vs. marriage) with corresponding increases in aggression of the disease (adjusted Odds Ratio (aOR): 1.56; 95% Confidence Interval) when the observed becomes less aggressive.

This suggests there is research out there, such as Walsh et al, (2023), that married people have lower levels of stress and anxiety than single or divorced people. Maintaining good emotional well being is helpful for coping with a cancer diagnosis and dealing with the effects of aggressive prostate cancer on the emotions. In addition, they highlighted that married people with prostate cancer may live longer than those who are never married.

Spousal or partner support may provide emotional and practical support that improves treatments adherence, reduces treatment delays and improves overall health outcome in patients with prostate cancer and in turn may be related to increased (aggressive) aggressiveness of prostate cancer.

Education wise, 56.2 percent reached secondary, undergraduate, and postgraduate level basically indicating that they were able to have a basic education foundation and have known of prostate cancer. Education at a higher level is typically correlated with better health literacy and recognition by individuals of healthcare choices. Furthermore, higher levels of education may foster the initiative towards seeking preventive healthcare services like prostate cancer screening, including early detection of and less aggressive forms of the disease. In fact, education level can be related to social economic status as well as the healthcare resources a person has available. People with more education might have a better chance to receive healthcare facilities; visit specialists and attain what we call advanced treatment. Prostate cancer can be managed and its aggressiveness affected, in part, by timely medical care and therespective treatment plans. Education level is also related to lifestyle choices and behavior. People with higher education can take a healthy diet, regular exercise, and not smoking, but individuals with lower education can also engage in similar individual behaviors. Lifestyle factors can affect health overall and might have a role in determining how aggressive prostate cancer can be. The education level can also influence the psychological factors like coping mechanism, stress management and emotional well being. Having higher education might give people with cancer more resources and more ways to deal with the emotional aspect of a cancer diagnosis, which may counteract the cancer stress effect on disease progression. Previous study Larsen et al, (2020) indicated that education level may be correlated with prostate cancer outcomes (ie: survival and disease progression) which is in concordance with our

study findings. Some studies have found that higher education levels are associated with better survival outcomes; however, the exact chain of events binding these two variables is convoluted and multifactorial. Larsen et al, (2020) also founds as this.

As many as 64.2% of the patients of PC were in the age group between 41 years and above 50 years. Although prostate cancer is primarily a disease of older men, the more it tends to occur with age. Men under the age of 40 get prostate cancer very rarely, but after 50 the incidence rises significantly. In many cases, a diagnosis at older age is associated with more aggressive tumor characteristics. There's a lot of biological variation between prostate cancers in older men and prostate cancers in younger men, and it's not unusual for the younger men to have a higher grade reaggresive prostat cancer than the older men might have. For older men with prostate cancer, the disease on the whole tends to grow slowly and many may live longer without aggressive treatment, especially if diagnosed early at a localized stage. On the other hand, younger patients may also have more aggressive forms that need urgent intervention. Because their life expectancy is a competing health issue, older men survive less long if they have aggressive prostate cancer. Treatment options for the cancer must be balanced against the patient's age and overall health, for the aggressiveness of the cancer. Our study's findings of these findings are consistent with the results of Rawla (2019) that prostate cancer incidence and mortality rates are very strongly correlated with the age to have highest incidence in the elderly men.

4.7.3 Obesity and PC Aggression

However, it is known that obesity plays major roles in the prostate cancers aggressiveness and contributing to higher death due to prostate cancer. Of the men with obesity, the majority (44.5%) complained of simultaneously having serious symptoms

of prostate cancer such as prostatitis due to obesity. Prostatitis means that the prostate gland is swollen and that it or is inflamed and will cause pain or discomfort of the pelvic area, difficulty urinating, and flu like symptoms. Hormonal imbalances associated with obesity may impact prostate health and contribute to inflammatory processes that could increase one's risk of having prostate cancer. Older men who have their prostate gland as a result of benign prostatic hyperplasia (BPH) or an enlarged prostate (a common condition not necessarily related to cancer) may also have inflammation of the prostate. Prostate inflammation symptoms need to be checked by a healthcare provider, as they may occur due to a problem with the gland and need to be examined. Therefore, Zhang et al., (2020) findings showing that prostatitis or BPH increases the probability of PC probability escalation are quite similar to our findings. This study's findings coincide with a study of Zhang et. al (2020) supporting the consequences of obesity to aggression toward PC and serve to bring attention to the effects of obesity.

Several factors contribute to how the body responds to treatments for prostate cancer and obesity can certainly be one of those factors; For instance, obesity can increase risk of surgical complications, such as infections or wound healing problem, which can interfere with the recovering from prostatectomy (surgical removal of the prostate) surgeries. Radiation therapy may be more difficult to deliver as effectively in obese patients as it can be in leaner individuals, since it is harder to precisely target the treatment area and because the patient may not be able to be positioned for treatment easily. This study further showed that 12.1% of PC patients have hormonal imbalance. Obesity can explain this, in that, the response to hormone therapy used to treat prostate cancer may be influenced by hormone levels in the body from the obesity. For this study, obese individuals experienced greater side effects to chemotherapy which

hampered their tolerance to chemotherapy and overall quality of life. The way the body metabolizes drugs can be changed by obesity, and this could affect how well chemotherapy, among other medications used to treat prostate cancer, works, so adjustments in drug doses were needed for the patients. Obesity increases the risk of recurrence and a poorer outcome in patients with many types of cancer, including prostate cancer. It is possible to make the attainment of successful long term treatment outcomes more difficult.

Insulin resistance is a condition where the body's cells become less responsive to the hormone insulin and the blood levels of insulin are elevated. Insulin resistance can have a role in prostate cancer development and progression in obese patients. An insulin growth factor is a growth factor that can stimulate the growth of some types of cancer cells, one of those being the type of prostate cancer cells. High levels of insulin in the blood may promote growth and proliferation of cancer cells in insulin resistant people. Chronic low grade inflammation in the body is associated with insulin resistance and both are known to be related to the development and progression of cancer. Inflamation can provide an environment that would support cancer growth and spread. This goes back to the response by the respondents with regard to inflammation which was dominant. Another growth factor that can affect cancer cell growth is insulin-like growth factor 1 (IGF-1); if insulin resistance disrupts the hormonal balance in the body, it may also affect this hormone. Furthermore, in the case of elevated IGF-1 levels in insulin resistant individuals, cancer development may be promoted.

Insulin resistance is closely related to obesity since excess fat tissue releases substances that falsify the insulin signaling. Parents achieving such weight loss can worsen insulin resistance in obese children and may increase the risk of prostate cancer development

and progression. Obese prostate cancer patients have insulin resistance, which may influence treatment outcomes and therefore may affect the effectiveness of treatments like chemotherapy, hormone therapy or targeted therapies. This also influences the prognosis of the disease as a whole.

Obviously, the frequency of hospital admissions for a PC patient determined by a certain spectrum of symptoms stands to a great extent on the overrealised stage of their cancer, as well as on the strength of treatment, its aggressiveness, the possibility of complications and their culmination, and the health status of the patient in itself. For example, patients may be admitted to the hospital for, for example, biopsies or imaging tests to confirm that prostate cancer exists and how far it has spread. Prostate cancer patients who undergo treatments like surgery, radiation therapy, chemotherapy or immunotherapy may need some hospital admissions. These procedures may require admissions for themselves and for the management of possible side effects and complications of treatment. Prostate cancer patients can experience very significant symptoms, such as pain, difficulty urinating, or cancer own complications. Symptom management and supportive care will require hospitalization.

By and large, the number of hospital admissions of a given prostate cancer patient can be quite varied. Because chemotherapy is most often given together with radiation or surgery, patients may have only a few or no hospitalizations at all, particularly if the cancer is found early and treatment is effective. Patients other than those already diagnosed may require multiple admissions as cancer is aggressive, treatment is complex and patients may have significant symptoms or complications.

Healthcare providers use the prostate cancer stages to know the extent of the cancer, decide about treatment and also to gauge the prognosis of the patient. The prostate cancer

staging helps in gauging how far the cancer has spread within the prostate, as some of the components of prostate cancer staging may include, size of the primary tumor, whether it has invaded nearby tissues or organs, whether it has spread to nearby lymph nodes, and whether the cancer has spread to distant parts of the body, like other organs or tissues. The abbreviation for this grading is, TNM and is for Tumor, Lymph Node Involvement and Metastasis respectively as per WHO.

A stage of a cancer is assigned based on the T, N, and M categories – Stages 0 to IV (0 = in situ cancer, where the tumor has not spread beyond the original site; IV = advanced cancer that has spread to distant sites). However, the stage contains valuable information on such things as the aggressiveness of the cancer, treatment options and prognosis. The WHO also takes other factors into account to establish a more personalized and refined cancer staging process (Posielski, 2020), such as tumor grade (how the cancer cells look like under a microscope), biomarkers, genetic mutations, and other clinical characteristics.

Several studies have found that obesity may be associated with the increased risk of aggressive features of prostate cancer including, increased Gleason scores, higher tumor grades, and higher rates of cancer recurrence. In addition, obese individuals may face increased probability of developing advanced stage prostate cancer and poor outcomes of treatment. Thus, Wilson et al, (2022) point out how epidemiological and clinical data continually confirm that obesity is linked to a faster prostate cancer progression rate and higher mortality, consistent with our study.

However, there is potential for obesity to impact cancer staging but it is important to remember that staging is a complicated process that includes a variety of other factors that are more important than obesity. Factors that the healthcare providers take into

consideration when determining the stage of the cancer include a patient's health status, characteristics of the tumor and a patient's response to treatment. Despite that, it is important to take obesity into account as a variable that correlates with cancer staging and overall management of people with cancer. For instance (2023), obesity may lead to physical barrier to accurate staging of cancer, such as increased fat body and altered anatomy. These imaging tests used to stage cancer, such as CT scans, MRI and PET scans, may be less effective in an obese person, and may make it less possible to assess how far the disease has spread. Delays in cancer diagnosis are also related to obesity due to masking of symptoms or attributing them to an obesity condition. This could lead to cancer delay in diagnosis and detection, hence affecting the overall staging of the disease. Obesity may affect the way the body responds to cancer treatment, such as tumor size and extent. Obese individuals may have poor treatment response that can result in residual disease or tumor progression, which can result in higher cancer stage at the time of diagnosis or during treatment. Obesity can present challenges for surgical oncologists in the setting of completion of tumor removal and staging of the cancer in cases where surgery (and other treatments) are part of the treatment plan. Superimposed on the morbidity and mortality of obesity themselves, surgical complications complicate cancer staging and treatment outcomes as well. Cancer metastasis is increased in obese people, characterized by when cancer spreads to different parts of your body such as distant organs or tissues. Metastatic disease can advance cancer to a later stage determining the overall staging and prognosis of cancer (Wilson et al, 2022). In several types of cancer, obesity has been associated with lower outcomes and higher mortality rates. In the shade of cancer staging, obesity may be a factor that correlates with the entire prognosis and survival rates of patients with cancer.

There is a known association of obesity with prostate cancer (PC) stage. They specifically have linked obesity to a higher risk of developing more advanced and more aggressive forms of prostate cancer. Prostate cancer is diagnosed in greater numbers of obese than nonobese patients. The studies have demonstrated that obesity increases the risk of larger tumors, higher Gleason scores and more aggressive forms of the disease (Galvão et al, 2022)

Treatment outcome for prostate cancer patients may also be influenced by obesity. Information exists that obese patients with prostate cancer may have a higher rate of disease recurrence, advanced stage disease, or poorer overall survival than non-obese individuals. Possible contributors to the development and progression of aggressive prostate cancer in obese people may include chronic inflammation, changes in hormone levels (e.g., insulin, insulin like growth factor 1) and changes in adipokine secretion. When we talk about prostate cancer, the healthcare providers consider that obesity status of the patient. New approaches or closer monitoring may be necessary in some obese patients due to the challenges posed by their cancer diagnosis and treatment. Overall, there is a general correlation between obesity and stage of prostate cancer with higher risk of advanced disease, potential impact on the treatment results, underlying biological mechanisms and implications for patient care.

Haugaens et al (2024) also found that obese men had increased risk of weight gain and that obesity was associated with increased PC specific mortality especially among nonsmokers, with their results agreeing with our findings. The presence of obesity increases biochemical recurrence after radical prostatectomy, rates of metastasis, and decreases overall survival in patients with prostate cancer. Prostate cancer in the obese man is often more aggressive and has a poorer prognosis than in the nonobese man.

Prostate cancer with obesity leads to severe symptoms and increased mortality. Prostate cancer aggression can be affected by obesity, that may lead to tumor growth, complicate treatment, raise risk of recurrence and progression, exacerbate symptoms through comorbidities and create a proinflammatory environment in the body. Together, these factors have the potential to facilitate more severe symptoms, worse outcomes of treatment, and higher mortality in obese men with prostate cancer (Rivera-Izquierdo et al, 2021).

Treatment outcomes of PC are varied and affected by obesity in different ways, which leads to PC aggression. The reason being that lower PSA levels which may be masking the presence of the cancer can delay diagnosis in obese patients at the early stages. Further, the PSA level can be diluted in excess body fat in obese men. It is known that obese men already have more advanced, aggressive tumors at the stage of diagnosis and we think this may be related to poorer treatment outcome.

Obese patients may have such treatment effects as surgery. More complications are associated with surgical procedures such as radical prostatectomy (removal of the prostate) among obese patients. These complications may be associated with longer stay, longer recovery time periods. Moreover, they have a greater likelihood for positive surgical margins (cancer cells are left behind) that could result in disease recurrence.

The radiation that is delivered to the prostate may be changed by obesity and therefore it may not be as effective. Radiation can also be harder to focus accurately on the cancer because extra body fat shifts the target area. And many prostate cancers are stimulated by hormones that are specific to being male. The body can metabolize these hormones differently depending on the weight, and hopefully less effectively, when people are on hormone therapy. The reason obesity is identified in this study as increasing the risk of

developing an increased PSA of the prostate after initial treatment is because the increased PSA means that the cancer has come back or progressed. But we found that most obese patients had advanced tumor stage. This can be debunked further with the fact that overweight or obese people may have metabolic changes (i.e. insulin resistance) that can foster outgrowth of cancer that may result in more aggressive tumor characteristics. Previous studies have also suggested that obesity is a risk factor for a worse overall survival in prostate cancer patients. This translates to the fact that being obese poses a higher risk of getting cancer recur and also presents greater risk of death from the disease. Our findings oppose the one from Slawinski et al, (2020) that being overweight or obese is linked to better survival. Furthermore, obesity is a risk factor for aggressive PC (Zhu et al 2022). These findings are consistent with findings of this study.

4.7.4 Confounding factors and PC aggression

According to this study, those with aggressive forms of the disease are more likely to be older men. Also, the aggressiveness of prostate cancer has the tendency to change with age due to age-related changes in hormone levels and cellular processes. As per a study done by Seibert, et al (2020) findings we support our study by finding the association of age and PC risk as well as PG gleason score.

However, this study suggested that a family history of prostate cancer, particularly if it was in one's family (such as father or brother), can raise the risk of aggressive prostate cancer. Beebe-Dimmer et al, (2020) have similar findings that indicate that a family history of PC among close relatives is an established risk factor for PC as we see in this study. The cause of this is due to the genetic factors that as well as inherited mutations within certain genes has led to the aggressiveness of the disease.

Prostate cancer aggressiveness, such as what other factors such as a diet high in saturated fats, low intake of fruits and vegetables, smoking and a sedentary lifestyle contributes to. Such a diet is not thought to be healthy. These lifestyle choice may influence the disease course but also inflammation, hormonal balance, the health of your body. As mentioned by Plym et al, (2023) maintaining healthy lifestyle is a way to reduce the genetic risk of lethal prostate cancer, in line with our study results.

In addition, the record of the patient's clinical records revealing the specific biological features of the tumor, for example, Gleason score stage of the tumor, presence of metastasis, also were found to directly correlate with aggressiveness of prostate cancer as stated in the patient's record. Crucial in determining the prognosis and treatment strategy for people with the disease were these tumor characteristics. depending on the size, condition of the tumor the healthcare professional based on this could determine how they would classify the cancer and how aggressive the PC could be.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary of Findings

This section provides a summary of the key findings of the study and observations made.

5.1.1 Prostate cancer aggression levels

The research also found that there was high prostate cancer aggression in obese men in Kiambu County. This further suggests that the chances of developing this cancer are higher with a man living in Kiambu County because of obesity and even of a higher grade of prostate cancer that can be fatal if it is not detected in time. The Gleason score obtained from clinical records of the patient was used as a measure of the aggression of prostate cancer. Patients with higher stages of prostate cancer showed high Gleason score due to the tumor characteristics as previously discussed.

5.1.2 Demographic characteristics and PC aggression

This study found one of the salient findings; most of the PC patients were between the age of 45 + years. Younger men had less PC than the older men. Therefore, the younger men were in a more aggressive stage of PC. In addition, the most patients were married and had better survival outcomes than unmarried because emotional and practical support of a spouse or partner may be an element that can facilitate improved treatment adherence as well as reduce delays in treatment and achieve better health outcomes. For the first objective, to answer the question of whether age, marital status, and education level had an effect on the aggression of the PC in patients, it was therefore asserted that

demographic factors as such had a role in determining the extent of aggression of PC in patients.

5.1.3 Obesity and PC aggression

A significant association between obesity and aggressiveness of prostate cancer was another key finding of the link between obesity and prostate cancer. In comparison to non obese individuals, men with higher BMI values were more likely to develop advanced tumor stage, higher Gleason score and poor treatment response. The disease progress and metastasis rate of obese patients was also found to be higher indicating a possible correlation between obesity and the aggressiveness of prostate cancer. The results indicate that obesity might be related to the progression and aggressiveness of prostate cancer. They might link obesity to cancer aggressiveness by underlying mechanisms, including hormonal changes, inflammation, insulin resistance and an altered immune system. Tumors are known to grow, invade and become resistant to treatment more aggressively if associated with obesity related factors.

Body fat also can dilute prostate specific antigen (PSA) levels, creating a potential problem with delayed diagnosis and chance that cancer is advanced at the time of detection. In addition, obese men are more prone to advanced tumors and subsequent worse outcomes. The chances of carcinomas growing to invade new tissue around the prostate after radical prostatectomy are higher in obese men. This increases the risk of surgery complications, leading to longer recovery times and a higher likelihood of cancer recurrence due to positive surgical margins. But the adverse side effect of obesity may impede cancerous tissues from being accurately targeted by radiation treatment. Obesity may increase metabolic changes that encourage more aggressive tumor traits. Poorer overall survival rates in prostate cancer patients is related to obesity, and it means that

the disease may recur as well as increase mortality from the disease. The results from this study create more aggressive PC. Inflammation is associated with obesity supports cancer growth and aggressiveness. Prostate cancer treatment outcomes can be affected by the obesity and even it can contribute to more aggressive forms of the disease. Therefore, the treatment efficacy and aggressiveness of the cancer can be improved by addressing obesity through lifestyle modifications, such as diet and exercise.

5.1.4 Confounding factors on PC aggression

Key findings were also about the confounding factors, that is, tumor characteristics, diet and lifestyle, and family history. Prostate cancer risk is associated with age and it is rare in men under 40 years of age, but becomes more common in men from 50 years of age and above. As our study shows, probability of developing aggressive forms of the disease rises with age. Older men are also likely to overall decline in health and immune function, and therefore may not be able to cope with cancer. It is known that high fat diets, especially one rich in red and processed meats, increase risk and aggressiveness of prostate cancer. On the other hand, fruits, vegetables and omega 3 fatty acids from diets may protect against alcohol abuse. Physical activity level and smoking have been also associated with prostate cancer outcomes. Exercising regularly may reduce the chance of aggressiveness while smoking is linked to a poor prognosis.

A family history of prostate cancer is an important increased risk for the disease, and it seems to be associated with more aggressive forms of cancer affecting clinical management and outcomes in affected individuals. Some genetic mutations that occur in genes such as the BRCA1 and BRCA2 may be present in men with a family history of prostate cancer and increase the risk of developing an aggressive type of prostate cancer.

As a result, these mutations can cause DNA repair defects that can favor more malignant tumor behavior.

5.2 Conclusion

5.2.1 Prostate cancer aggression levels

This study underscores a strong correlation between obesity and increased risk of prostate cancer, bringing attention to a very important public health issue. The data indicate that hormonal, inflammatory, and metabolic factors by which mechanisms connect excess body to prostate cancer pathogenesis have to be investigated further. Due to the rising level of obesity, these results support inculcating targeted prevention as well as interventions for weight management to prevent prostate cancer, as the rising obesity pertains to the rise in prostate cancer. Overall, this study stresses the necessity for the treatment of obesity as a modifiable risk factor and urges further research to fully characterize the underlying biological pathways, which can help in improving health outcome for at risk population.

5.2.2 Demographic characteristics

This study has provided insights into the complex association between sociodemographic factors and disease progression of prostate cancer, and should be used alongside other prognostic variables when assessing and managing prostate cancer aggressiveness. Consistently, advanced age is linked to an increased risk of aggressive prostate cancer because more rapid progression and less effective treatment options may be present in older patients. Recently education level has become an important suspected socioeconomic factor to modulate prostate cancer aggression through higher infection risk in people of higher education leading to better access to health care, earlier detection and improved adherence to the treatment regime. One barrier to optimal cancer care for

the patient with lower education levels includes delays in diagnosis, suboptimal treatment, and a subsequent increase in disease aggression.

Its been shown that marital status is an important factor in prostate cancer outcomes; married individuals tend to have better over all survival rates and treatment compliance than unmarried individuals. Patients with prostate cancer have disease management and quality of life that can be influenced positively by social support, emotional well-being, and marital shared decision making.

5.2.3 Obesity and PC aggression

In particular, these findings were very compelling for linking obesity to prostate cancer risk among men that increases the prognosis of the disease because of body size. The observed association emphasizes the importance of increased awareness and prevention efforts focused on obesity as a modifiable risk factor, in light of the fact that populations at higher risk for prostate cancer are present. Healthcare practitioners may aid in prostate cancer prevention by encouraging healthier lifestyles and the launch of weight management programs. Both, these findings add to existing literature but also signify the need to further explore the particular biological processes involved in this association with the ultimate goal of designing future prevention strategies and improving health of men affected from obesity.

5.2.4 Confounding factors leading to PC aggression

Using this study, the complex interplay between diet, lifestyle, metabolic health, and psychosocial factors are elucidated with regard to why prostate cancer behaves so aggressively. We show that poor diet, lack of activity and adverse metabolic profiles do not just increase the risk of prostate cancer, but also raise the risk of aggressive disease, and we confirm our findings in two validation sets. This is also attended to by

psychosocial aspects, e.g. stress and social support, which negatively affect the disease progression and patient outcome. By underscoring the need for a comprehensive approach to prostate cancer prevention and management that considers not only medical interventions, lifestyle modifications and psychosocial support, these insights reinforce that chances of successful fight and treatment are far better if one follows all that. In the end, addressing these multi-faceted contributors may help to yield more effective strategies to reduce prostate cancer aggressiveness, and have a better impact on patient wellbeing.

5.3 Recommendations

As a result of the findings of objective one; which shows a high level of hostility in prostate cancer cases, a comprehensive approach to the management and results of the patients should be employed by healthcare providers. Screening and the use of the risk assessment tools should include routine screening and the ability to identify patients with a higher risk of aggressive disease early on for time effective intervention.

According to the findings of objective two (governing demographics like age, marital status, and education that will prompt prostate cancer to be more dynamic) future study and clinical practices should mirror these factors into modalities of patients evaluation and administration. More specifically, targeted educational programs focusing on the raising awareness about prostate cancer risks among older men and those with lower level of education may be needed since they may be more susceptible to aggressive forms of the disease. Finally, marital status should also be factored into the design of such support systems as socially isolated patients may be under more stress and have less support to sustain them during the course of their treatment. By integrating the demographic sensitive approaches into screening program and treatment plan, it

improves early detection as well as tailored interventions leading to improved patient outcomes. Healthcare providers can enhance the efficiency of management strategies that can reduce the probability of aggressive prostate cancer and sustaining total health of these populations, if they acknowledge and deal with these demographic impacts.

In part three, since the obesity and its potential association with prostate cancer agression has been identified in situ, it is recommended that obesity management strategies should be added to the standard care protocol of men who diagnosed of prostate cancer. It could include designing and implementing on comprehensive lifestyle intervention programs, such as on nutrition participates, physical exercises and behavioral therapy that would help patients to achieve and keep the normal weight. Furthermore, body mass index (BMI) and risk for aggressive progression can be identified by routine patient assessment, and metabolic health should also be addressed. Additionally, such awareness among healthcare providers on the weight of obesity on prostate cancer outcomes should foster early interventions that may minimized its aggression. Clinicians can therefore make a huge difference to the treatment of prostate cancer patients by focussing on obesity as a modifiable risk factor.

Looking at objective 4 which was confounding factors such as diet, family history, and lifestyle choices to prostate cancer aggressiveness, it is advised that comprehensive dietary assessments should be included in order to assess the on role of nutrition on the progression of the disease, hence allowing for tailored dietary intervention to reduce aggressiveness of the cancer. A family history of prostate cancer should also be an important part of patient evaluation, resulting in further genetic counselling and focused screening for those at a high familial predisposition. Along with making lifestyle choices, such as smoking, physical activity, stress management should be included in a

holistic care approach and approach to patients with informed consent to mitigate their risk of more aggressive disease. Healthcare providers can at least maximize the precision of their treatment strategies and perhaps ameliorate survival probabilities in men with prostate cancer who have been exposed to these confounding factors by systematic consideration of them.

5.3.1 Recommendations for further research

More work is expected to explain in detail specific mechanisms behind the obesity impact and recommending interventions to circumvent the negative influences on prostate cancer outcomes.

The health sector should advocate that patients be regularly monitored regarding weight and body composition, and related health indicators (e.g., blood pressure, cholesterol levels), to enable assessing progress and advising the patients on what adjustments they need to make for them.

Future research should focus on exploring how healthcare policies affect obesity management for cancer care by exploring barriers to treatment access for obese patients and improving care delivery.

Futher studies could be done looking for genetic and epigenetic factors that may influence the relationship between obesity and prostate cancer outcomes in order to personalize the treatment plans according to candom personal risk profile.

Psychological and social factors that may affect obesity in prostate cancer patients and thus also weight management and treatment adherence, e.g. mental health status,

coping mechanisms and support systems should be studied in studies and then evaluated and tailored to meet the needs of these patients.

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APPENDIX I: DATA EXCTRACTION FORM

Category	**Indicate**	**Comments from physician**
Demographics (age/ethnicity)	***	
Medical History – previous cancer diagnoses/family history of cancer		
Cancer diagnosis – Type, stage, grade		
Treatment history – surgery/chemotherapy/radiotherapy		
Medications & supportive care – pain management and anti-nausea medication		
Laboratory and imaging results – blood tests/CT scans and MRIs		
Adverse & side effects of treatment		
Quality of life and functional status		
Follow up and disease re-occurrence		
Patient reported outcomes – symptoms, physical and emotional wellbeing		

APPENDIX II: In-depth Interview Guide

Instructions: This IIG will be conducted by the researcher in this study

Study Title: obesity as a risk factor for prostate cancer aggression among cancer patients in selected hospitals in kiambu county, Kenya.

Principal Investigator: **Selvine Ondego**

Introduction: Welcome to our study on the relationship between obesity and aggressive prostate cancer. Your participation in this research project is instrumental in helping us understand how obesity may influence the aggressiveness of prostate cancer. Before proceeding, please review the following key information and instructions.

Participant Eligibility:

- Male participants aged 50 years and above
- Participants diagnosed with prostate cancer
- Participants with a body mass index (BMI) of 30 or higher

Background Information

Please take down the following information about the Indepth interviews in your notebook

1. Name

2. Residence

3. Name of hospital attended

4. How long have you been diagnosed with prostate cancer?

5. Are you married?

6. Have you been diagnosed with obesity before? _____

7. When was the first time you were diagnosed with PC? _____

8. What stage of PC are you currently in? _____

9. What are some of the severe symptoms you are experiencing in relation to PC with obesity?_____

10. What is your BMI index? _____

Study Procedures:

- Complete an initial questionnaire to provide information on your medical history, treatment regimens, lifestyle factors, and weight status.
- Undergo physical measurements including BMI assessment and waist circumference.
- Medical records review to gather information on prostate cancer diagnosis, staging, and treatment history.
- Participate in interviews to provide insights into your experiences with prostate cancer and weight management.
- Follow-up assessments may be conducted to monitor disease progression and treatment responses.

Questions

1. Can you describe your personal experience with prostate cancer, including your thoughts on how obesity may have influenced your diagnosis?

   _____

2. In your view, how do you perceive the relationship between obesity and the aggressiveness of prostate cancer? What experiences or observations have shaped this perception?

   _____

   ____

3. What lifestyle changes, if any, have you made since your prostate cancer diagnosis, particularly concerning weight management? How do you believe these changes have affected your health?

   _____

4. How well-informed do you feel about the links between obesity and prostate cancer? What sources of information have influenced your understanding of this relationship?

   _____

5. Can you discuss how discussions with healthcare providers about obesity and its impact on prostate cancer aggression have influenced your treatment choices?

   _____

6. How has your diagnosis of prostate cancer and any associated issues with obesity affected your emotional and psychological well-being? Can you share specific instances or feelings? _____

7. What role do your family, friends, or support groups play in managing your health, especially regarding obesity and prostate cancer? How do they impact your decisions?

   _____

8. What challenges or barriers have you encountered in trying to maintain a healthy weight during your prostate cancer journey? How have these barriers impacted your overall health?

   _____

   _____

9. What strategies, both physical and emotional, have you found helpful in coping with the challenges of prostate cancer and obesity?

   _____

   _____

10. Based on your experiences, what recommendations do you have for healthcare providers in supporting patients with prostate cancer who also struggle with obesity?

    _____

APPENDIX III: CONSENT FORM

Principal Researcher: **Selvine Ondego**

You are being invited to participate in a research study that aims to investigate the relationship between lifestyle factors and cancer risk. Your participation in this study is voluntary, and before you decide whether to participate, it is important that you understand the purpose of the study, what was involved, and the potential risks and benefits. Please take your time to read this form carefully and ask any questions you may have before making your decision.

The purpose of this study is to gather information on obesity as a potential impact on prostate cancer risk. By understanding these relationships, we hope to contribute to the

development of strategies for prostate cancer prevention and management. Your privacy and confidentiality are of utmost importance. All information collected during the study was kept confidential and stored securely. Your identity will not be disclosed in any reports or publications resulting from this research. Participation in this study is entirely voluntary. You have the right to withdraw from the study at any time without penalty or loss of benefits. Your decision to participate or not will not affect your medical care or relationship with the researchers. By signing below, you acknowledge that you have read and understood the information provided in this consent form and agree to participate in the research study on understanding the impact of lifestyle factors on cancer risk.

Participant's Signature: _____

Date: _____

Principal Investigator's Signature: _____

Date: _____

APPENDIX IV: RESEARCH QUESTIONNAIRE

Please fill in the questionnaire appropriately

A. DEMOGRAPHIC CHARACTERISTICS

1. What is your age_____(in years)

2. For how long have you been diagnosed with Prostate cancer? _____

3. Where do you live?

   Urban ☐ Rural ☐

4. Which hospital do you receive treatment in mostly_____ (specify).

5. Do you have available means of transport to the nearest hospital for treatment?

   Yes ☐ No ☐

6. (a) Is there any family member that provides home-based care for you?

   Yes ☐ No ☐

   (b) If yes above please specify who attends to you.

   Spouse ☐

   Sibling ☐

   Parent ☐

   Neighbor ☐

7. At what age were you diagnosed with prostate cancer? _____

8. Indicate your marital status

   ☐

Married single cohabiting widow/divorced

9. What is your highest level of education

Primary

Secondary

University/ college

Postgraduate

None

B. OBESITY AND AGRESSION OF PROSTATE CANCER

(This section provides information on the linkage between obesity and prostate cancer aggression, tick where necessary)

1. Have you ever been declared as an obese before?

Yes

2. If yes, did it lead to the aggression of prostate cancer?

Yes No

3. What were some of the severe prostate cancer symptoms you had when you were diagnosed with obesity? (as indicated by the doctor/cancer physician, tick more than one)

Inflammation

Hormonal imbalance

Insulin resistance

Difficulty in treatments

4. How many times have you been admitted at the hospital due to severity of the prostate cancer symptoms?

Once Occasionally rally

5. Are you still obese?

Yes No

6. If NO, do you still face the severe symptoms of prostate cancer?

Yes No

7. Have you ever been enrolled in palliative care for prostate cancer?

Yes ☐ ☐

8. On a Likert scale of 1 – 5, indicate how likely you are to agree with the following statements on the impact of obesity to prostate cancer aggression, with 1 being strongly disagree and 5 being strongly agree.

	1	**2**	**3**	**4**	**5**
Obesity contributes to severe PC symptoms					
It's difficult to manage PC with obesity at the same time					
Chances of surviving PC with obesity is very minimal					
Most PC patients die due to obesity					
Palliative care for obese PC patients is very difficult to attain					

C. CONFOUNDING FACTORS THAT CONTRIBUTE TO PROSTATE CANCER

(This section highlights some of the confounding factors that contribute to prostate cancer)

1. Have you had any underlying medical conditions before that might have led to aggression of prostate cancer?

Yes ☐ No ☐

2. If YES above, please indicate the medical condition you had _____?

3. Are there any environmental factors that led to prostate cancer according to medical report?

   Yes ☐ No ☐

4. If yes specify the environmental factor _____

5. From 4 above, how did it affect you in your daily activities as a prostate cancer patient?

   I could not walk long distances ☐
   I could not do house chores/activities ☐
   I experienced a lot of pain ☐
   I fell sick often/ visited the hospital often ☐

APPENDIX V: APPROVAL DOCUMENT

Mount Kenya University

DIRECTORATE OF GRADUATE STUDIES

MPH/2022/45960

4th June, 2024

National Commission for Science Technology & Innovation (NACOSTI)
Off Waiyaki, Upper Kabete
P.O Box 30623- 00100
NAIROBI, KENYA

Dear Sir/Madam,

RE: SELVINE OUMA ONDEGO – REGISTRATION NO. MPH/2022/45960

The purpose of this letter is to introduce the above named student who is pursuing **Master of Public Health** in the department of **Epidemiology and Biostatistics** in the school of **Public Health.**

The title of the research is **"Obesity as a Risk Factor for Prostate Cancer Aggression Among Cancer Patients in Selected Hospitals in Kiambu County, Kenya."** It has been cleared by the University's Ethics Review Committee (Certificate attached) and now has to proceed to the field to collect data between **June, 2024 and August, 2024.**

Any assistance accorded to the student will be highly appreciated.

Thank you.

Mount Kenya University
P. O. Box 342 - 01000, THIKA
Office of the Director
Graduate Studies

Dr. Samuel M. Karenga, Ph.D
Director, Graduate Studies
Enc.

Mount Kenya University

REF: **MKU/ISERC/3762**
TO: **SELVINE OUMA ONDEGO**

Date: 03 June 2024

REG: **MPH/2022/45960**

Dear Sir/Madam,

RE: OBESITY AS A RISK FACTOR FOR PROSTATE CANCER AGGRESSION AMONG CANCER PATIENTS IN SELECTED HOSPITALS IN KIAMBU COUNTY, KENYA.

This is to inform you that **Mount Kenya University** has reviewed and approved your above research proposal. Your application approval number is **2806.** The approval period is **03/06/2024 - 02/06/2025.**

This approval is subject to compliance with the following requirements;

i. Only approved documents including informed consents, study instruments, MTA will be used
ii. All changes including amendments, deviations and violations are submitted for review and approval by **Mount Kenya University**
iii. Death and life-threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to **Mount Kenya University** within 72 hours of notification
iv. Any changes, anticipated or otherwise that may increase the risks or affect the safety or welfare of study participants and others or affect the integrity of the research must be reported to **Mount Kenya University** within 72 hours
v. Clearance for export of biological specimens must be obtained from relevant institutions
vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal
vii. Submission of an executive summary report within 90 days upon completion of the study to **Mount Kenya University**

Prior to commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology and Innovation (NACOSTI) https://research-portal.nacosti.go.ke and also obtain other clearances needed.

MOUNT KENYA UNIVERSITY
P.O. Box 13495 - 00100, NAIROBI CAMPUS
04 JUN 2024
DIRECTOR
Graduate Studies
RECEIVED

Yours sincerely,

Dr. Alfred Owino, PhD
Chairman, Mount Kenya University ISERC

MKU/PG/F011 SCHOOOL LEVEL

Mount Kenya University

SCHOOL OF POSTGRADUATE STUDIES

MKU/PG/F011: RESEARCH PROPOSAL CERTIFICATE OF CORRECTIONS

(NB: This Research Proposal Certificate of corrections should be submitted to the Dean, School of Postgraduate Studies for clearance before the Student proceeds to collect data)

PART I: CANDIDATE PARTICULARS

Name of candidate Dr./Mr./Ms .....MR. Velvine Ouma Ondego

Registration No: .....MPH/2022/45960.....

Department of study: .....EPIDEMIOLOGY AND BIOSTATISTICS.....

Cell phone No: .....0796754538.....

School: .....PUBLIC HEALTH.....

Degree Title (MA, MED, PhD): .....MASTER.....OF PUBLIC HEALTH.....

Area of specialization: .....EPIDEMIOLOGY AND DISEASE CONTROL.....

Title of Thesis: ..... OBESITY AS A RISK FACTOR FOR PROSTATE CANCER AGGRESSION AMONG CANCER PATIENTS IN SELECTED HOSPITALS IN KIAMBU COUNTY, KENYA .....

.....

.....

Date of Meeting/Examination: .....18/1/2024.....

Signature of candidate: ..... Date: ....15/3/2024.....

PART II: DECLARATION OF SUPERVISOR(S) OVERSEEING CORRECTION / REVISION

I/We, the undersigned supervisor(s) overseeing corrections of the research proposal as advised by the candidate's evaluation panel do hereby declare that all the corrections have been effected satisfactorily as required.

Any other remarks .....

.....

Names of Supervisors	Signature	Date

1. ......DR ALFRED OWINO ODONGO..................................... 5/4/24.......
....

2. DR. DIANA NJUGUNA......... ....15/3/2024...................
....

3. ....

PART III: CONFIRMATION BY THE CAMPUS/ SCHOOL POSTGRADUATE COORDINATOR

I hereby do confirm that the supervisor(s) appointed to oversee the candidate effect the corrections on the research proposal have done so as per the instructions of the candidate's evaluation panel.

Any other remarks ....

....

....

Name of Coordinator: ....Dr. Owino Alfred..

Signature .... Date ....5/4/24.......

Mount Kenya University
P. O. Box 342 - 01000,
Thika
POST-GRADUATE COORDINATOR

Stamp ....

PART IV: CONFIRMATION BY THE DEAN OF THE RELEVANT SCHOOL

I hereby do confirm that the supervisor(s) appointed to oversee the candidate effect the corrections on the research proposal have done so as per the instructions of the candidate's evaluation panel.

Any other remarks ....

....

Name of Dean ....

Signature .... Date ....

MOUNT KENYA UNIVERSITY
P.O. Box 342 - 01000,
THIKA
DEAN, SCHOOL OF PUBLIC HEALTH

School Stamp ....

PART V: CLEARANCE BY THE UNIVERSITY ETHICAL REVIEW COMMITTEE (ERC)

The candidate will be issued with a Certificate of Ethical Clearance by the Directorate of Research and Development.

NB. Two (2) copies of the corrected/revised research proposal should accompany this Certificate of corrections

PART VI: COMMENTS BY THE DEAN SCHOOL OF POSTGRADUATE STUDIES

The candidate is granted/not granted permission to proceed to the field to collect data (delete where applicable)

NB: One (1) copy of the corrected/revised research proposal should accompany this certificate of corrections

Name of Dean ..... Dr. Samuel Karenga.....

(School of Postgraduate Studies)

Signature ..... Date 06/05/2024

School Stamp .....

Mount Kenya University
P. O. Box 342 - 01000, THIKA
Office of the Director
Graduate Studies

Ref No. 320933

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Date of Issue: **18/June/2024**

RESEARCH LICENSE

This is to Certify that Mr.. Selvine Ouma Ondego of Mount Kenya University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Kiambu on the topic: OBESITY AS A RISK FACTOR FOR PROSTATE CANCER AGGRESSION AMONG CANCER PATIENTS IN SELECTED HOSPITALS IN

KIAMBU COUNTY, KENYA. for the period ending : 18/June/2025.

License No: **NACOSTI/P/24/36900**

COUNTY GOVERNMENT OF KIAMBU
DEPARTMENT OF HEALTH SERVICES
P.O Box 2344 - 00900 Kiambu, Kenya
Tel: +254 709 877 000 **Email**: info@Kiambu.go.ke **Website**: www.Kiambu.go.ke **Twitter**: @KiambuCountyGov

REFERENCE KIAMBU/HRDU/AUTHO/ONDEGO S. O.

2nd June 2025

TO WHOM IT MAY CONCERN,

RE: CLEARANCE TO CONDUCT RESEARCH IN KIAMBU COUNTY

Kindly note that we have received a request by **SELVINE OUMA ONDEGO** of **Mount Kenya University** to carry out research in Kiambu County, the researchtopic being on ***"Obesity as a Risk Factor for Prostate Cancer Aggression***

Among Cancer Patients in Selected Hospitals in Kiambu County, Kenya".

We have duly inspected His documents and found that He has been clearedby **Mount Kenya University ERC** and Nacosti until **2nd June 2025**. He thus does not need any further clearance with another regulatory body in order to conduct research within the county of Kiambu.

However, it is incumbent upon the facility in which the research is being carried out to ensure that they are conversant with the remit of the study andoperate in line with their institutional norms on conducting research. This note also accords Him the duty to provide feedback on His research to the countyat the conclusion of His research.

DR. JUNE MUTHIORA

COUNTY HEALTH RESEARCH OFFICER
KIAMBU COUNTY

APPENDIX VI: Plagiarism R.

submission

My Files

My Files

University

Document Details

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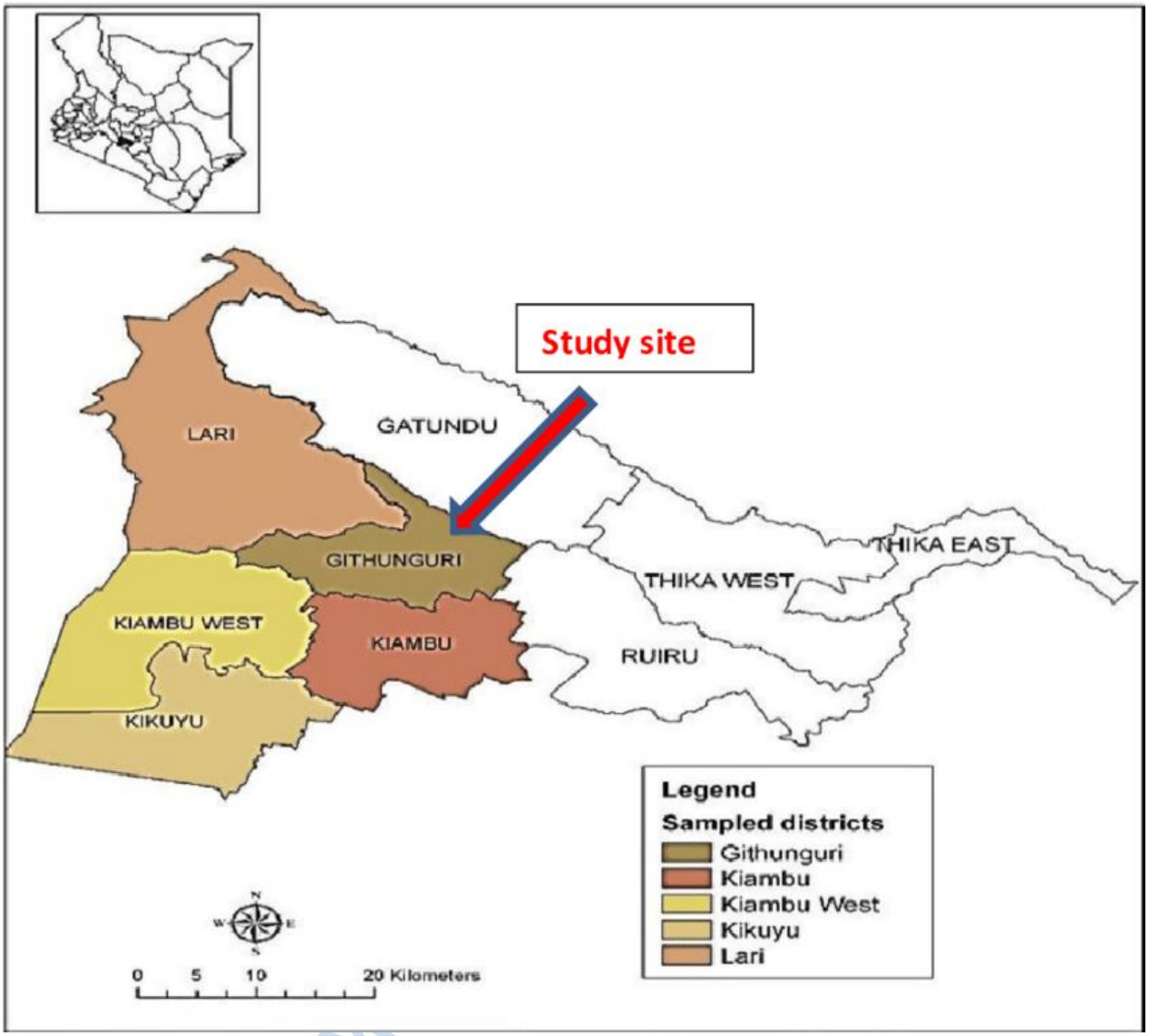
APPENDIX VII: MAP OF KIAMBU COUNTY (AREA OF STUDY)



Source: ResearchGate (Google)