FACTORS ASSOCIATED WITH BREAST CANCER AMONG FEMALES SCREENED AT THIKA LEVEL 5 HOSPITAL, KIAMBU COUNTY, KENYA

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DECLARATION

This thesis is my original work and has not been presented for a degree in any other university.

Signature …… Date…….

Diana Rose Kerubo Memba

This thesis has been submitted for examination with our approval as University Supervisors

Signature…… Date……

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Signature …… Date……

Mr. Lawrence Muthami

KEMRI, Kenya

DEDICATION

This work is dedicated to my husband, Paul Ochieng and my daughter Samaha Miyaki for their love and immense support during my study; also, my parents Prof. John Memba and Dr. Florence Memba for their support and encouragement during the course of this study.

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ABBREVIATIONS AND ACRONYMS

ACS	American Cancer Society
AIDS	Acquired Immunodeficiency Syndrome
BMI	Body Mass Index
BRCA	BReast CAncer gene
CD	Compact Diskette
ER	Estrogen-Receptor
HRT	Hormone Replacement Therapy
IARC	International Agency for Research on Cancer
KEMRI	Kenya Medical Research Institute
KNH	Kenyatta National Hospital
NCD	Non-communicable Diseases
NCR	Nairobi Cancer Registry
WHO	World Health Organization

DEFINITION OF TERMS

Menarche: The first menstrual cycle, or first menstrual bleeding, in female humans, occurs during puberty

Screening: Examination involving diagnostic techniques to detect presence of breast cancer, in this case, breast ultrasound.

ABSTRACT

The present study used a sample of 167 women ranging from ages 24 to 66 years, attending the radiology department of the Thika level 5 hospital for breast cancer screening revealed that fat intake, fruits and vegetables, weight, physical activity, alcohol consumption, passive tobacco smoking, breastfeeding and hormonal contraceptive use were significant for breast cancer development. Multiple binary logistic regression indicated that women with BMI greater than 28 had a 53.43- fold risk of testing positive for breast cancer (13.2%, p-value 0.00) compared to those with BMI below 22 while those with BMI range from 22 to 27.9 showed 6.07 - fold risk (9.6%, p-value < 0.05) of testing positive for breast cancer compared to those with BMI below 22. Those women in the study who had breastfed for between 2 to 4 years had a 0.17-fold risk (5.4%, p-value = 0.001) and women who had breastfed for more than 4 years had a 0.05 -fold risk (3.6%, p-value = 0.00) of testing positive for breast cancer compared to those who had breastfed for less than 2 years. This suggests a protection from breast cancer for those women who breast fed for 2 years and above. Equally, women who spent 3-5 hours engaging in any physical activity had 0.02 (95% CI:0.02 (0.004-0.153) lower odds of testing positive for breast cancer compared to those who spent 1-3 hours daily engaged in any physical activity. Women who passively smoked for more than 3 hours daily had a 15.66- fold risk (95% CI: (4.807-50.983) of testing positive for breast cancer compared to those who did not passively smoke. The results from this study strongly suggest that lifestyle behavior is one of the main predisposing factors to developing aggressive forms of breast cancer.

CHAPTER ONE

INTRODUCTION

1.1 Background

Breast cancer is the most prevalent cancer among women both in high-income and low-income countries (Boyle & Levin, 2008).). Breast is the leading site for tumors affecting women, accounting for 182,460 cases and 26% of cancers diagnosed in women (Colman & Tara, 2010). Breast cancer is the most commonly diagnosed cancer in women (24.2%, about one in 4 of all new cancer cases diagnosed in women worldwide are breast cancer), and the cancer is the most common in 154 of the 185 countries included in GLOBOCAN 2018 (IARC, 2018). Breast cancer is also the leading cause of cancer deaths in women (15.0%), followed by lung cancer (13.8%) and colorectal cancer (9.5%), which are also the third and second most common types of cancer, respectively; cervical cancer ranks fourth for both incidence (6.6%) and mortality rate (7.5%) (IARC, 2018). Breast cancer incidence is increasing in the low-income and middle- income countries due to increasing life expectancy, increased urbanization and adoption of western lifestyle. By 2030, the developing world is expected to bear 70% of the global cancer burden (Boyle & Levin, 2008). More than 50% of new cancer cases and nearly two-thirds of deaths from breast cancer occur in low-income, lower middle income and upper middle income countries of the developing world (Boyle & Levin, 2008).

Of African countries, Kenya has among the highest risk of breast cancer (Parkin *et al.*; 2014). In Kenya, cancer ranks as the number three killer disease, of Kenyans, with an estimated 18,000 cancer deaths being reported annually (International Agency for Research on Cancer, Globocan, 2008). About 80,000 cases of cancer are diagnosed each year with about 50 Kenyans dying daily from various forms of cancers (Pact Kenya Cancer Assessment in Africa and Asia, 2010) and (Global Medicine, 2011). The top six types of cancer include breast cancer, cervical cancer, cancer of the esophagus, stomach,

prostate and liver. The Cancer situation in Kenya is dire with a severe lack of Medical Practitioners for a large number of new Cancer cases being diagnosed annually according to the Kenyan Ministry of Health (National Cancer Control Strategy 2017–2022, 2017).

The mortality rate for breast cancer creates a heavy burden for women both financially and psychologically to their families and friends. Cancer ranks third among the main causes of death in Kenya after infections and Cardiovascular or Heart related diseases; up to 60 per cent of those who die are in the most productive years of their life.

1.2 Statement of the Problem

Although the Kenyan Ministry of Health (MOH) is committed to reducing cancer mortality, as evidenced by policies such as the National Cancer Control Strategy (2011-2016), cancer is the third leading cause of mortality in Kenya, accounting for 7% of annual deaths (Topazian & Galassi, 2016). Breast cancer is the most common type of cancer among women in the world. It is more than 100 times more common in women than in men (Korir & Mutuma, Kemri report 2015). The prevalence rate for breast cancer among women in Nairobi County is 33.5% and is now the number one killer of women aged 35-55 years in Kenya (Nairobi Cancer Registry Centre, 2015).

While numerous studies have been conducted in high income countries to study the epidemiology of breast cancer, few have been done in Sub-Sahara Africa populations, Kenya included (Mutuma & Korir, 2015). Such studies are of interest because different risk profiles may help to explain the differences in occurrence of the disease in different populations. Cases of breast cancer in Kenya have been reported by practicing physicians to be on the increase, a fact corroborated by Nairobi cancer registry (Mutuma & Korir, 2015). Due to the high costs of breast cancer management and treatment breast, the disease is therefore a major cause of economic hardships to the woman herself and to her family.

1.3 Justification

According to the NCR cancer report 2000-2002, breast cancer is the most commonly diagnosed form of the disease among women at 23.3% of all diagnosed cases. From the Literature Review, there are few studies on breast cancer especially those that explain the lifestyle, socio-economic and reproductive factors contributing to the increase (Yasmin *et al*, 2006). The fact that breast cancer incidence is decreasing in other parts of the world, Australia and France, highlights the fact that breast cancer is not inevitable (Globocan, 2008). Indeed it is a stark reminder that every year in this country many women are diagnosed with cancer that could have been prevented.

The catchment area of Thika hospital is mostly people who live in rural settings and whose lifestyles are not similar to urban-setting life standards; despite this, cancer cases have been on the rise. The role of the risk factors associated with breast cancer under investigation in this study are different as compared to similar risk factors in high income countries (Yasmin *et al* 2006), for example breastfeeding is a norm in our culture as compared to high income countries where a lot of mothers choose not to breastfeed their babies. The study will be important as it will establish the associated factors including lifestyle factors, socio-economic factors and reproductive factors of female clients attending the radiology department at Thika Level 5 Hospital. The results of the study will be used in designing awareness, health education, prevention and control programs focused on women to reduce the burden of the disease.

1.4 Objectives

1.4.1 General objective

To determine the factors associated with breast cancer among females screened for breast cancer at Thika Level 5 Hospital.

1.4.2 Specific objectives

i. To determine the prevalence of breast cancer among the females screened at Thika Level 5 Hospital.
ii. To determine the socio-demographic and economic factors associated with breast cancer among females screened for breast cancer at Thika Level 5 Hospital.
iii. To establish the lifestyle factors associated with occurrence of breast cancer among females screened for breast cancer at Thika Level 5 Hospital.
iv. To determine the reproductive factors associated with occurrence of breast cancer among females screened for breast cancer at Thika Level 5 Hospital.

CHAPTER TWO

LITERATURE REVIEW

2.1 Global Burden of Breast Cancer

Cancer is a leading cause of death worldwide and accounted for 7.6 million deaths (around 13% of all deaths) in 2008. Breast cancer caused 458,000 deaths which is more than cervical cancer that accounted for 275,000 deaths. About 70% of all cancer deaths occurred in low- and middle-income countries. Deaths from cancer worldwide are projected to continue rising to over 13.1 million in 2030 (Globocan, 2008; IARC, 2010).

The overall burden of cancer in the world is projected to rise worldwide by 50%, between 2002-2020, particularly in developing countries due to increasing proportion of elderly people in the world (in whom cancer occurs more frequently than in the young), an overall decrease in deaths from communicable diseases, the decline in some countries in mortality from cardiovascular diseases, and the rising incidence of certain forms of cancer, notably lung cancer resulting from tobacco use (Jemal *et al*; 2010). The top six types of cancer include breast cancer, cervical cancer, cancer of the esophagus, stomach, prostate and liver. According to the Kenyan Ministry of Health, the Cancer situation in Kenya is dire with a severe lack of Medical Practitioners for a large number of new Cancer cases being diagnosed annually (National Cancer Control Strategy 2017–2022, 2017).

Breast cancer is the most frequently diagnosed cancer and the leading cause of cancer deaths in females worldwide, accounting for 23% (1.38 million) of the total new cancer cases and 14% (458,400) of the total cancer deaths in 2008. About half of the breast cancer cases and 60% of deaths are estimated to occur in economically developing countries (Globocan, 2008; IARC, 2010).

Worldwide breast cancer has many etiological factors, including family history of breast cancer, benign breast diseases, age, sex, hormones and reproductive history factors (early menarche, late or no pregnancy), western lifestyle (high caloric diet, lack of physical activity and related factors), ionizing radiation, drugs, agro-chemicals, gene mutations, alcohol, and smoking (Bernard *et al*., 2003).

In North America, Western Europe and Australia, breast cancer mortality rates have declined, mainly due to lower use of combined postmenopausal hormone therapy, improvements in early detection and treatment, and high breast cancer awareness levels in the population, surveys and national screening programs. Five year breast cancer survival rates are higher than 70% in most developed countries and less than 40% for most developing countries; mainly due to low awareness levels, lack of access to early diagnosis and treatment options (Seradour *et al*., 2009; Canfell *et al*., 2008).

In Nigeria breast cancer trends were declining and rate of hospital attendance has risen, reduced late presentation and this was attributed to several factors; increased awareness about breast cancer , improved early detection methods and usefulness of breast self-examination (Parkin *et al*., 2003).

In many African and Asian countries however, including Uganda, South Korea, and India, incidence and mortality rates have been rising (Parkin *et al*., 2010), with changes in reproductive patterns, physical inactivity, and obesity being the main contributory factors (Colditz *et al*., 2006).

While communicable diseases still remain the leading killers in many developing countries, the incidence and mortality from non-communicable diseases is rising rapidly. According to the latest WHO data published in April 2011, Breast cancer deaths in Kenya reached 1,491 or 0.47% of total deaths. The age adjusted death rate was 15.76 per 100,000 people. Kenya ranks 102, in breast cancer mortality, in the world (WHO 2011). In Kenya, it was noted that breast cancer is the number one killer of women aged 35 to 55 years (Korir & Mutuma, 2015).

Maintaining a healthy body weight, increasing physical activity, and minimizing alcohol intake are the best available strategies to reduce the risk of developing breast cancer (Kushi *et al*., 2006). Early detection through mammography has been shown to increase treatment options and save lives, although this approach is cost prohibitive and not feasible in most economically developing countries (Anderson *et al*; 2006). Recommended early detection strategies in these countries include the promotion of awareness of early signs and symptoms and screening by clinical breast examination (Anderson *et al*., 2007).

2.2 Epidemiology of Breast Cancer

Available data from both Nairobi Cancer Registry and GLOBOCAN list breast cancer as the top type of cancer with high incident and mortality rate, which predominate females. Based on 2002 data from the Nairobi Cancer Registry, of all the cancers registered, breast cancer accounted for 23.3%, cervical cancer 20% and prostate cancer 9.4%. Available data showed that younger women were at a higher risk compared to older women (aged 55 and above). According to data by the US's National Cancer Institute, more than 65% of women diagnosed with breast cancer were aged 55 years old and above. Comparative data from Kenya's Nairobi Cancer Registry show only 26% of women diagnosed were 55 years old and above. Majority (60%), of the women diagnosed with breast cancer was aged 35-54 years. According to the Nairobi Cancer Registry, women affected by breast cancer in Kenya were relatively younger than those in developed countries. For years, according to the study, poverty, ignorance, less and late screening, and lack of adequate health care were believed to be responsible for high breast cancer deaths in Kenya.

Screening aims to identify individuals with abnormalities suggestive of a specific cancer or pre-cancer who have not developed any symptoms and refer them promptly for diagnosis and treatment (WHO, 2017). According to the 2013 National Guidelines for Cancer Management in Kenya, screening for early detection is recommended as lesions treated in the early stages have a high cure rate. The women diagnosed in Kenya are said

to be much younger than those in developed countries with late diagnosis being the main reason for high mortality. Screening for breast cancer includes breast self-examination, clinical breast examination, and breast imaging (mammogram and/ or ultrasound scanning). Mammogram is recommended for women over 40 years while ultrasound is the imaging of choice for younger women. According to the Kenyan Ministry of Public Health and Sanitation guidelines published in 2012 (National Guidelines for prevention and management of cervical, breast and prostate cancers 2012), advocated for providence of annual clinical breast examination by a skilled health care provider to individuals aged 40 years or more. Individuals who are younger than 40 years should have the screening every 2 years beginning from the age of 18 years (National Guidelines for prevention and management of cervical, breast and prostate cancers, 2012).

The Kenya Breast Health Programme (KBHP) educates women to care for their breasts through regular self-examination and organizes workshops for exchange of information with the public (Neondo *et al.*, 2006). Health promotion talks are given regularly by medical professionals in Kenya through the media outlets but not every region of the country receives the broadcasts (Musimbi *et al.*, 2008).

2.3 Breast Cancer situation in Kenya

Despite the fact that non communicable diseases such as breast cancer were on the increase, the health systems in the country have traditionally concentrated on the prevention and control of communicable diseases. As a result, health and development plans have not adequately invested in the prevention and control of these diseases. Breast cancer rarely occurs before 25 years of age but it is more common in clients of ages 30 to 40 years with a peak at 40 to 50 years in our community (National Guidelines for prevention and management of cervical, breast and prostate cancers, 2012).

The silent epidemic of non-communicable diseases now imposes a ‘double burden of disease’ to the country which unless it is addressed, the situation as it is will over whelm

the country in the near future. This bias in the system has resulted in weakness in programs that should be addressing non-communicable diseases and associated risk factors in the country. According to the regional cancer registry at KEMRI, about 80% of reported cases of breast cancer were diagnosed at advanced stages, when very little can be achieved in terms of curative treatment. This is largely due to low level of awareness of breast cancer signs and symptoms, inadequate screening services, inadequate diagnostic facilities and poorly structured referral facilities. The country has few cancer specialists who are concentrated in a few health facilities in Nairobi. This makes it difficult for a great majority of the population to access cancer treatment services resulting in long waiting times causing some previously curable tumors to progress to incurable stages.

The reason for this sad situation is that cancer treatment infrastructure in Kenya is inadequate and some management options were not readily available necessitating some Kenyans to seek breast cancer treatment abroad. Within the health care systems, breast cancer is treated through medical, surgical or radiation therapy. Effective treatments require that all these modalities of treatment be available in the same setting to avoid distant referral and delays in treatment administration. The essential drugs list does not include chemotherapy for breast cancer. Some of the very essential drugs for pain management are rare to find in most public hospitals. There is therefore need for clear policies concerning terminal pain management, supportive and palliative care for breast cancer patients in Kenya. Some of the main impediments to palliative care in Kenya include shortage of financial and human resources, lack of awareness and legal restrictions on the use and availability of opioid analgesics. Breast cancer research in Kenya does not commensurate with the magnitude of the problem. This is due to inadequate funding and training facilities in cancer research. There is also no comprehensive breast cancer surveillance system and no population based breast cancer registry.

2.4 Lifestyle risk factors

Findings from China study, done to investigate the risk factors on female breast cancer in Zhejiang province showed that lifestyle, environment and diet related factors are significantly associated with risk of breast cancer (Yao *et al*; 2012).

A research study done by Pieta, showed that health promoting lifestyle related with physical activity and other health promoting behaviors (mode of nutrition, reduction or elimination of alcohol consumption, discontinuation of smoking) is associated with a decreased risk of breast cancer development (Pieta *et al*., 2012).

The American Cancer Society's dietary guidelines for cancer prevention recommend that people choose foods and amounts that promote a healthy weight, eat 5 or more servings of fruits and vegetables each day, choose whole grains instead of refined grain products, should limit consumption of processed and red meat. Women should limit alcohol consumption to 1 drink per day (women at high risk for breast cancer should consider not drinking alcohol at all). For breast cancer survivors, the American Cancer Society recommends diets that include lots of fruits and vegetables, low amounts of saturated fat (from meat and high-fat dairy products), moderation in soy foods, and moderate or no alcohol consumption.

To prevent new cancers from starting, scientists look at risk factors and protective factors. Anything that increases your chance of developing cancer is called a cancer risk factor; anything that decreases chance of developing cancer is called a cancer protective factor. There are established known breast cancer risk factors which include; family history of breast cancer, hormones and reproductive factors; ionizing radiation, diet and diet related factors, benign breast diseases; increasing with age (age at menarche), Gender (mainly female), lack of exercise. Avoiding risk factors and increasing protective factors may lower risk but it does not mean that one will not get cancer (Ries *et al*., 2007). Obesity, alcohol consumption, and smoking significantly increase the risk of breast cancer recurrence among breast cancer survivors (Li Cl *et al*., 2009).

A study conducted by researchers from the Fred Hutchinson Cancer and Research Center in Seattle showed that lifestyle factors such as obesity, smoking, and drinking could significantly increase the risk of developing a second cancer. Modifying these factors might provide breast cancer survivors with a way to reduce their risk of developing a second cancer (Chen *et al*., 1999).

2.4.1 Weight

Recent studies have shown that postmenopausal women who are overweight or obese have an increased risk of breast cancer, and they have a higher risk of having the cancer recur after treatment. Gaining weight after menopause can increase a woman's risk. Putting on 9.9 kg after menopause increases the risk of developing breast cancer by18% (Nelson *et al*., 2011). Lack of exercise can be linked to breast cancer by the American Institute for Cancer Research (Nelson *et al*., 2011). Obesity has been linked to an increased risk of developing breast cancer in many scientific studies (Ligibel *et al*., 2011). There is evidence to suggest that excess body fat at the time of breast cancer diagnosis is associated with higher rates of cancer recurrence and death; women who are obese at diagnosis have a 30% higher risk of breast cancer related and overall mortality, compared with leaner women (Ligibel *et al*., 2011). Furthermore, studies have shown that obese women are more likely to have large tumors, greater lymph node involvement, and poorer breast cancer prognosis with 30% increased risk of mortality (Protani *et al*., 2010).

2.4.2 Physical activity

A regular exercise routine has many pros and cons, including increased longevity and stable physical and emotional health, cuts risk of heart disease, makes bones stronger and less prone to osteoporosis, can slow memory loss, exercises all main muscle groups; strengthens lungs; excellent for aerobic fitness and easing joint and back problems (Tehard *et al*., 2006). Regular exercise is good for cardiovascular fitness and core body

strength; intense bursts of energy followed by rest helps muscles use oxygen efficiently; improves leg strength (Tehard *et al.*, 2006).

While there are many medical benefits to exercise, there are also drawbacks, such as the sacrifice of time and energy that must be given over to establishing a consistent workout, high injury potential and suppresses appetite. Poor technique can cause muscle strains, neck and back pain. The inconvenience and expense of exercise deters many people from embarking on a regular routine, despite the various benefits (Buchner *et al*., 2008).

Increased physical activity is associated with a decreased risk of developing breast cancer and a lower risk of breast cancer recurrence after treatment. Regular physical activity may protect against breast cancer by helping women maintain a healthy body weight, lowering hormone levels, or causing changes in a women's metabolism or immune factors. For example, activity equal to walking 30 minutes a day may lower breast cancer risk by about 3% (Wu Y. *et al.*, 2013). Exercise can help with weight control. Higher estrogen levels in women increase the risk of breast cancer therefore being active may lower estrogen levels (Smith *et al.*, 2013) and boost body's immune system to kill or slow the growth of cancer cells (Winzer *et al.*, 2011).

2.4.3 Fruits and Vegetables

A huge advantage of following a fruitarian diet is that it cleanses the digestive system and helps in flushing toxins out of the body. Fruits are high in fiber and water content which helps in scrubbing and cleansing the intestine of waste and toxins. It also helps in creating a strong and robust digestive system. The high water content in fruits also keeps the body well hydrated. Another advantage of a fruit only diet is the rich intake of vitamins and minerals. A fruit diet also ensures the entry and maintenance of adequate amounts of antioxidants in the body. As fruits are low in fat, they can be consumed in more quantities without adding on more calories (Graff *et al*., 2006).

A fruitarian diet may not necessarily incorporate all essential nutrients required for the effective functioning of the body. For example, there is the possibility of decreased intake of vitamin D or Vitamin B12, both of which are important for the body. Protein levels in the body may also come down and this could lead to extreme weakness, malfunctioning of the immune system and also problems with the absorption of certain minerals such as calcium, which can impact bone health. There is also a risk of iron and zinc deficiency. Severe weight loss could result which could further lead to anorexia. Finally, it is important to note that a fruit only diet can be very expensive. Fresh fruits and vegetables have a shelf life so it is very important for them to be consumed timely for maximum benefits and also to avoid wastage (Robb *et al*., 2005)

Fruits and vegetables are important sources of antioxidants, which may help protect against the tissue damage linked to increased cancer risk. In a study published in the Journal of the American Medical Association, biomedical investigators found that vegetable intake (broccoli, cauliflower, cabbage, kale and Brussels sprouts) was inversely related to the development of breast cancer. The relative risk among women in the highest decile of vegetable consumption (median, 1.5 servings per day) compared to the lowest decile (virtually no consumption) was 0.58. That is, women who had consumed around 1.5 servings of vegetables per day had 42% reduced risk of developing breast cancer than those who consumed virtually none (Terry *et a.*, 2001).

2.4.4 Grain Consumption

Grains are major components of the diet and they contribute to daily intake of carbohydrate, protein and dietary fibres (Mourouti *et al.*, 2016). The association between whole grain consumption and breast cancer risk has been investigated in previous epidemiological studies. A study done by Farvid which evaluated individual grain-containing foods and whole and refined grain intake during adolescence, early adulthood, and premenopausal years showed that whole grain food intake may be associated with lower breast cancer risk before menopause (Farvid *et al.*, 2016). A study carried out by Mourouti and colleagues showed that whole grain consumption of more

than 7 times/week was associated with a 0.49-fold lower likelihood of having breast cancer (Mourouti *et al.*, 2016). Whole grains are a source of dietary fiber and have a lower high glycemic index than refined grains. High intake of dietary fiber has been found to be associated with reduced risk of breast cancer. A new study conducted by a team led by Nour Makarem, a Ph.D. student at the New York University found that consuming healthy carbs like legumes, fruits and whole grains was associated with 67% lower breast cancer risk (Nour *et al.*, 2018).

2.4.5 Fat Intake

Almost all foods contain some fat. Fat provides a terrific source of energy as well as a great depot for storing it. It is an important part of cell membranes, helping govern what gets into cells and what comes out. The body uses cholesterol as the starting point to make estrogen, testosterone, vitamin D, and other vital compounds. Fats are also biologically active molecules that can influence how muscles respond to insulin's "open up for sugar" signal; different types of fats can also fire up or cool down inflammation (Mozaffarian *et al*., 2011).

When there is too much Low-density lipoproteins (LDL) cholesterol in the blood, these particles can form deposits in the walls of the coronary arteries and other arteries throughout the body. Such deposits, called plaque, can narrow arteries and limit blood flow. When plaque breaks apart, it can cause a heart attack or stroke. Meat is a good source of iron, vitamin B, riboflavin, thiamin and niacin. They have high levels of saturated fat and can raise cholesterol. Because of its high-fat content, red meat has been linked to heart disease, cancer and diabetes and processed meat is loaded with sodium, which can raise blood pressure (Mozaffarian *et al*., 2011).

Findings from rural china study showed that reducing dietary fat frequency from 24% to 6% was associated with lower breast cancer risk. However, lower dietary fat in rural China meant less consumption not only of fat but, more importantly, of animal based foods (de Stavola *et al*., 2008). A study 'Harvard study' which asserted the relation

between dietary fat intake and breast cancer risk among 90,655 women who have not yet reached menopause reported that the intake of animal fat, mainly red meat and high-fat dairy foods, during premenopausal years, was associated with increased risk of breast cancer. (Eunyoung *et al.,* 2003).

Too much consumption of sugar can make one put on weight and being overweight increases the risk of breast cancer. But high sugar intake may not only lead to weight gain; a new study claims it can increase the risk of breast cancer and hasten the spread to the lungs. Study coauthor Peiying Yang and colleagues publish their findings in the journal Cancer Research. The team set out to assess how sugar intake influenced breast cancer development in mice that were randomized to various diets, including a sucrose-enriched diet, a fructose-enriched diet and a starch-control diet (Peiying *et al*., 2016).

According to the researchers, the amount of sucrose and fructose the mice consumed was comparable to that found in a typical Western diet - characterized by high intake of refined sugars, saturated fat and red meat, and low intake of fresh fruits and vegetables and whole grains. 50% to 58 % of mice fed sucrose -enriched diet developed breast cancer. Compared with the mice who were fed the starch-control diet, those fed the sucrose- and fructose-enriched diets were more likely to develop breast cancer. The team determined that it was specifically fructose, in table sugar and high-fructose corn syrup, ubiquitous within our food system, which was responsible for facilitating lung metastasis and 12-HETE production in breast tumors (Peiying *et al*., 2016).

2.4.6 Alcohol Consumption

Excessive alcohol consumption could lead to suicidal tendencies, depressive illness and other nervous disorders, chronic pancreatitis, chronic hepatitis (quite significant), high blood pressure, heart failure, cancer of the pancreas, mouth, pharynx, larynx, esophagus and liver, as well as breast cancer. Sometimes alcohol consumption can also cause hormone induced tumors (usually estrogen and testosterone), miscarriage in pregnancies, increased risk of getting a stroke and obesity (Rehm *et al*., 2009).

Current research suggests that having more than one to two alcoholic drinks (including beer, wine, and spirits) per day raises the risk of breast cancer, as well as the risk of having the cancer come back after treatment. 3.6% of all cancer cases and 3.5% of all cancer deaths worldwide are attributable to consumption of alcohol (Boffetta *et al.*, 2006). The International Agency for Research on Cancer of the World Health Organization has classified alcohol as group 1 carcinogen. Its evaluation states "There is sufficient evidence for the carcinogenicity of alcoholic beverages in humans" (IARC, 2007). The more alcohol a woman drinks, the more likely she is to get breast cancer (IARC, 2007). The relationship is linear and dose-dependent. Even low levels of alcohol consumption carry some risk (IARC, 2007). A study of more than one million middle-aged British women concluded that each daily alcoholic beverage increases the incidence of breast cancer by 11 cases per 1000 women (Allen *et al*., 2009). Approximately 6% of breast cancers reported in the United Kindom are due to women drinking alcohol (Allen *et al*; 2009). The primary mechanism through which alcohol causes breast cancer is increased estrogen levels (Margolese *et al*., 2000).

2.4.7 Tobacco

Tobacco smoke is associated with cancer, strokes and heart disease. Smoking does not just harm the smoker – it also harms people nearby, who breathe in the smoke (this is called "passive smoking") (Russo *et al.*, 2003). Smokers choose to smoke, but people nearby do not choose to smoke passively. People should only be exposed to harm if they understand the risks and choose to accept them (Russo *et al*., 2003).

Most epidemiological studies demonstrated an association of heavy smoking, long duration smoking, smoking before a first full term pregnancy (FFTP) and passive smoking with increased risk of breast cancer in women with high levels of estrogen (Catsburg *et al.*, 2015). There is some evidence that exposure to tobacco smoke is most problematic between puberty and first child birth. The reason is that breast tissue appears to be more sensitive to chemical carcinogens because breast cells not fully differentiated until lactation (Russo *et al*; 2003). The newer studies, which exclude

passive smokers from the control group, generally show elevated risks associated with active as well as passive smoking. Breathing second hand smoke increases breast cancer risk by 70% in younger, primarily pre-menopausal women. The California Environmental Protection Agency concluded that passive smoking causes breast cancer (Russo *et al.*, 2003).

2.4.8 Brassiere wearing

Sleeping with a bra on can often prevent back aches or muscular cramps, particularly in large-breasted women, and the practice is usually recommended after breast surgery as a way to protect the tender tissues as they heal and to prevent re-injury or infection. Some women may also choose to sleep in their undergarments as a measure of modesty in front of others. One of the main reasons women wear brassiere in the daytime is to keep their breasts supported and to prevent them from sagging. Support of a bra during the night can also help keep tender or sensitive breasts from rubbing against each other or the mattress (Cadwell *et al*., 2006).

The practice is not always particularly comfortable, though, and women who wear poorly fitting brassiere (wrong size brassiere; too small or narrow for the cup size) to bed often complain of skin irritation and breast swelling. Breastfeeding mothers may also notice a reduction in their breast milk supply if they sleep in bras that are too tight fitting, as this can reduce flow and sometimes even clog milk ducts. A woman who sleeps in a poorly fitting brassiere is likely to wake up feeling achy and sore, and may have indentations or score marks in her skin if the straps dug in to her back or shoulders (Singer *et al*., 1995).

A 1991 case control study found premenopausal women who did not wear brassiere had half the risk of breast cancer than women who did wear brassieres (Hsieh *et al*., 1991). However, the authors stated that this link was likely due to factors related to wearing a brassiere rather than the brassiere itself (Hsieh *et a.*, 1991).

2.5 Reproductive risk factors

2.5.1 Age at first Childbirth

Lower age of first childbirth compared to the average age of 24 years and having more children (about 7% lowered risk per child) (Ray *et al*., 2005) have all been associated with lowered breast cancer risk in large studies.

Most studies have found out that for first births over the entire child bearing period, the lower a woman's age at first birth, the lower the risk of breast cancer (Ray *et al*., 2005, Palmer *et al*., 2003). A study conducted by the Huiyan revealed an increased risk of breast cancer with late age at birth of first child. Parous women whose first full-term pregnancy occurred at age 35years or later had a 118% greater risk for breast carcinoma in situ (RR=2.18, 95% CI= 1.36–3.49) and 27% greater risk for invasive breast cancer (RR=1.27, 95% CI= 0.99 – 1.65) than those whose first full term pregnancy occurred before 21 years of age (Huiyan *et al*., 2010).

In contrast, for instance, having the first live birth after age 30 doubles the risk compared to having first live birth at age less than 25 years. Never having children triples the risk (Newcomb *et al.*, 1994).

2.5.2 Breastfeeding

Women who give birth and breastfeed by the age of 20 may have even greater protection from breast cancer (Newcomb *et al*., 1994). Prolonged lactation among Africans has a protective role for it lowers endogenous estrogen levels over a life time therefore it reduces the risk of breast cancer (Fregene & Newman *et al*., 2005). Although child bearing is known to protect against breast cancer, whether or not breast feeding contributes to this protective effect is unclear (Collaborative Group on Hormonal Factors, 2002).

2.5.3 Age at Menarche

Early age at menarche has been consistently associated with an increased risk of breast cancer. Breast cancer is a disease that is thought to be related to high lifetime exposure to the hormone estrogen (Cloditz *et al*., 2006). Estrogen is needed for normal reproductive development and estrogen levels in the body rise at menarche. The earlier a girl starts menstruating, the more menstrual cycles she was likely to have, and the greater risk of exposure to estrogen during her child-bearing years hence increased chances of developing breast cancer (Cloditz *et al*., 2006). However, one study in sub-Saharan Africa showed late menarche was a risk factor for breast cancer in post-menopausal women (Sighoko *et al.,* 2013).

2.5.4 Hormonal Contraception

Some studies have suggested that women who began using hormonal contraceptives before the age of 20 or before their first full-term pregnancy were at increased risk for breast cancer, but it is not clear how much of the risk stems from early age at first use, and how much stems from use before the first full-term pregnancy (WHO, IARC, 1999). Another study found a 1.24 -fold risk of breast cancer diagnosis among current combined oral contraceptive pill users; 10 or more years after stopping, no difference was seen. (National Cancer Institute, 2006). The relative risk of breast cancer diagnosis associated with current and recent use of hormonal contraceptives did not appear to vary with family history of breast cancer (National Cancer Institute, 2006).

The East African Legislative Assembly (EALA) bill seeks to introduce contraceptives for children and teenagers aged between 10 and 19 years (Emmanuel *et al.*, 2017). Hormonal contraception do not protect against sexually transmitted infections or HIV, may not be as effective when taken with certain medicines and may delay return of normal cycles. If used in early breast-feeding, they may reduce milk supply (World Health Organization, 2010).

2.5.5 Hormonal Therapy

Estrogen plus progestin is the most effective treatment for relieving hot flashes, also helps prevent vaginal thinning and prevent bone loss but increase risk for stroke, thromboembolic events, gallbladder disease, and urinary incontinence (Heidi *et al*., 2012). Estrogen plus progestin increase risk for breast cancer and probable dementia, whereas estrogen alone decrease risk for breast cancer (Heidi *et al*., 2012).

Data exists from both observational and randomized clinical trials regarding the association between menopausal hormone replacement therapy (menopausal HRT) and breast cancer. An observational study showed a 1.35- fold risk of breast cancer for women who had used HRT for five or more years after menopause (Heiss *et al*., 2008). HRT-related breast cancers had adverse prognostic characteristics (more advanced stages and larger tumors) compared to cancers occurring in the placebo group, and HRT was also associated with a substantial increase in abnormal mammograms. A correlation was found between the use of hormonal contraceptives and subsequent reliance on hormone replacement therapy (WHO & IARC, 1999).

2.6 Socio-economic risk factors

2.6.1 Race

Several studies have established that black women in the U.S. were more likely to die from breast cancer even though white women were more likely to be diagnosed with the disease. Even after diagnosis, black women were less likely to get treatment compared to white women (Hirschman *et al*., 2007). Some studies suggest that racial disparity in breast cancer outcomes may reflect cultural biases more than biological disease difference (Benjamin *et al*., 2003). However, the lack of diversity in clinic trials for breast cancer treatment may contribute to these disparities, with recent research indicating that black women were more likely to have estrogen receptor negative breast

cancers, which are not responsive to hormone treatments that are effective for most white women (Zuckerman *et al*., 2009).

According to the statement distributed by the Science Public Relations Firm Newswise, 47 breast cancer samples had been collected from the Nairobi Cancer Registry and compared with others from the University of Miami in the US. After analysis, the researchers confirmed that 29 of the Kenyan cases were very similar to the presentation of African-American women with breast cancer in the US. According to the American Cancer Society, when discovered, African-American breast tend to respond poorly to treatment than those of white women.

2.6.2 Economic status

Low-income women were less likely to have access to healthy foods and quality healthcare. Compelling research and simple intuition tells us that true reduction of both breast cancer incidence and death from the disease required a better understanding of how the complex tangle of the environmental and social factors, genetics and personal behavior results in different ethnic and economic group (Vainshtein *et al*., 2008). Incidence rise with improved economic situation, while mortality was tied to low economic status. In the US incidence is significantly lower and mortality higher among black women and this difference appeared to persist even after adjusting for economic status (Vainshtein *et al*., 2008).

2.6.3 Education level

Education is a key component of socioeconomic status. Several previous studies reported a positive association between a high level of education and breast cancer risk (Hemminki *et al.*, 2013, Andrea *et al.*, 2007). A study done on Iranian women showed that a higher education level was significantly correlated with a lower breast cancer risk (OR 0.10, 95% CI 0.03-0.34) (Hajian *et al*., 2012). Another study (Andrea *et al.*, 2007) found university graduates, compared to women completing less than 9 years of

education, were more likely to be diagnosed with in situ (HR = 1.44, 95% CI: 1.28–1.63) and invasive (HR = 1.28, 95% CI: 1.20–1.36) breast cancer.

2.6.4 Ethnic Background

According to Dr. Lisa Baumbach-Reardon, one of the researchers of Nairobi Cancer Registry, stated that understanding significant ethnicity-specific differences will help us to better understand how and why breast cancer differs across different ethnicities and will ultimately help us to translate this knowledge into clinical practice. She also stated that more specific research is showing that differences in ethnic biology maybe the key to understanding why breast cancer incidence and rates of death differ. This may lead to new preventive measures and treatment. In Kenya, there are approximately 40–50 tribes which can be divided into 3 main ethno-cultural groupings: the Bantus who originated from West Africa after 400 AD, the Nilotic tribes who migrated from regions of the present day Sudan and Egypt around 400 AD, and the Cushitic tribes who came from northern Africa around 2000 BC (Shahin *et al.*, 2018)

CHAPTER THREE:

MATERIALS AND METHODS

3.1 Study design

A descriptive cross-sectional study design was used for this study and was carried out in the radiology department at Thika Level 5 Hospital. This design was used for this study as it was deemed the best to describe the burden of exposures and breast cancer disease within the population of Thika (Wachira *et al.*, 2018). Also, this study design was considered best for pinpointing areas of precaution and to provide insights for discovering more about the risk factors associated with breast cancer.

3.2 Study site

The research was conducted at Thika Level 5 Hospital, which is a Government facility located in Thika town, about 50km north east of Nairobi, in Kiambu County.

My choice of Thika level 5 hospital for the present study was due to the assurance of getting a sizeable sample for the research due to the big number of patients visiting the hospital on a regular basis. This is because the hospital serves a population of 454,166 people and is the main referral hospital in Kiambu County. It has 265 beds and the outpatient department handles an average workload of 21,000 patients' per month with a total of 460 staff (Thika Hospital HIS, 2015). The other justification is as in (Muiruri *et al.*, 2016), which reported Thika Level 5 Hospital as the hospital with staff that is committed to the health Service Charter.

Thika Level 5 Hospital is a mid-sized Kenyan Government Hospital receiving patients from all over the region of Kiambu County. The hospital serves a high population of outpatients per day from diverse background and has a high burden of patients presenting with cases of breast cancer (Thika Hospital Data, 2011). Majority of the population served by the hospital live in rural setups and are predominantly farmers

growing cash crops and food crops. The department of radiology is highly specialized with full service department which strives to meet all patient and clinician needs in diagnostic imaging as well as image-guided therapies. Services rendered include the ultrasound service (breast, abdomen, pelvic, prostate, among others), routine radiography, mammography and dental radiography. It has a rotating pool of 16-20 medical officers and clinical officers who handle a range of cancer cases together with their referrals to the national hospitals.

3.3 Study population

The study population refers to the specific group relevant to a particular study. Mugenda and Mugenda (2003) explain that a population is a group of individuals or objects that have the same form of characteristics. They are the "totality of cases that conform to certain specifications, which defines the elements that are included or excluded in the target group". The study population was eligible female clients aged 18years and above attending the radiology department for breast cancer screening at Thika Level 5 Hospital and who agreed to participate after giving their consent (Appendix I).

3.3.1 Inclusion criteria

All female clients who attended breast cancer screening at the radiology department, 18years of age and above and who gave informed consent were included in the study.

3.3.2 Exclusion criteria

Females who did not consent to the study, those below 18 years of age, those who had previously been diagnosed with breast cancer, those who did not understand English or Kiswahili and men diagnosed with breast cancer were excluded from taking part in the study.

3.4 Variables

Dependent variable: Breast cancer occurrence

Independent variable: Lifestyle factors; fat intake, fruits and vegetables, grain consumption, brassier wearing, weight gain, physical activity, alcohol consumption and tobacco smoke. Socio-demographic and economic factors; age, race, ethnic background, economic status, marital status and education level. Reproductive factors; pregnancy, childbirth, breastfeeding, age at menarche, hormonal contraception and hormonal therapy.

3.5 Sampling technique

3.5.1 Sample size determination

Fishers *et al* formulae (1998) for determining sample size at 5% precision and a 95% level of confidence was used as follows:

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

Where: n = sample size for the core group

p = unknown prevalence of breast cancer occurrence (taken as 50%)

$Z_{\alpha/2}^{\ 2}$ = the value corresponding to the 95% confidence interval

d^2 = the allowable error margin

$$n = \frac{(0.5)(1-0.5) \times 1.96^2}{(0.05)^2} = 385$$

Since the target population is <10,000, the calculated sample size is adjusted using finite population correction factor and the adjusted sample size becomes:

$$n_{cf} = \frac{n}{1 + (\frac{n}{N-1})}$$

Where: n = desired sample size (below 10,000)

N = estimate of population attending the radiology department for breast cancer screening (700)

$$n\,fcf = \frac{385}{1 + (385/_{248-1})} = 151$$

Adjusting for attrition of 10%

$n = \frac{151}{0.9} = 167$ Females

The study used the entire target population of 167 females.

3.5.2 Sampling procedure

Thika Level 5 Hospital, averagely attends to 744 patients in three months, screening for breast cancer in the Radiology Department. This study therefore employed the systematic random sampling to come up with the representative sample.

1 month = 248 females screened for breast cancer (Kenya Medical Directory, 2017)

3months = 3 × 248 = 744 females screened for breast cancer

$$K(\text{sample interval}) = \frac{\text{Total population}}{\text{Sample size desired}} = \frac{744}{167} = 4.5 \cong 5$$

The flow of patients in the radiology department at level 5 Thika Hospital is 248 on average per month. This gave a total of 744 in three months. This study applied a systematic sampling procedure for patients screened for breast cancer. The sampling interval was 5, therefore, from the starting patient, every 5^{th} patient in line was selected until the 167^{th} was achieved. If the sampled patient was not eligible for the study, the next eligible woman in line was selected.

3.6 Recruitment plan

The potential participants, who were awaiting for their breast cancer diagnosis result, were provided with a dedicated phone number and an email address for their use should they need to learn more about the study.

3.7 Pretesting of questionnaires

The questionnaires were pretested on a purposively selected sample of about 10 respondents who awaited for breast cancer screening at the radiology department at Kiambu hospital. This was done two weeks before the actual study at Thika level 5 hospital. The aim of the pretesting was to fine tune the questions and have clarity in the interpretation and understanding of the questions to be put forth to the respondents. Kiambu hospital was the hospital of choice for pretesting as it serves women with the same characteristics as those seen in Thika level 5 hospital. The pretest was also aimed at assessing the flow, order, timing and overall respondent well-being. The questionnaire was drawn into its final form. Participants in the pretesting of the questionnaire were not included in the final data analysis.

3.8 Validity and Reliability

Mugenda and Mugenda (1999) defined validity as the accuracy and meaningfulness of inferences which are based on research results. On the other hand, Saunders, Lewis and Thornhill (2009) defined reliability as a measure of the degree to which a research instrument yields consistent results after repeated trials. To ensure reliability and validity of data collected, two research assistants with previous experience on data collection were recruited and trained on how to administer the questionnaire. The questionnaire was well designed and field pilot results were also considered in improving the validity of the questionnaire. The investigator ensured that the appropriate data collection and sampling procedure was followed. The completeness of the filled questionnaires was assessed on daily basis. The weighing machine was also tested for reliability by stepping on machine, checking the weight, stepping off the machine, and then repeating this process several times among the provided weighing machines till finally identifying the machine that gave same answer each time. Use of a control weigh scale was done to test for the accuracy of measurements acquired.

3.9 Data collection procedure

Quantitative technique of data collection was used. Data was collected at the radiology department between 8:00AM and 5:00PM daily over a period of three months. There was no interference with the health worker's decision with regards to patient's diagnosis or influence in the selection of pathological methods of diagnosis. The breast ultrasound screening was done in a dimly lit room with an exam bed and ultrasound equipment (computer, monitor, keyboard, trackball and wands of various shapes called transducers) within the radiology department. The participant was asked to remove her clothing from the waist up and lie on her back on the exam bed with either arm above their head. A clear gel was then put on the skin over the area to be imaged. The transducer was gently applied against the skin by the radiologist, slid back and forth and watched as the image was created on the monitor. The test took about 10 minutes to complete, the gel was then wiped off the skin and the participant was given time to dress.

Primary data was collected using a structured questionnaire (Appendices VII and VIII). The diet section in the structured questionnaire (Appendix VII) that was used was developed using statements from existing instruments (Fred *et al*; 2000) whereas the rest of the questions were formulated by the principal investigator. The questionnaire contained closed ended and open ended questions. They were administered to the respondents who were waiting for their breast cancer screening results via the help of research assistants. The participants filled the questionnaires in the waiting area as they waited to be served. The questionnaire contained demographic characteristics as well as lifestyle factors, socio-economic factors and reproductive factors. The questionnaire was administered in either English or Kiswahili which were the official languages in Kenya. Secondary data was obtained by review of participant's records so as to ascertain the breast cancer diagnosis of the screened participant. The weight measurement was done with the use of calibrated weighing machine and height measurement with use of a portable stadiometer The results of the participants was revealed to them by the health worker in charge, after the filling of the questionnaires.

The hospital authorities was requested in advance to give three months in which the questionnaires was administered.

3.10 Data management

3.10.1 Data entry

The data collected was coded and manually entered in MS excel spreadsheet and there after saved in SPSS format.

3.10.2 Data storage

The data was stored in the computer hard disk in a password protected folder to avoid loss of confidentiality. The questionnaires was coded, filled and stored safely in a locked cabinet accessible only by the principal investigator for future use. The coded information, used to link data to an individual, was stored in the password protected

folder used to store the electronic data. Back up of data was done in a CD/ROM and also in the email account and X cloud.

3.10.3 Data analysis.

Data was entered into SPSS Statistics version 20 software and the outcome (occurrence of breast cancer) was coded as 1 or 0 where 1 indicated success and 0 indicated failure. This was necessary so as to use logistic regression which recognize 1 or 0 coding system in SPSS software. Analysis was done for each objective and results presented in tables, figures and statistical statements. In order to describe the study population, proportions (%) were determined. Distribution of the sample (univariate analysis) was done and variables found to be statistically significant were subjected to bivariate regression model and finally to multivariate logistic regression model to establish the factors of association with breast cancer and independent variables. Both Pearson's Chi-square test and level of significance fixed at 0.05 (p=0.05) were used in bivariate analysis. p value less than 0.05 were considered significant. Both odds ratio (0R) and P values at 95% confidence interval were used to describe the significance of association in multivariate logistic regression.

3.11 Ethical considerations

The study was carried out after obtaining formal ethical clearance from the KEMRI scientific steering committee and the National Ethical Review Committee (Appendices II and III). Written consent was also be obtained from the participants prior to administering the questionnaire (Appendices I and II). Approval was also obtained from Thika Level 5 Hospital, Thika to collect both the primary data and secondary data (Appendix V).

Respondents were assured of anonymity as their names will not appear in any report. The questionnaires did not bear the patients name or hospital numbers and the patients were identified by study numbers. Participants who could not read and write but understood Kiswahili or English languages, were assisted by the research assistants though the consent process so that they were informed of and understood the requirements of the study fully before consent was given.

3.12 Study limitations

The main limitation of this study was that it was a cross-sectional study, which precludes the possibility of studying causal associations.

CHAPTER FOUR

RESULTS

4.1 Socio- demographic and economic factors

4.1.1 Age

A total of 167 questionnaires were completed giving a response rate of 100%. The ages of the women ranged from 24 to 66 years and were all Africans. 55.1% of the respondents were aged between 41 to 50 years as shown in (Figure 4.1).

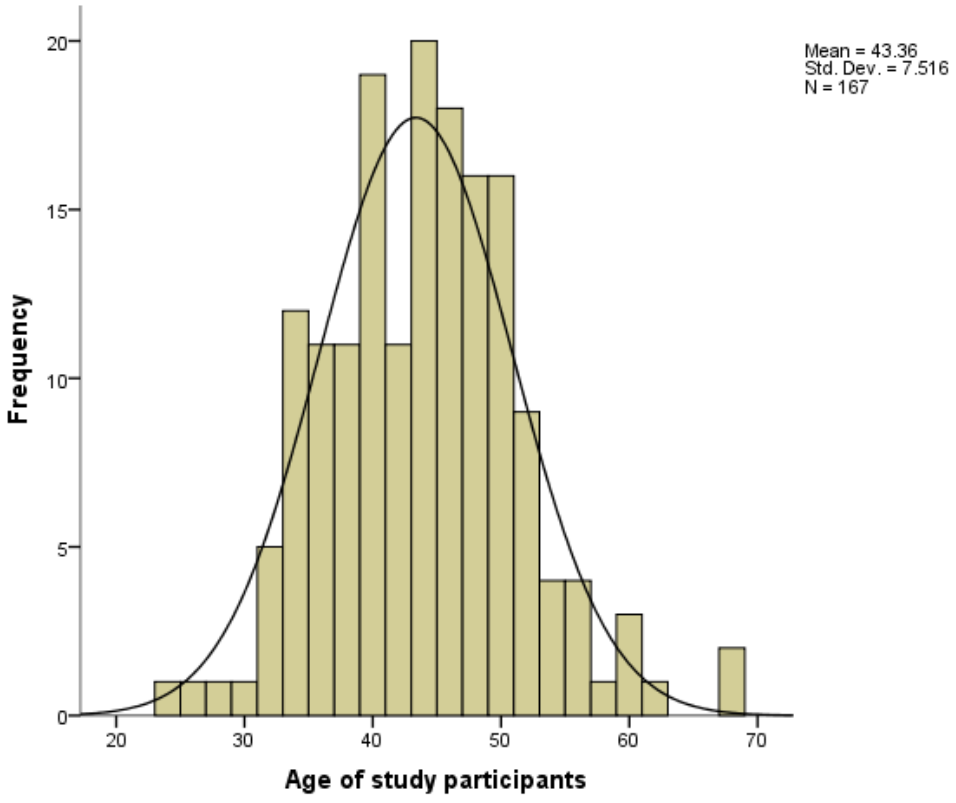

Figure 4.1: Age distribution of study participants

4.1.2 Ethnic background

26.3% of the study population were from the kikuyu tribe with 11.4% being the participants from the Luo tribe. (Table 4.1)

Table 4.1: Ethnicity of respondents

Ehnicity	Number (n)	Percent (%)	Cumulative percent
Kamba	33	19.8	19.8
Kikuyu	44	26.3	46.1
Kisii	28	16.8	62.9
Luo	19	11.4	74.3
Luhya	20	12.0	86.2
Meru	23	13.8	100.0
Total	**167**	**100.0**	

4.1.3 Level of education

On the level of education, 31.1% had reached secondary school and 34.7% had completed primary school as their highest level of formal education while 13.8% did not have any formal introduction. 4.8% had attained university education (Table 4.2).

Table 4.2: Respondents level of education

Level of education	Number (n)	Percent (%)	Cumulative percent
None-formal	23	13.8	13.8
Primary	58	34.7	48.5
Secondary	52	31.1	79.6
University/college	34	20.4	100.0
Total	**167**	**100.0**	

4.1.4 Marital Status

74.9% of the women were married, while 7.8% were single, 17.4% were divorced or widowed respectively (Table 4.3)

Table 4.3: Respondents marital status

Marital status	Number (n)	Percent (%)	Cumulative percent
Single	13	7.8	25.1
Married/cohabiting	125	74.9	82.6
Divorced/widowed	29	17.4	100.0
Total	**167**	**100.0**	

Unemployed respondents had the highest percentage of 41.3% followed by the self-employed (35.9%) and employed (16.8%). 4.2% of respondents represented the retired and 1.8% students (Table 4.4).

Table 4.4: Respondents employment status

Employment status	Number (n)	Percent (%)	Cumulative percent
Unemployed	69	41.3	41.3
Employed	28	16.8	58.1
Student/self-employed/retired	70	41.9	100.0
Total	**167**	**100.0**	

4.1.5 Income

Under the income docket, 67.7% earned salaries between KSH.0-20,000 whereas 32.3% earned Ksh.60, 000-80,000 (Table 4.5).

Table 4.5: Respondents income

Income	Number (n)	Percent (%)	Cumulative percent
<Ksh.20,000	113	67.7	67.7
>Ksh.20,000	54	32.3	100.0
Total	**167**	**100.0**	

4.2 Magnitude of breast cancer

This section provides results of the first objective which was to determine the prevalence of breast cancer among the females screened at Thika Level 5 Hospital. Prevalence is the percentage of participants who tested positive against the total number sampled. Therefore, from table 4.6, prevalence of breast cancer for this study was 27.

Table 4.6: Breast cancer occurrence of study participants

Breast cancer occurrence	Frequency	Percent	Cumulative percent
Positive	45	26.9	73.1
Negative	122	73.1	100.0
Total	**167**	**100.0**	

4.3 Bivariate analysis of Sociodemographic and Socioeconomic factors of females screened for breast cancer

Table 4.7 showed that there was no statistically significant association of age ($\chi^2 = 0.62$, $p > 0.73$), education ($\chi^2 = 1.61$, $p > 0.66$), ethnicity ($\chi^2 = 1.12$, $p > 0.95$), marital status ($\chi^2 = 0.60$, $p > 0.69$), employment ($\chi^2 = 0.07$, $p > 0.97$) and income ($\chi^2 = 0.83$, $p > 0.36$) to breast cancer occurrence.

Table 4.7: Socio-demographic and Economic factors of study participants

		Breast cancer occurrence		Total
		Positive	Negative	
Age	<40years	12	39	51
	41-50years	27	65	92
	>50years	6	18	24
Total		45	122	167
Pearson chi square = 0.62	**P-value = 0.73**			

		Breast cancer occurrence		Total
		Positive	Negative	
Education	None - formal	6	17	23
	Primary	15	43	58
	Secondary	17	35	52
	College/University	7	27	34
Total		45	122	167
Pearson chi square = 1.61	**P-value = 0.66**			

		Breast cancer Occurrence		Total
		Positive	Negative	
Ethnicity	Kamba	7	26	33
	Kikuyu	11	33	44
	Kisii	8	20	28
	Luo	6	13	19
	Luhya	7	14	20
	Meru	7	16	23
Total		45	122	167
Pearson chi square = 1.12	**P-value = 0.95**			

		Breast cancer occurrence		Total
		Positive	Negative	
Marital Status	Single/divorced/widowed	10	32	42
	Married/cohabiting	35	90	125
Total		45	122	167
Pearson chi square = 0.60	**P-value = 0.69**			

		Breast cancer occurrence		Total
		Positive	Negative	
Employment	Unemployed	19	50	69
	Employed	7	21	28
	Student/self-employed/retired	19	51	70
Total		45	122	167
Pearson chi square = 0.07	**P-value = 0.97**			

		Breast cancer occurrence		Total
		Positive	Negative	
Income	Less than 20,000	28	85	113
	More than 20,000	17	37	54
Total		45	122	167
Pearson chi square = 0.83	**P-value = 0.36**			

4.4 Bivariate analysis of Lifestyle factors of females screened for breast cancer

This section provides results of the third objective which was to establish the lifestyle factors associated with occurrence of breast cancer among females screened for breast cancer at Thika Level 5 Hospital.

Table 4.8 showed the absolute variables of the lifestyle factors evaluated for the purpose of obtaining frequency distribution before analysis.

Table 4.8: Lifestyle factors frequency distribution of study participants

Cooked vegetables frequency	**Absolute Frequency (n)**	**Percent (%)**
Weekly	19	11
Daily	148	89
Total	167	100
Vegetable juice frequency	**Absolute Frequency (n)**	**Percent (%)**
Never	123	73
Monthly	23	13
Weekly	21	14
Total	167	100
Raw vegetables frequency	**Absolute Frequency (n)**	**Percent (%)**
Never	85	51
Weekly	35	21
Monthly	47	28
Total	167	100
Fruit salads frequency	**Absolute Frequency (n)**	**Percent (%)**
Never	28	17
Monthly	83	50
Weekly	56	33

Total	167	100
Whole fruits frequency	**Absolute Frequency (n)**	**Percent (%)**
Weekly	112	67
Daily	55	33
Total	167	100
Fruit juice frequency	**Absolute Frequency (n)**	**Percent (%)**
Never	40	23
Monthly	91	55
Weekly	36	22
Total	167	100
Cooked vegetables serving	**Absolute Frequency (n)**	**Percent (%)**
1/4 cup	19	11
1/2 cup	58	35
1 cup	51	31
1&1/2 cup	39	23
Total	167	100
Raw vegetables serving	**Absolute Frequency (n)**	**Percent (%)**
0	85	51
1/4 cup	58	35
1/2 cup	24	14
Total	167	100
Vegetable juice serving	**Absolute Frequency (n)**	**Percent (%)**
0	123	74
1/4 cup	14	8
1/2 cup	21	13
1 cup	9	5
Total	167	100
Fruit salad serving	**Absolute Frequency (n)**	**Percent (%)**

0	28	16
1/4 cup	51	31
1/2 cup	63	38
1 cup	25	15
Total	167	100
Fruit juice serving	**Absolute Frequency (n)**	**Percent (%)**
0	40	24
1/4 cup	32	19
1/2 cup	59	35
1 cup	36	22
Total	167	100
Whole fruit serving	**Absolute Frequency (n)**	**Percent (%)**
1/4 cup	19	11
1/2 cup	90	54
1 cup	58	35
Total	167	100
White meat frequency	**Absolute Frequency (n)**	**Percent (%)**
Never	60	36
Monthly	52	31
Weekly	55	33
Total	167	100
Read meat frequency	**Absolute Frequency (n)**	**Percent (%)**
Never	61	37
Monthly	53	32
Weekly	53	32
Total	167	100
Yoghurt frequency	**Absolute Frequency (n)**	**Percent (%)**

Never	35	21
Monthly	49	29
Weekly	83	50
Total	167	100
Eggs frequency	**Absolute Frequency (n)**	**Percent (%)**
Never	31	19
Monthly	45	27
Weekly	91	54
Total	167	100
Milk frequency	**Absolute Frequency (n)**	**Percent (%)**
At most monthly	53	32
Weekly	55	33
Daily	59	35
Total	167	100
Cheese frequency	**Absolute Frequency (n)**	**Percent (%)**
Never	126	75
At most monthly	41	25
Total	167	100
Sugary foods frequency	**Absolute Frequency (n)**	**Percent (%)**
Never	85	51
Monthly	62	37
At most weekly	20	12
Total	167	100
Oily foods frequency	**Absolute Frequency (n)**	**Percent (%)**
Monthly	68	41
Weekly	99	59
Total	167	100
Red meat serving	**Absolute Frequency (n)**	**Percent (%)**
0	61	37

1/4 cup	32	19
1/2 cup	49	29
1 cup	25	15
Total	167	100
White meat serving	**Absolute Frequency (n)**	**Percent (%)**
0	6	36
1/4 cup	38	23
1/2 cup	44	26
1 cup	25	15
Total	167	100
Milk serving	**Absolute Frequency (n)**	**Percent (%)**
0	29	17
1/4 cup	24	14
1/2 cup	40	24
1 cup	42	25
1&1/2 cup	32	20
Total	167	100
Oily foods serving	**Absolute Frequency (n)**	**Percent (%)**
0	14	8
1/4 cup	41	25
1/2 cup	48	29
1 cup	49	29
1&1/2 cup	15	10
Total	167	100
Sugary foods serving	**Absolute Frequency (n)**	**Percent (%)**
0	85	51

1/4 cup	25	15
1/2 cup	27	16
1 cup	30	18
Total	167	100
Eggs serving	**Absolute Frequency (n)**	**Percent (%)**
0	31	19
½	35	21
1	49	29
2	36	22
3	16	9
Total	167	100
Yoghurt serving	**Absolute Frequency (n)**	**Percent (%)**
0	35	21
1/4 cup	55	33
1/2 cup	49	29
1 cup	28	17
Total	167	100
Cheese serving	**Absolute Frequency (n)**	**Percent (%)**
0	126	75
1/4 cup	23	14
1/2 cup	18	11
Total	167	100
Rice frequency	**Absolute Frequency (n)**	**Percent (%)**
Monthly	31	19
Weekly	117	70
Daily	19	11
Total	167	100

Beans frequency	**Absolute Frequency (n)**	**Percent (%)**
At most Monthly	18	11
At least Weekly	149	89
Total	167	100
Githeri frequency	**Absolute Frequency (n)**	**Percent (%)**
Monthly	65	39
Weekly	102	61
Total	167	100
Ugali frequency	**Absolute Frequency (n)**	**Percent (%)**
Weekly	108	65
Daily	59	35
Total	167	100
Porridge frequency	**Absolute Frequency (n)**	**Percent (%)**
Monthly	19	11
Weekly	91	55
Daily	57	34
Total	167	100
Bread frequency	**Absolute Frequency (n)**	**Percent (%)**
Weekly	112	67
Daily	55	33
Total	167	100
Rice serving	**Absolute Frequency (n)**	**Percent (%)**
1/4 cup	20	12
1/2 cup	81	48
1 cup	66	40
Total	167	100
Beans serving	**Absolute Frequency (n)**	**Percent (%)**
1/4 cup	24	14
1/2 cup	72	43

1 cup	71	43
Total	167	100
Githeri serving	**Absolute Frequency (n)**	**Percent (%)**
0	17	10
1/4 cup	19	11
1/2 cup	74	44
1 cup	57	34
Total	167	100
Ugali serving	**Absolute Frequency (n)**	**Percent (%)**
1/4 cup	33	20
1/2 cup	77	46
1 cup	57	34
Total	167	100
Cereals serving	**Absolute Frequency (n)**	**Percent (%)**
1/2 cup	84	50
1 cup	57	34
1&1/2 cup	26	16
Total	167	100
Porridge serving	**Absolute Frequency (n)**	**Percent (%)**
1/4 cup	15	9
1/2 cup	68	41
1 cup	84	50
Total	167	100
Bread serving	**Absolute Frequency (n)**	**Percent (%)**
2 slices	115	69
3 slices	33	20
4 slices	19	11
Total	167	100

Length of exposure to secondary smoke per day (hrs)	**Absolute Frequency (n)**	**Percent (%)**
0	46	28
1 – 2 hours	41	25
2 – 3 hours	48	29
More than 3 hours	32	19
Total	167	100
Alcohol use (Yrs)	**Absolute Frequency (n)**	**Percent (%)**
Never	115	69
0 – 10 years	14	8
10 – 20 years	17	10
20 – 30 years	21	13
Total	167	100
Alcohol quantity per week	**Absolute Frequency (n)**	**Percent (%)**
None	115	69
Less than 10 glasses	19	11
More than 10 glasses	33	20
Total	167	100
Length of time wearing a bra	**Absolute Frequency (n)**	**Percent (%)**
Less than 12hrs a day	60	36
More than 12hrs a day	43	26
All day and all night	64	38
Total	167	100
Total activity hours	**Frequency (n)**	**Percent (%)**
1-3hrs	29	17
3-5hrs	40	24
Over 5hrs	98	59
Total	167	100

4.4.1 Weight

Figure 4.2 shows that 75 participants (45%) weighed within the range of 60-69.9 kilograms as compared to 22 participants who weighed between 70-79.9 kilograms (13%)

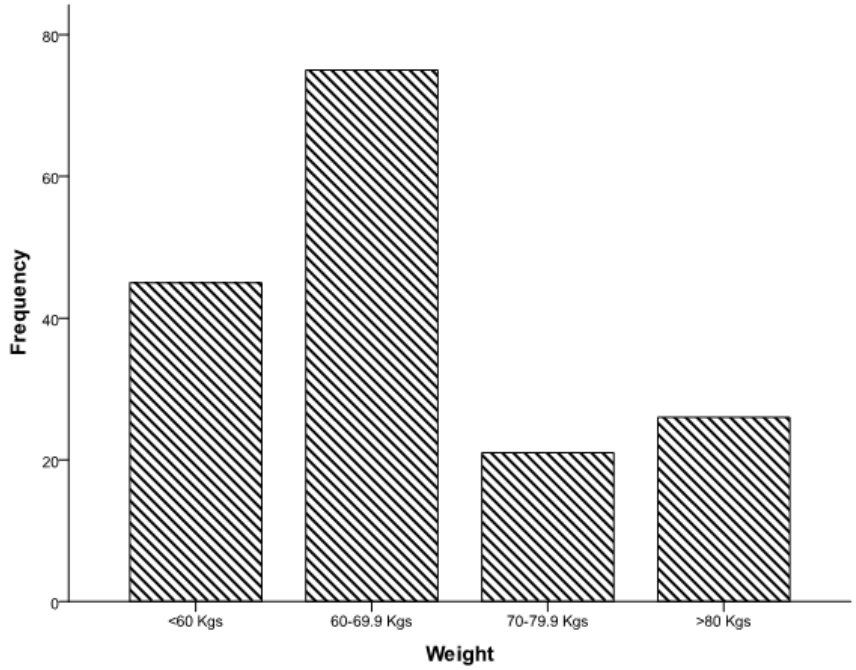

Figure 4.2: Weight distribution of study participants

Table 4.9 shows that most of the respondents were in the overweight category (n=85) with a body mass index of between 22-27.9kg\m^2. However, 82% of those who were obese had breast cancer. From the table, proportions tend to increase with increase in body mass index ($\chi^2 = 49.50$, $p < 0.00$).

Table 4.9: Weight characteristic of study participants

		Breast cancer occurence		Total
		Positive	Negative	
BMI (kg/m^2)	BMI < 22	7 (12%)	50 (88%)	85 (34%)
	BMI 22-27.9	16 (19%)	67 (81%)	35 (50%)
	BMI > 28	22 (82%)	5 (19%)	47 (16%)
Total		45	122	167
Pearson chi square = 49.50		**P-value < 0.00**		

4.4.2 Physical activity

The study shows a statistically significance ($p < 0.00$) between breast cancer and physical activity hours (Figure 4.3). 76% of women who had done physical activity for 1 to 3 hours per week had breast cancer compared to those who did physical activity for over 5 hours per week (8 of 98, 8%).

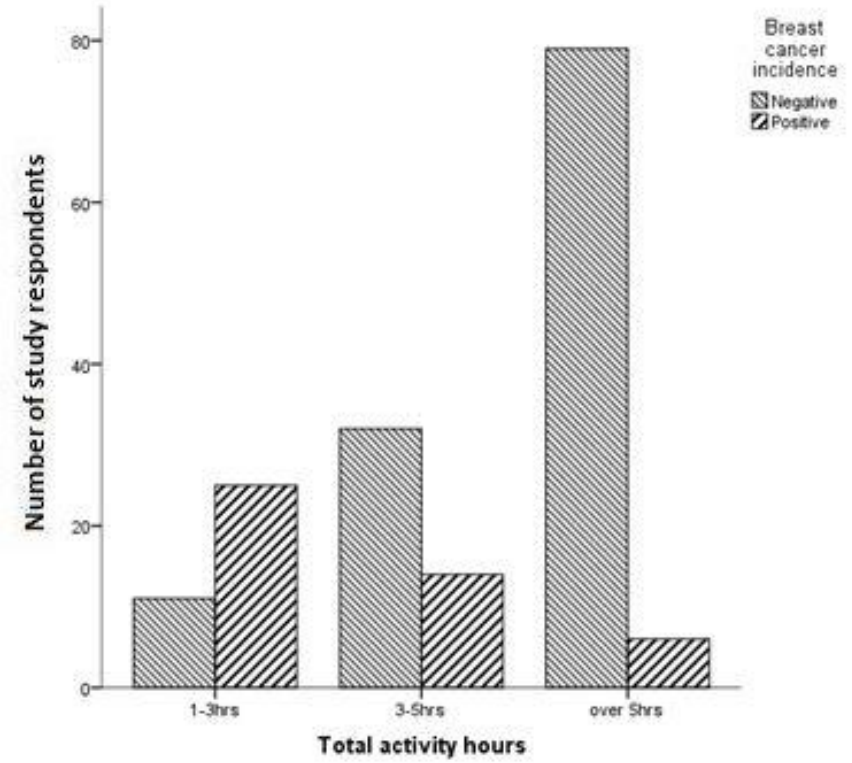

Figure 4.3: Duration of physical activity of study participants

4.4.3 Fruits and vegetables

Among the items tested in the vegetable group, whole fruits, fruit salad and raw vegetable frequencies showed statistical significance in frequency of use ($p < 0.05$) as shown in Table 4.10. The findings show that 33% of those who consumed fruits weekly had breast cancer (37 of 112) compared to those who consumed daily (15%).

Table 4.10: Whole fruits, fruit salads and raw vegetables consumption of study participants

		Breast cancer occurence		Total
		Positive	Negative	
Whole fruits frequency	Weekly	37 (33%)	75 (67%)	112 (67%)
	Daily	8 (15%)	47 (86%)	55 (33%)
Total		45	122	167
Pearson chi square = 6.41		**P-value < 0.01**		

		Breast cancer occurence		Total
		Positive	Negative	
Fruit salad frequency	Never	23 (82%)	5 (18%)	28 (17%)
	Weekly	6 (11%)	50 (89%)	56 (33%)
	Monthly	16 (19%)	67 (81%)	83 (50%)
Total		45	122	167
Pearson chi square = 53.31		**P-value < 0.00**		

		Breast cancer occurence		Total
		Positive	Negative	
Raw vegetables frequency	Never	34 (40%)	51 (60%)	85 (51%)
	Weekly	5 (14%)	30 (86%)	35 (21%)
	Monthly	6 (13%)	41 (87%)	47 (28%)
Total		45	122	167
Pearson chi square = 15.01		**P-value < 0.00**		

The cooked vegetables serving however, had no statistical association to breast cancer occurrence ($\chi^2 = 0.43$, $p > 0.935$). Table 4.11

Table 4.11: Cooked vegetables serving of participants

		Breast cancer occurence		**Total**
		Positive	Negative	
	1/4 cup	5 (26%)	14 (74%)	19 (11%)
Cooked vegetables serving	1/2 cup	14 (24%)	44 (76%)	58 (35%)
	1 cup	15 (29%)	36 (71%)	51 (31%)
	1&1/2 cup	11 (28%)	28 (72%)	39 (23%)
Total		45	122	167
Pearson chi square = 0.425	**P-value > 0.935**			

4.4.4 Fat intake

From the findings of the study, both white and red meat showed significant association to breast cancer occurrence ($p< 0.00$ and $p< 0.00$) in red meat frequency and white meat frequency. 47% of women who consumed red meat weekly had breast cancer, compared to those who consumed red meat monthly (26%) and those who have never consumed red meat (10%). (Table 4.12)

Table 4.12: Red meat frequency of study participants

		Breast cancer occurence		Total
		Positive	Negative	
Red meat frequency	Never	6 (10%)	55 (90%)	61 (37%)
	Weekly	25 (47%)	28 (53%)	53 (32%)
	Monthly	14 (26%)	39 (74%)	53 (32%)
Total		45	122	167
Pearson chi square = 20.09		**P-value < 0.00**		

68% of the respondents who ate red meat at a serving of 1cup had breast cancer as compared to those who have never eaten (6 of 61, 10%) Table 4.13

Table 4.13: Red meat serving of study participants

		Breast cancer occurence		Total
		Positive	Negative	
	Never	6 (10%)	55 (90%)	61 (37%)
Red meat Serving	¼ cup	7 (22%)	25 (78%)	32 (19%)
	½ cup	15 (31%)	34 (69%)	49 (29%)
	1 cup	17 (68%)	8 (32%)	25(15%)
Total		45	122	167
Pearson chi square = 20.09		**P-value < 0.00**		

39% of women consumed white meat monthly compared to those who consumed weekly (36%) and those who have never consumed white meat (8%) Table 4.14. However, as for the white meat serving, there is no statistical association (χ^2= 1.19, p > 0.76) to breast cancer occurrence.

Table 4.14: White meat consumption of study participants

		Breast cancer occurence		**Total**
		Positive	Negative	
White meat frequency	Never	5 (8%)	55 (92%)	60 (36%)
	Weekly	20 (36%)	35 (64%)	55 (33%)
	Monthly	20 (39%)	32 (62%)	52 (31%)
Total		122	45	167
Pearson chi square = 19.03		**P-value < 0.00**		

The other dairy products that showed significant relation to breast cancer occurrence are "yoghurt", "eggs" and "cheese" and "milk" (p < 0.05). The findings show that 14% of those respondents who drunk yoghurt weekly had a higher protection from breast cancer than those who drunk monthly (7 of 49) Table 4.15.

Table 4.15: Yoghurt consumption of study participants

		Breast cancer occurence		**Total**
		Positive	Negative	
Yoghurt frequency	Monthly or less	7 (14%)	42 (86%)	49 (29%)
	Weekly	38 (32%)	80 (68%)	118 (71%)
Total		45	122	167
Pearson chi square = 5.65		**P-value < 0.02**		

However, breast cancer occurrence increases with increase in yoghurt serving, with the highest proportion (54%) being for those who consumed 1 cup and lowest (20%) for those who never consume (Table 4.16). The study also shows that egg serving is statistically significant ($p < 0.05$) with breast cancer decreasing with decrease in egg serving (Table 4.16).

Table 4.16: Yoghurt and eggs servings of study participants

		Breast cancer occurence		**Total**
		Positive	Negative	
Yoghurt Serving	Never	7 (20%)	28 (80%)	35 (21%)
	¼ cup	12 (22%)	43 (78%)	55 (33%)
	½ cup	11 (23%)	38 (78%)	49 (29%)
	1 cup	15 (54%)	13 (46%)	28 (17%)
Total		45	122	167
Pearson chi square = 12.18		**P-value < 0.01**		
		Breast cancer occurence		**Total**
		Positive	Negative	
Eggs serving	Never	10 (32%)	21 (68%)	31 (19%)
	1	6 (17%)	29 (83%)	35 (21%)
	1/2	12 (25%)	37 (76%)	49 (29%)
	2	8 (22%)	28 (78%)	36 (22%)
	3	9 (56%)	7 (44%)	16 (9%)
Total		45	122	167
Pearson chi square = 9.69		**P-value < 0.05**		

42% of the respondents who consumed cheese severally for a period of at most a month, had breast cancer than those who did not consume cheese at all (22%) Table 4.17. Increasing the frequency of taking milk resulted in increased proportion of breast cancer occurrence Table 4.17

Table 4.17: Cheese and milk consumption of study participants

		Breast cancer occurence		**Total**
		Positive	Negative	
Cheese frequency	Never	28 (22%)	98 (78%)	126 (75%)
	At most monthly	17 (42%)	24 (59%)	41 (25%)
Total		45	122	167
Pearson chi square = 5.82		**P-value < 0.02**		

		Breast cancer occurrence		**Total**
		Positive	Negative	
Milk frequency	Monthly or less	5 (9%)	48 (91%)	53 (32%)
	Weekly	17(31%)	38 (69%)	55 (33%)
	Daily	23 (39%)	36 (61%)	59 (35%)
Total		45	122	167
Pearson chi square = 13.04		**P-value < 0.00**		

Sugary foods, in frequency, was statistically significant (p< 0.00). The proportions of breast cancer tend to reduce with decrease in sugary foods intake. 70% of the respondents who consumed sugary foods at most weekly, had breast cancer compared with those who actually never consumed sugary foods (14 of 85, 17%) Table 4.18

Table 4.18: Sugary foods consumption of study participants

		Breast cancer occurence		**Total**
		Positive	Negative	
Sugary foods frequency	Never	14 (17%)	71 (84%)	85 (51%)
	At most weekly	14 (70%)	6 (30%)	20 (12%)
	Monthly	17 (27%)	45 (73%)	62 (37%)
Total		45	122	167
Pearson chi square = 23,58		**P-value < 0.00**		

The same also happens with the sugary foods serving, breast cancer increases with increase in sugary foods serving, with 50% being those who consumed 1 cup and had breast cancer compared to those who consumed 1\4 cup (6 of 25, 24%) Table 4.19.

Table 4.19: Sugary foods serving of study participants

		Breast cancer occurrence		Total
		Positive	Negative	
Sugary foods serving	Never	14 (17%)	71 (24%)	85 (51%)
	¼ cup	6 (24%)	19 (76%)	25 (15%)
	½ cup	10 (37%)	17 (63%)	27 (16%)
	1 cup	15 (50%)	15 (50%)	30 (18%)
Total		45	122	167
Pearson chi square = 23.89		**P-value < 0.00**		

As for the oily foods serving, breast cancer increases as the serving increases. 50% of those respondents who consumed 1 and 1\2 cup of oily foods had breast cancer compared to those who consumed 1\4 cup (17%) Table 4.20.

Table 4.20: Oily foods serving of study participants

		Breast cancer occurrence		Total
		Positive	Negative	
	Never	8 (57%)	6 (43%)	14 (8%)
Oily food serving	¼ cup	7 (17%)	34 (83%)	41 (25%)
	cup½	11 (23%)	37 (79%)	48 (29%)
	1 cup	11 (23%)	38 (78%)	49 (29%)
	1 & ½ cup	8 (50%)	7 (47%)	15 (10%)
Total		45	122	167
Pearson chi square = 13.64		**P-value = 0.01**		

The oily food frequency however, had no statistical association to breast cancer occurrence ($\chi^2 = 3.57$, $p > 0.059$). Table 4.21

Table 4.21: Oily foods frequency of study participants

		Breast cancer occurence		**Total**
		Positive	Negative	
Oily foods frequency	Monthly	13 (19%)	55 (81%)	68 (41%)
	Weekly	32 (32%)	67 (68%)	99 (59%)
Total		45	122	167
Pearson chi square = 3.571		**P-value < 0. 059**		

4.4.5 Grain consumption

Grains group that included 'rice', 'beans', 'githeri', 'ugali', 'porridge', 'cereals' and 'bread' showed no significant relation to breast cancer occurrence. Ugali was not statistically significant to breast cancer ($\chi^2 = 3.19$, $p > 0.074$). 17% of respondents who ate ugali on a daily basis had breast cancer compared to those who consumed weekly (32%). Table 4.22

Table 4.22: Ugali frequency of study participants

		Breast cancer occurence		**Total**
		Positive	Negative	
Ugali frequency	Daily	11 (17%)	48 (81%)	59 (35%)
	Weekly	34 (32%)	74 (69%)	108 (65%)
Total		45	122	167
Pearson chi square = 3.194		**P-value > 0.074**		

Ugali, in serving, was not statistically significant (($\chi^2 = 0.40$, $p > 0.819$). However, the proportions of respondents who had breast cancer increased with increase in ugali servings. Table 4.23

Table 4.23: Ugali serving of study participants

		Breast cancer occurence		**Total**
		Positive	Negative	
	1/4 cup	8 (24%)	25 (76%)	33 (20%)
Ugali serving	1/2 cup	20 (26%)	57 (74%)	77 (46%)
	1 cup	17 (30%)	40 (70%)	57 (34%)
Total		45	122	167
Pearson chi square = 0.399		**P-value > 0.819**		

Rice was not statistically significant to breast cancer ($\chi^2 = 0.426$, $p > 0.808$). However, 30% of the respondents who ate 1/4 cup had breast cancer as compared to those who ate 1 cup (24%). Table 4.24

Table 4.24: Rice serving of study participants

		Breast cancer occurence		**Total**
		Positive	Negative	
	1/4 cup	6 (30%)	14 (70%)	20 (12%)
Rice serving	1/2 cup	23 (28%)	58 (72%)	81 (49%)
	1 cup	16 (24%)	50 (76%)	66 (40%)
Total		45	122	167
Pearson chi square = 0.426		**P-value > 0.808**		

Githeri, in frequency, was not statistically significant ((χ^2 = 1.554, p > 0.213). 32% of those who consumed githeri on monthly basis had breast cancer as compared to those who consumed githeri weekly (24%). Table 4.25

Table 4.25: Githeri frequency of study participants

		Breast cancer occurence		**Total**
		Positive	Negative	
Githeri frequency	Monthly	21 (32%)	44 (68%)	65 (39%)
	Weekly	24 (24%)	78 (77%)	102 (61%)
Total		45	122	167
Pearson chi square = 1.554		**P-value > 0.213**		

Githeri serving was not statistically significant to breast cancer (χ^2 = 2.694, p > 0.44). Table 4.26

Table 4.26: Githeri serving of study participants

		Breast cancer occurrence		**Total**
		Positive	Negative	
Githeri serving	Never	5 (29%)	12 (71%)	17 (10%)
	1/4 cup	8 (42%)	11 (58%)	19 (11%)
	1/2 cup	18 (24%)	56 (76%)	74 (44%)
	1 cup	14 (25%)	43 (75%)	57 (34%)
Total		45	122	167
Pearson chi square = 2.694		**P-value > 0.441**		

Porridge serving was not statistically significant to breast cancer (χ^2 = 1.474, p > 0.48).Table 4.27

Table 4.27: Porridge serving of study participants

		Breast cancer occurrence		Total
		Positive	Negative	
Porridge serving	1/4 cup	5 (33%)	10 (67%)	15 (9%)
	1/2 cup	15 (22%)	53 (78%)	68 (41%)
	1 cup	25 (30%)	59 (70%)	84 (50%)
Total		45	122	167
Pearson chi square = 1.474		**P-value > 0.478**		

Both bread frequency cancer (χ^2 = 1.392, p > 0.24) and serving were not statistically significant to breast cancer (χ^2 = 5.127, p > 0.05).Table 4.28

Table 4.28: Bread frequency and servings of study participants

		Breast cancer occurence		Total
		Positive	Negative	
Bread frequency	Weekly	27 (24%)	85 (76%)	112 (67%)
	Daily	18 (33%)	37 (67%)	55 (33%)
Total		45	122	167
Pearson chi square = 1.392		**P-value > 0.238**		

		Breast cancer occurence		Total
		Positive	Negative	
Bread serving	2 slices	25 (22%)	90 (78%)	115 (69%)
	3 slices	13 (39%)	20 (61%)	33 (20%)
	4 slices	7 (37%)	12 (63%)	19 (11%)
Total		45	122	167
Pearson chi square = 5.127		**P-value > 0.077**		

Beans frequency was not statistically significant to breast cancer ($\chi^2 = 3.138$, $p > 0.076$). 44% of those who consumed beans at most monthly had breast cancer compared to those who ate beans at least weekly. Table 4.29.

Table 4.29: Beans frequency of study participants

		Breast cancer occurence		**Total**
		Positive	Negative	
Beans frequency	At most monthly	8 (44%)	10 (56%)	18 (11%)
	At least weekly	37 (25%)	112 (75%)	149 (89%)
Total		45	122	167
Pearson chi square = 3.138		**P-value > 0.076**		

Beans serving was not statistically significant to breast cancer ($\chi^2 = 4.950$, $p > 0.08$).Table 4.30

Table 4.30: Beans servings of study participants

		Breast cancer occurence		**Total**
		Positive	Negative	
Beans serving	1/4 cup	10 (42%)	14 (58%)	24 (14%)
	1/2 cup	14 (19%)	58 (81%)	72 (43%)
	1 cup	21 (30%)	50 (70%)	71 (43%)
Total		45	122	167
Pearson chi square = 4.950		**P-value > 0.084**		

Cereals servings was not statistically significant to breast cancer ($\chi^2 = 3.138$, $p > 0.076$). However, the proportions of respondents who had breast cancer increased with increase in cereals servings Table 4.31.

Table 4.31: Cereals servings of study participants

		Breast cancer occurence		**Total**
		Positive	Negative	
Cereals serving	1/4 cup	21 (25%)	63 (75%)	84 (12%)
	1/2 cup	13 (23%)	44 (77%)	57 (49%)
	1&1/2 cup	11 (42%)	15 (58%)	26 (40%)
Total		45	122	167
Pearson chi square = 3.774		**P-value > 0.151**		

4.4.6 Alcohol consumption

Figure 4.4 shows a decrease in women without breast cancer with increase in the number of years of alcohol use ($\chi^2 = 47.77$, $p < 0.01$). 89% of those who drank alcohol for 20-30 years had breast cancer compared to those who have never drank alcohol (22 of 115, 19%).

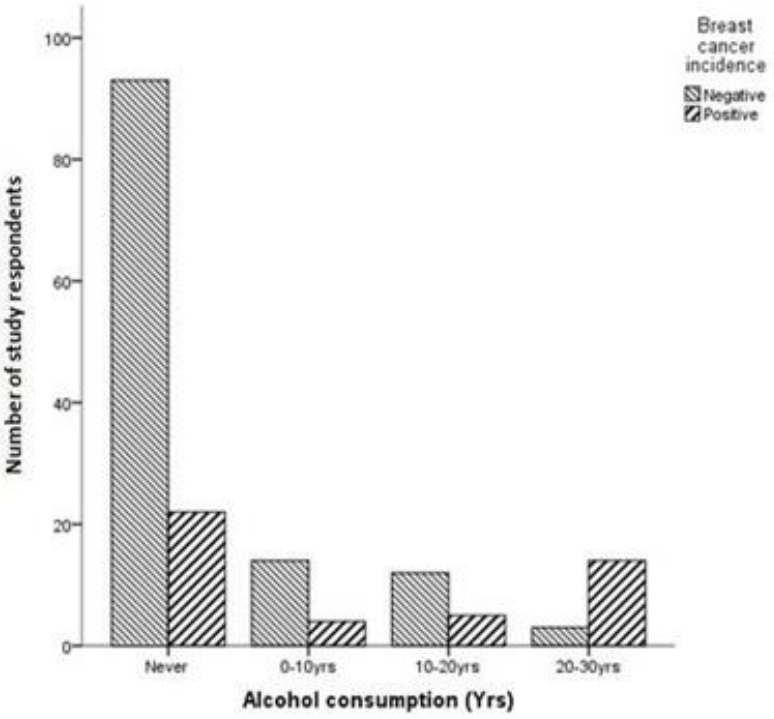

Figure 4.4: Duration of alcohol use of study participants

The study also shows that 55% of respondents who drunk more than 10 glasses of alcohol per week had breast cancer compared to those who drank less than 10 glasses (26%) and those who have never drank (19%). There is indeed a statistical significant relation of alcohol consumption and breast cancer (χ^2=16.34, $p < 0.00$) Table 4.32.

Table 4.32: Quantity of alcohol use of study participants

		Breast cancer occurence		Total
		Positive	Negative	
Alcohol quantity per week	None	22 (19%)	93 (81%)	115 (69%)
	<10 glasses	5 (26%)	14 (74%)	19 (11%)
	>10 glasses	18 (55%)	15 (46%)	33 (20%)
Total		45	122	167
Pearson chi square = 16.34		**P-value = 0.00**		

4.4.7 Tobacco

Tobacco smoking was not statistically significant to breast cancer ($p>0.05$) but passive smoking was statistically significant ($\chi^2 = 31.91$, $p < 0.00$). Over 27% of respondents have zero exposure to secondary smoke per day. (Table 4.33) However, 66% of the women who have been exposed to secondary smoke for more than 3 hours per day had breast cancer**.** The proportion of breast cancer incidence caused by tobacco use was also highest among women aged between 41-50 years who had a peak proportion of 38%, for those who were exposed for more than 3 hours a day.

Table 4.33: Duration of passive smoking of study participants

		Breast cancer occurence		Total
		Positive	Negative	
Length of exposure to secondary smoke per day	Zero	5 (11%)	41 (89%)	46 (28%)
	1-2 hours	8 (20%)	33 (81%)	41 (25%)
	2-3 hours	11 (23%)	37 (77%)	48 (29%)
	>3 hours	21 (66%)	11 (34%)	32 (19%)
Total		45	122	167
Pearson chi square = 31.91		**P-value < 0.00**		

4.4.8 Brassier wearing

Brassiere wearing was not statistically significant to breast cancer (p>0.095) (Table 4.34).

Table 4.34: Duration of brassiere wearing

		Breast cancer occurence		Total
		Positive	Negative	
Length of time wearing a bra	< 12hrs a day	13 (22%)	47 (78%)	60 (36%)
	> 12hrs a day	17 (40%)	26 (61%)	43 (26%)
	All day and night	15 (23%)	49 (77%)	64 (38%)
Total		45	122	167
Pearson chi square = 4.712		**P-value > 0.095**		

4.5 Reproductive factors of females screened for breast cancer

Chi-square test of significance was used to find out if there was an association between breast cancer and reproductive factors. Among the reproductive factors, only breast feeding and hormonal contraceptives use were found to be significantly associated ($p < 0.05$. Before the analysis, the absolute variables were evaluated as showed in table 4.35

Table 4.35: Reproductive factors frequency distribution of study participants

First pregnancy age	**Absolute Frequency (n)**	**Percent (%)**
< 20yrs	73	44
20-25yrs	69	41
> 25yrs	25	15
Total	167	100
Pregnancies	**Absolute Frequency (n)**	**Percent (%)**
At most 2	83	50
3-4	46	28
At least 5	38	23
Total	167	100
Years of Hormonal Contraceptives use	**Absolute Frequency (n)**	**Percent (%)**
< 1 year	69	41
1-15 years	34	21
> 15 years	64	38
Total	167	100
Years of Hormonal Therapy use	**Absolute Frequency (n)**	**Percent (%)**
Never	137	82
1-2 years	17	10
> 2 years	13	8
Total	167	100
Age at menarche	**Absolute Frequency (n)**	**Percent (%)**
At most 15 years	123	74
At least 16 years	44	26
Total	167	100
Total breastfeed years	**Absolute Frequency (n)**	**Percent (%)**
<2yrs	47	28
2-4yrs	39	23
>4yrs	81	49
Total	167	100

4.5.1 Pregnancy

Pregnancy had no statistical association to breast cancer occurrence (χ^2 = 1.07, p > 0.586). 33% of respondents who had 3-4 children had breast cancer as compared to those with at least 5 children (24%). Table 4.36.

Table 4.36: Respondents number of pregnancies

		Breast cancer occurence		**Total**
		Positive	Negative	
Number of pregnancies	At most 2	21 (25%)	62 (75%)	83 (50%)
	3-4	15 (33%)	31 (67%)	46 (28%)
	At least 5	9 (24%)	29 (76%)	38 (23%)
Total		45	122	167

Pearson chi square = 1.069 **P-value > 0.586**

4.5.2 Child birth

Age at first child birth had no statistical association to breast cancer occurrence (χ^2 = 2.55, p > 0.28). the proportions of the respondents who had breast cancer increased with increase in age at fist pregnancy. Table 4.37.

Table 4.37: Age of respondents at first child birth

		Breast cancer occurrence		Total
		Positive	Negative	
First pregnancy age	< 20yrs	18 (25%)	55 (75%)	73 (44%)
	20-25yrs	17 (25%)	52 (75%)	69 (41%)
	> 25yrs	10 (40%)	15 (60%)	25 (15%)
Total		45	122	167
Pearson chi square = 2.545		**P-value > 0.280**		

4.5.3 Age at menarche of respondents

Age at menarche also had no statistical association to breast cancer occurrence (χ^2 = 0.003, p > 0.955). Table 4.38

Table 4.38: Age of respondents at first menarche

		Breast cancer occurrence		Total
		Positive	Negative	
Age at first period	At most 15 years	33 (27%)	90 (73%)	123 (74%)
	At least 16 years	12 (27%)	32 (73%)	44 (26%)
Total		45	122	167
Pearson chi square = 0.003		**P-value > 0.955**		

4.5.4 Duration of breastfeeding

64% of those who breastfed for a total of 2 years or less had breast cancer (30 of 47, 64%). Breast feeding for 2 years and above is protective for breast cancer, proportion of those who tested negative for breast cancer increased with increase in total years of breast feeding (χ^2= 48.89, p < 0.00). (Table 4.39)

Table 4.39: Duration of breastfeeding of the participant's children

		Breast cancer occurrence		**Total**
		Positive	Negative	
Total years of breastfeeding	< 2 years	30 (64%)	17 (36%)	47 (28%)
	2-4 years	9 (23%)	30 (77%)	39 (23%)
	> 4 years	6 (7%)	75 (93%)	81 (49%)
Total		45	122	167
Pearson chi square = 48.49		**P-value < 0.00**		

4.5.5 Duration of hormonal contraceptives

38% of respondents used hormonal contraceptives for more than 15 years. That duration of use is significantly strongly associated with breast cancer (χ^2= 31.08, p < 0.00) and had 50% of women with breast cancer (32 of 64, 50%). Table 4.40.

Table 4.40: Years of hormonal contraceptives use of the respondents

		Breast cancer occurence		Total
		Positive	**Negative**	
Years of hormonal contraceptive use	< 1 year	5 (9%)	64 (93%)	69 (41%)
	1-15 years	8 (24%)	26 (77%)	34 (20%)
	> 15 years	32 (50%)	32 (50%)	64 (38%)
Total		45	122	167
Pearson chi square = 31.08		**P-value < 0.00**		

4.5.6 Duration of hormonal therapy

Years of use of hormonal therapy had no statistical association to breast cancer occurrence ($\chi^2 = 2.475$, $p > 0.290$). 46% of the women who used hormonal therapy for more than 2 years had breast cancer. Table 4.41.

Table 4.41: Years of hormonal therapy use of the respondents

		Breast cancer occurrence		Total
		Positive	Negative	
Years of hormonal therapy use	Never	32 (23%)	105 (77%)	137 (82%)
	1-2 years	7 (41%)	10 (59%)	17 (10%)
	>2 years	6 (46%)	7 (54%)	13 (8%)
Total		45	122	167
Pearson chi square = 2.475		**P-value > 0.290**		

4.6 Multivariate analysis of all variables of the study participants

The multivariate logistic regression results for the sociodemographic and economic individual predictor variables are tabulated in table 4.42. None of the sociodemographic and economic factors retained their significance in this regression model ($p>0.05$). This showed that they could not be used as predictors for future breast cancer occurrence in women.

Table 4.42: Regression analysis to determine influence of participant's socio demographic and economic factors on breast cancer occurrence

Factor	Regression coefficient (β)	OR (95% CI)	P - value
Age (years)	- 0.066	0.971(0.473-1.992)	0.848
Ethnicity			
Kamba	-0.827	0.437 (0.185-2.254)	0.927
Kikuyu	-0.804	0.448 (0.099-2.018)	0.296
Kisii	-0.607	0.545 (0.135-2.195)	0.393
Luhya	-0.455	0.635 (0.142-2.833)	0.551
Luo	-0.511	0.600 (0.116-3.103)	0.542
Meru	-0.196	0.822 (0.169-3.996)	0.808
Education	-0.310	0.733 (0.430-1.249)	0.254
Employment	0.047	1.048 (0.577-1.905)	0.877
Income	0.403	1.496 (0.726-3.081)	0.275
Marital status	0.053	1.055 (0.609-1.827)	0.849

Women in BMI category 22-27.9 had 6.07 (95% CI: 6.07 (2.286-16.125)) higher odds of testing positive for breast cancer compared to women with BMI less than 22. Those with BMI greater than 28 had 53.43 (95% CI: 53.43 (15.466-184.575)) higher odds of testing positive for breast cancer compared to those with BMI less than 22. (Table 4.43).

Gardening retained its significance to reveal that women who practiced gardening, compared to those who did not garden, reduced their odds of testing positive for breast

cancer by values of 0.03 (95% CI: 0.03 (0.006-0.178)) and 0.01 (95% CI: 0.01 (0.001-0.070)) for those who gardened for 0.5 hours and 1 hour weekly respectively. (Table 4.43).

Total activity hours, which is the total number hours a respondent spent in various activities, was also significant in this regression model. Women who spent 3-5 hours engaging in any physical activity had 0.02 (95% CI:0.02 (0.004-0.153)) lower odds of testing positive for breast cancer compared to those who spent 1-3 hours daily engaged in any physical activity. (Table 4.43).

Another variable that retained its significance as a predictor of breast cancer incidence was duration of passive smoking. Women who passively smoked for more than 3 hours daily had 15.66 (95% CI: 4.807-50.983) higher odds of testing positive for breast cancer compared to those who were not exposed to any passive smoking. (Table 4.43).

Table 4.43: Multiple binary logistic regressions of participant's Lifestyle variables against breast cancer occurrence

Factor	**Regression coefficient (β)**	**OR (95% CI)**	**P - value**
BMI (kg/m^2)			
<22	1.00 (ref.)	1.00 (ref.)	0.00
22-27.9	1.80	6.07 (2.286-16.125)	0.00
>28	3.98	53.43 (15.466-184.575)	0.00
Physical activity			
Gardening hours			
Zero	1.00 (ref.)	1.00 (ref.)	0.00
0.5 hours	-3.42	0.03 (0.006-0.178)	0.00
1 hour	-4.66	0.01 (0.001-0.070)	0.00
Total activity hours			

1-3 hours	1.00 (ref.)	1.00 (ref.)	0.00
3-5 hours	-3.14	0.02 (0.004-0.153)	0.00
Duration of passive smoking			
Zero	1.00 (ref.)	1.00 (ref.)	0.00
> 3 hours	2.75	15.66 (4.807-50.983)	0.000
Quantity of alcohol per week	- 0.007	0.993 (0.861-1.146)	0.923
Brassier wearing	-0.941	0.390 (0.280-0.234)	0.866
Fruits and vegetables			
Cooked vegetables frequency	-19.469	0.000	0.999
Raw vegetables frequency	-19.099	0.000	0.994
Vegetable juice frequency	-16.672	0.000	0.996
Whole fruits frequency	-1.629	0.196 (0.019-2.060)	0.175
Fruit salads frequency	-20.604	0.000	0.995
Fruit juice frequency	-1.348	.260 (0.065-1.032)	0.055
Cooked vegetables serving	0.128	1.137 (0.419-3.085)	0.802
Raw vegetables serving	-0.369	0.691 (0.267-1.788)	0.446
Vegetable juice serving	-1.597	0.202	1.000
Fruit salad serving	-0.086	0.917 (0.273-3.080)	0.889
Fruit juice serving	0.309	1.362 (0.660-2.808)	0.403
Whole fruit serving	-0.385	0.681 (0.188-2.460)	0.557
Fats			
Red meat frequency	-0.314	0.161 (0.835-0.112)	0.178
White meat frequency	-0.303	0.739 (0.260-2.103)	0.571
Milk frequency	0.242	1.274 (0.506-3.205)	0.607
Yoghurt frequency	-0.154	0.857 (0.283-2.601)	0.786
Eggs frequency	-0.469	0.625 (0.212-1.849	0.396

Cheese frequency	0.993	2.701 (0.881-8.274)	0.082
Margarine frequency	-0.314	0.731 (0.302-1.768)	0.486
Oily foods frequency	0.068	1.070 (0.347-3.295)	0.906
Red meat serving	0.953	2.965 (1.010-4.205)	0.158
White meat serving	0.258	1.294 (0.650-2.578)	0.464
Milk serving	-0.317	0.728 (0.437-1.215)	0.225
Yoghurt serving	0.518	0.612 (0.178-3.457)	0.161
Eggs serving	0.481	0.357 (0.629-2.528)	0.107
Cheese serving	0.227	1.255 (0.419-3.759)	0.685
Margarine serving	-0.212	0.809 (0.349-1.878)	0.622
Oily foods serving	0.754	1.952 (1.158-2.463)	0.091
Sugary foods frequency	0.382	1.465 (0.676-3.175)	0.334
Sugary foods serving	0.423	1.526 (0.980-2.375)	0.061
Grains			
Rice frequency	-19.378	0.000	0.999
Githeri frequency	-0.151	0.860 (0.483-1.529)	0.606
Ugali frequency	-0.341	0.711 (0.272-1.860)	0.487
Porridge frequency	-0.863	0.741 (0.274-1.894)	0.076
Bread frequency	0.624	1.867 (0.764-4.559)	0.171
Rice serving	-0.336	0.715 (0.414-1.218)	0.217
Beans serving	0.087	1.091 (0.704-1.689)	0.697
Githeri serving	-0.311	0.733 (0.462-1.163)	0.187
Ugali serving	0.098	1.103 (0.589-2.068)	0.760
Cereals serving	-0.459	0.632 (0.345-1.159)	0.138
Porridge serving	0.025	1.025 (0.551-1.908)	0.938
Bread serving	0.842	2.813 (1.627-4.928)	0.247

Breastfeeding as a predictor variable retained its significance showing that women who had breastfed for between 2-4 years and for more than 4 years had 0.17 (95% CI: 0.17 (0.066-0.441)) and 0.05 (95% CI: 0.05 (0.016-0.126)) lower odds of testing positive for breast cancer, respectively, compared to those who had breastfed for less than 2 years. Hence protection from breast cancer. (Table 4.44)

Table 4.44: Multiple binary logistic regression analysis to determine influence of participant's reproductive factors on breast cancer occurrence

Factor	Regression coefficient (β)	OR (95% CI)	P - value
Total breastfeed years			
< 2 years	1.00 (ref.)	1.00 (ref.)	0.00
2 – 4 years	-1.77	0.17 (0.066-0.441)	0.00
> 4 years	-3.09	0.05 (0.016-0.126)	0.00
Pregnancies	-0.846	0.429 (0.071-2.592)	0.356
Age at first child birth	1.082	2.951 (0.909-9.574)	0.072
Contraceptive use years	-0.942	0.390 (0.093-1.631)	0.197
Age at menarche	0.757	2.131 (0.251-18.067)	0.488
Hormonal therapy	-0.322	0.725 (0.490-1.072)	0.107

CHAPTER FIVE

DISCUSSION, CONCLUSIONS AND RECCOMMENDATIONS

5.1 Socio-demographic and economic factors associated with breast cancer

This study indicated that the following factors are the only ones associated with breast cancer: fat intake, fruits and vegetables, weight physical activity, alcohol consumption, passive tobacco smoking, breastfeeding and hormonal contraceptive use.

In respect to the risk factors for breast cancer, red meat frequency, red meat serving, white meat frequency, oily foods serving, sugary foods frequency and serving, yoghurt frequency and serving, eggs serving, milk serving, cheese frequency, whole fruits frequency, fruit salad, raw vegetables, physical exercise, weight, alcohol frequency and serving, passive smoking, years of breastfeeding and hormonal contraceptives use were all found to be associated to breast cancer occurrence with chi-square analysis as discussed in this section.

There was no association between breast cancer and brassier wearing, pregnancy, childbirth, age at menarche, hormonal therapy, race, economic status, education level and ethnic background.

There was no significant association between breast cancer occurrence and age ($p > 0.73$). This result suggests that an increase or a decrease of the variable does not have any effect on breast cancer occurrence. The risk cuts across all ages, both older women and younger ones are prone to have breast cancer. Some of the risk factors of breast cancer cannot be changed e.g. race, age. From the results, all participants in the study were all Africans therefore race in this study is not a factor that is associated with breast cancer.

The results of this study indicate that there was no association between breast cancer occurrence and income ($p > 0.36$). This suggests that economic status does not have an effect on breast cancer prevalence for this study. Whether the participants are low or high income earners, they are prone to have breast cancer. This may be due to subsistence farming practiced by most of low income earning women, where they grow greens and other fresh produce so they have access to healthy foods just as much as their high income counterparts. This may also be due to same eating habits, for both the high and low income groups, with the first food trend coming in and accessible cheap animal products. The results are not similar to a study done in the US which showed that low income women are less likely to have access to healthy foods (Vainshtein *et al*., 2008).

There was no significant association between breast cancer occurrence and education ($p > 0.66$), whether the participants are educated to a high level or not. These results are not similar to those of a study done on Iranian women showed that a higher education level was significantly correlated with a lower breast cancer risk (OR 0.10, 95% CI 0.03-0.34) (Hajian *et al*., 2012).

There was no significant association between breast cancer occurrence and ethnic background ($p > 0.95$), to show that the risk of developing breast cancer cuts across all ethnic groups in Thika. Neither Nilotes, Bantus nor Cushites are at a higher risk of developing breast cancer.

5.2 Lifestyle factors associated with breast cancer

This study showed a strong significant association ($p < 0.01$) to breast cancer occurrence in fat serving. This implies that women who had larger servings of the oily foods had breast cancer compared to those who had smaller servings. This may be due to the presence of polyunsaturated fats, which increase cancer- promoting oxidation in the body. Consumptions of large servings of oily foods could be due to migration of people

from one area to another and who started eating the typical diet of their new residency thereby assuming the disease risk of the area to which they moved.

Women who consumed red meat both on weekly basis and large servings (1 cup) had breast cancer and a strong association to breast cancer occurrence ($p < 0.00$). The same is true for the respondents who consumed white meat frequently ($p < 0.00$).The findings of this study are similar with those of the Harvard study which reported that the intake of animal fat, mainly from red meat and high-fat dairy foods, during premenopausal years, was associated with increased risk of breast cancer. (Eunyoung *et al.,* 2003). Based on the evidence we have, it appears that saturated fats play a big role in the occurrence of breast cancer.

The findings of this study are similar to those from a rural China study that showed that reducing dietary fat from 24% to 6% was associated with lower breast cancer risk. However, lower dietary fat in rural China meant less consumption not only of fat but, more importantly, of animal based foods (de Stavola *et al.*, 2008).

The other animal products that showed significant association to breast cancer occurrence are “yoghurt”, “eggs”, “milk” and “cheese”. These all showed a strong association ($p < 0.05$) in their servings and frequencies (for only yoghurt and cheese). This implies that those who consumed a large servings of yoghurt, eggs and milk as well as those who frequently consumed yoghurt and cheese had breast cancer. This suggests that increasing the frequency of consumption and servings, both lead to an increase in the chances of developing breast cancer.

Sugary foods showed a strong association to breast cancer occurrence both in frequency and serving ($p < 0.00$). This indicates that frequent consumption and large portions of sugary foods results to increase in breast cancer. The proportions of breast cancer tend to reduce with decrease in sugary foods intake by 54% and by 22% with decrease in sugary food serving from 1 cup to ¼ cup. Therefore sugar is a major aggravate of breast cancer and this result is similar to that of Peiying Yang study team which determined

that it was specifically fructose, in table sugar and high-fructose corn syrup, ubiquitous within our food system, which was responsible for inducing12-LOX andb12-HETE production in breast tumor cells (Peiying *et al.,* 2016).

Only whole fruits ($p < 0.01$), fruit salads ($p < 0.01$) and raw vegetables ($p < 0.01$) tested in the vegetable group showed significant association in frequency of use to breast cancer. These statistics show that frequent consumption of the raw vegetables, whole fruits and fruit salad is protective against breast cancer.

The results are similar to those of a study published in the Journal of the American Medical Association, where biomedical investigators found that vegetable intake (broccoli, cauliflower, cabbage, kale and Brussels sprouts) was inversely related to breast cancer development that is women who had consumed an average of 1.5 servings of vegetables per day had 42% reduced risk of developing breast cancer than those who consumed virtually none (Terry *et al.*, 2001). This inverse relationship associated with frequency of consumption of raw vegetables, whole fruits and fruit salads with breast cancer could be due to antioxidants that they contain which, through the process of oxidation, cause gene damage in cancerous cells.

There was no significant association between breast cancer occurrence and grains group; rice ($p > 0.74$), githeri ($p > 0.213$ and 0.441), ugali ($p > 0.074$ and 0.819). This may be due dietary intake assessment methods used or the amount of whole grain consumption of the different participants within the study population. The results of this study are not similar to a study by (Nour *et al.*, 2018) which found that consuming healthy carbs like legumes, fruits and whole grains was associated with 67% lower breast cancer risk (Nour *et al.*, 2018).

As regards brassiere wearing habits, measured in hours, no association with breast cancer was established in this study ($p > 0.095$). The result suggests that the number of hours that the women wore brassiere, per day, had no effect on the risk of developing breast cancer. This result could be explained by recent studies that have associated breast cancer to breast density, which could mean that the length of time of wearing a bra has no association to breast cancer. There are no well-designed scientific studies that have investigated the association between breast cancer and bra wearing. A study of more than 1,500 women found that breast cancer was less common among women who did not wear bras, however, the authors stated that this link was likely due to factors related to wearing a brassiere rather than the brassiere itself (Hsieh *et al.*, 1991).

This study determined that increase in BMI results to increase in breast cancer occurrence among women in menopause. The proportion of breast cancer among menopausal women who weighed between 41-50Kgs was highest at 37% while among post-menopausal women who weighed over 50 Kgs, had 11%. These are the highest proportion values in this study when age and weight were cross-examined. The results of this study are similar to the findings by (Nelson *et al.*, 2011) who found out that putting on 9.9 kg after menopause increases the risk of developing breast cancer by 18%. Before menopause, ovaries make most of the estrogen, and fat tissue makes a small amount. After menopause, most of a woman's estrogen comes from fat tissue and increase in fat tissue can increases the chances of getting breast cancer by raising estrogen levels.

From the multivariate logistic regression, the study showed that increase in Body mass index is a risk factor for breast cancer. These results are similar to a previous study done by (Ligibel *et al*., 2011) which indicate that there is evidence to suggest that excess body fat at the time of breast cancer diagnosis is associated with higher rates of cancer recurrence and death (Ligibel *et al*., 2011). The results also are similar to research findings that indicate that obese women were more likely to have large tumors, greater

lymph node involvement, and poorer breast cancer prognosis with 30% higher risk of mortality (Protani *et al*., 2010)

The study also showed a strong relationship (82.0%) between prediction and total activity grouping. Gardening hours and total activity hours were significant and protective for breast cancer for those who exercised for a total of 3-5 hours a week compared to those who exercised for 1-3 hours per week. These results were similar to those of the Nurses' Health Study which reported that women who had one or more hours per day of moderate exercise had a 30 percent lower risk of colon cancer than women who exercised less. Exercise protects against breast cancer, as well by helping women maintain a healthy body weight, lowering hormone levels, or causing changes in a women's metabolism or immune factors.

The present findings also suggest that breast cancer occurrence decrease with increase in physical activity. Increasing the hours spent in physical activities including running, jogging, gardening, house work, dancing and in general total activity hours; all have an effect of decreasing the risk of developing breast cancer. This study went beyond to include everyday tasks and activities such as housework and gardening, which the study respondents were more likely to engage in more than gym-type exercises. This showed that such everyday activities can stand in for typical exercises and have similar effects in mitigating breast cancer. This is supported by findings (Wu *et al.*, 2013) which reported that intense exercise routine is not needed, activity equal to walking 30 minutes may lower risk by about 3%. Exercise can help in weight control, lower estrogen levels (Smith *et al.,* 2013) and boost the immune system to kill or slow the growth of cancer cells in the body (Winzer *et al.,* 2011).

In respect to alcohol consumption, the study showed a strong association between alcohol consumption and breast cancer occurrence ($p < 0.01$). The results of this study is similar to that of (Allen *et al.,* 2009) done on middle-aged British women which concluded that each daily alcoholic beverage increases the incidence of breast cancer by 11 cases per 1000 women and avoiding alcohol leads to a decrease in breast cancer

occurrence from 26% to 19%. The more alcohol a woman drunk, the more likely she was to get breast cancer (IARC, 2007). The relationship is linear and dose-dependent. Even low levels of alcohol consumption carry some risk (IARC, 2007)

The association of alcohol and breast cancer may be explained by the primary mechanism through which alcohol causes breast cancer which in turn increases estrogen levels (Margolese *et al.*, 2000).For this study, the direct proportion between amount of alcohol consumption and breast cancer occurrence may have been aggravated by the fact that most local alcohol brands contain a lot of sugar necessary for fermentation process which may lead to compounding of the risk factors.

The study determined a strong association ($p < 0.00$) between breast cancer occurrence and secondary smoking. This showed that not only mainstream but also secondhand smoke contain chemicals that, in high concentrations, cause breast cancer. The highest occurrence of breast cancer was among postmenopausal women who are exposed for more than 3 hours per day. The proportion of breast cancer incidence caused by tobacco use was highest among women aged between 41-50 years who had a peak proportion of 38%, for those who were exposed for more than 3 hours a day, compared to the average peak proportion (22%) among women exposed to secondary smoke for more than 3 hours a day. The effects of smoking in aggravating breast cancer is felt more among menopausal women. The findings in the present study are similar to those of (Russo *et al.*, 2003) findings that breathing second hand smoke increases breast cancer risk by 70% in younger, primarily pre-menopausal women.

Most epidemiological studies associated heavy smoking, smoking of long duration, smoking before a first full term pregnancy (FFTP) and passive smoking with increased risk of breast cancer in women with high levels of estrogen (Catsburg *et al* 2015). In this study, the highest odds of testing for breast cancer were noted in the passive smokers group where women who had passively smoked for more than 3 hours daily had 15.66 (95% CI: 4.807-50.983). This indicates that, there could be a link between passive smoking and breast cancer occurrence. This as a critical area that needs urgent attention

preferably from the politicians, simple and efficient measures such as increasing taxes and enforcing strict pricing policies as well as restricting cigarrete smoking in public and providing educational information could combat this upcoming pandemic.

5.3 Reproductive factors associated with breast cancer

The findings of the study showed that there was no association between number of pregnancies ($p > 0.59$) and first pregnancy age ($p > 0.28$). The findings are not similar to that of (Ray *et al*., 2005) that showed lower age of first childbirth, compared to the average age of 24, having more children (about 7% lowered risk per child) and breastfeeding (4.3% per breastfeeding year, with an average relative risk around 0.7) have been correlated to lowered breast cancer risk in large studies. The result of age at first pregnancy is not similar to that of (Newcomb *et al*., 1994) that showed women who give birth and breastfeed by the age of 20 may have greater protection from breast cancer.

However, total years of breast feeding had a significant ($p < 0.00$) association to breast cancer. Findings of multivariate regression on breastfeeding showed the risk to be statistically significant and it decreased with increase in years of breast feeding their children (> 2 years, $p < 0.05$) hence protective for breast cancer. These results are consistent with those (Fregene and Newman *et al*., 2005) that indicated that prolonged lactation among Africans has a protective role for it lowers endogenous estrogen levels over a life time therefore it reduces the risk of breast cancer (Fregene & Newman *et al*., 2005). We suggest that young women, despite of challenges of work and other stressful events of life, should allow their children to breastfeed the longest for this is not only beneficial to the immunity of the baby and bonding between the baby and the mother, but also protects from developing breast cancer.

The findings of the study revealed that out of 21 women who had used hormonal contraceptives before they attained age of 20 years and before first pregnancy had a greater chance of developing breast cancer by 33.3%. The findings also established that

there was a 23.8% chance of breast cancer occurrence in women who had used hormonal contraceptives before they attained age of 20 years and had frequently continued to use them. This study showed that use of hormonal contraceptives before 20 years of age and also first pregnancy pose a risk of testing positive for breast cancer. The East African Legislative Assembly (EALA) bill which seeks to introduce contraceptives for children and teenagers aged between 10 and 19 years (Emmanuel *et al.*, 2017) will pause great danger to our girls since more cases of breast cancer may be seen in the future. The findings are similar to those of some studies which have suggested that women who began using hormonal contraceptives before the age of 20 or before their first full-term pregnancy were at increased risk for breast cancer, but it is not clear how much of the risk stems from early age at first use, and how much stems from use before the first full-term pregnancy (WHO & IARC, 1999).

Findings of the present study indicated that there was no association between breast cancer occurrence and age at menarche ($p > 0.96$). The findings are not similar to a study done in sub-Saharan Africa that showed late menarche to be a risk factor for breast cancer in post-menopausal women (Sighoko *et al.*, 2013). This is inconsistent with a study done by (Cloditz *et al.*, 2006) which established that the earlier a girl starts menstruating, the more menstrual cycles she will have, and the greater will be her exposure to estrogen during her child-bearing years hence increased chances of developing breast cancer.

Findings of the present study indicated that there was no association between breast cancer occurrence and hormonal therapy ($p > 0.05$). This may be due to most of the menopausal respondents opting for herbal medicine as opposed to conventional approach. For the few respondents using the conventional approach, they have not been consistent in using the HRT as observed in their responds, attributing it to some adverse effects of the therapy thus no relation to breast cancer. The results therefore indicate that use of HRT has no association to breast cancer. Further studies should be done to assess and ascertain this. The finding of this study is not similar to those of a study done by

(Heiss *et al.,* 2008) that indicated a relative risk of breast cancer of 1.35 for women who had used HRT for five or more years after menopause.

5.4 Conclusion

i. This study showed that there was a positive association between lifestyle and reproductive risk factors and the occurrence of breast cancer among women in Thika Hospital. Diet factors,
ii. Prolonged lactation, regular physical activity, increased fruits and vegetables intake, avoidance of fat intake, avoidance of obesity, avoidance of hormonal contraceptives use below 20 years of age, avoidance of alcohol consumption and avoidance of tobacco smoking may reduce the risk of developing breast cancer.
iii. Those women who have one or more of the following risk factors should be followed up keenly and screened regularly for breast cancer: women in menopausal stage, those exposed to passive smoking, alcohol intake and obesity.
iv. This study provides important background information for designing detailed studies and interventions that aim to improve our understanding of the epidemiology and management of breast cancer in Thika.

5.5 Recommendations

This study recommends the need for a new emphasis in health education more so focusing on lifestyle behaviors and reproductive risk factors associated with breast cancer, promotional campaigns of breast cancer screening and public health policy aimed at women.

The Ministry of Health should also allocate more resources both financial and manpower to programs in the county to deal with non-communicable diseases in an effort to scale up early cancer detection and management to reduce morbidity and mortality from the disease. This should also include subsidizing the cost of treatment.

Further studies should be done to ascertain the findings of hormonal therapy and age at menarche of Kenyan women. Further follow up studies that are more of community based rather than hospital based should be carried out so that the sample size can represent Kenya at large. Further study is needed to determine if these associations hold true in more racial-diverse groups.

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APPENDICES

Appendix I: Consent Form

Part A: Information to the participant

Title of study

Socio-demographic factors associated with breast cancer among females screened for breast cancer at Thika Level 5 Hospital.

Introduction

My name is Diana Rose Kerubo Memba from the College of Health Sciences, Jomo Kenyatta University of Agriculture and Technology. I am conducting a research on the socio-demographic factors associated with breast cancer among females screened for breast cancer at Thika Level 5 Hospital. You are therefore invited to participate in this study whose main objective is to determine the socio-demographic factors associated with breast cancer among females screened for breast cancer at Thika Level 5 Hospital. Kindly read the form carefully and any questions arising will be addressed before you agree to take part in this study.

Purpose of the study

To determine the socio-demographic factors associated with breast cancer among females screened for breast cancer at Thika Level 5 Hospital.

Study Procedures

If you agree to take part in this study, you will be required to fill a detailed questionnaire regarding yourself, demographic characteristics as well as lifestyle factors, socio-economic factors and reproductive factors.

Nature of the Study

Participation in this study is voluntary. Your decision whether or not to participate in this study will not affect your current or future relations with the investigator or the other institutions involved. If you decide to participate, you are free to withdraw at any time without affecting those relationships.

Research Related Risks or Injury

The questionnaires may contain emotional questions so feel free to skip the questions in case you are not comfortable in answering them.

Benefits

If you agree to participate, the information gathered from this study will be used to sensitize both the policy makers that guide the breast cancer prevention and control programs to increase awareness on risks of breast cancer in the management of the rise in cancer incidence. There are no monetary benefits that will be gained from this study by the participant.

Study Costs

If you accept to take part in this study, there will be no payment to you, for the study procedures and also for participation in this study.

Confidentiality

All information provided will be kept confidential. Questionnaires will be coded and personal information from the interview will not be released without your written permission. Your names will not be used in any report of this study, or in any reports, publications or presentations. In case the officials from College of Health Sciences (ITROMID, KEMRI), or Jomo Kenyatta University of Agriculture and Technology will review your records for the study, they will protect your privacy.

Participation information

Participation is voluntary and there are no risks at all. It is your decision to participate or not to participate in this study. If at any time you wish to withdraw from participating in the study, you can do so, and this will not affect any future participation or relations with anyone or any institution.

There are no wrong or right answers. Your openness and honest opinions are extremely important. In case you do not understand a question or issue, please ask the investigator for clarification.

Contacts and Questions

The principal investigator conducting this study is Diana Rose Kerubo Memba. You may ask any questions you have now, or if you have questions later, you are encouraged to contact her through telephone number: 0733 965 202 or E-mail dianamemba@ymail.com

If you have any questions or concerns regarding the study and would like to talk to someone other than the researcher(s), you are encouraged to contact the following:

The Director, College of Health Sciences (COHES),

Jomo Kenyatta University of Agriculture and Technology,

P. O. Box 62000 00200,

Nairobi.

Tel. 067 – 52711,

E-mail: itromid@nairobi.mimcom.net

OR

ITROMID-KEMRI OFFICE,

Kenya Medical Research Institute,

P.O. BOX 54840-00200,

Nairobi.

Tel: 020-2722541/4

E-mail: itromid@nairobi.mimcom.net

And more important contact:

The Secretary, Ethical Review Committee, KEMRI

TEL: (020) 2722541, 2726781;

E-mail: ercadmin@kemri.org

Part B: Agreement

I have read the information provided to me and I have had the opportunity to ask questions about it. Any questions that I had were answered to my satisfaction.

Participants initials _____

Signature _____ Date: _____

Name of person obtaining consent _____

Signature _____ Date _____

Appendix II: Fomu ya Ridhaa

Sehemu A: Habari kwa mshiriki

Kichwa cha Utafiti

Mambo ya maisha na kijamii yanayohusika na saratani ya matiti miongoni mwa wanawake wanaopimwa katika Hospitali ya Thika.

Mwanzo

Jina langu ni Diana Rose Kerubo Memba kutoka Chuo cha Sayansi ya Afya, katika Chuo Kikuu cha Jomo Kenyatta cha Kilimo na Teknolojia. Ninafanya utafiti kuhusu mambo ya maisha na kijamii yanayohusika na saratani ya matiti miongoni mwa wanawake wanaopimwa katika Hospitali ya Thika. Kwa hivyo,umealikwa kushiriki katika zoezi hili ambayo lengo kuu ni kuamua mambo ya maisha na kijamii yanayohusika na saratani ya matiti miongoni mwa wanawake wanaopimwa katika Hospitali ya Thika. Tafadhali soma fomu hii kwa umakini na swali lolote unalo litajibiwa kabla ya kuamua kushiriki katika zoezi hili.

Madhumuni ya Utafiti

Kuamua mambo ya maisha na kijamii yanayohusika na saratani ya matiti miongoni mwa wanawake wanaopimwa katika Hospitali ya Thika.

Taratibu ya Utafiti

Kama utakubali kushiriki katika zoezi hili, utatakikana kujaza dodoso kwa kina, kuhusu wewe mwenyewe, sifa ya idadi ya watu, mambo ya maisha, mambo ya kijamii na kiuchumi na pia eneo ya kijiografia.

Asili ya Utafiti

Ushirika katika zoezi hili ni kwa hiari. Uamuzi wako kukubali au kukataa kushiriki katika zoezi hili haitaathiri mahusiano, ya sasa au ya baadaye, kati yako na mpelelezi au taasisi nyingine zinazohusika. Ikiwa utaamua kushiriki, uko huru kuondoka wakati wowote bila ya kuathiri mahusiano hayo.

Hatari au Majeraha zinazohusiana na Utafiti

Dodoso yanaweza kuwa na maswali ya kihisia kwahivyo una uhuru wa kuruka hayo maswali ikiwa hutapendezwa kuyajibu.

Faida

Ikiwa utaamua kushiriki, habari itakayokusanywa kutoka zoezi hili itatumiwa kuhamasisha watunga sera ambao wanaongoza saratani ya matiti pamoja na programu za kinga na udhibiti ili waongeze ufahamu wa hatari za saratani ya matiti katika usimamizi wa kupanda kwa matukio ya saratani. Hakuna faida ya pesa mshiriki atapata kutoka zoezi hili.

Gharama ya utafiti

Ikiwa utakubali kushiriki katika zoezi hili,hakutakuwa na malipo utakayopewa.

Faragha

Habari yoyote utakayopatiana itatunzwa kwa siri. Dodoso na taarifa ya kibinafsi kutoka kwa mahojiano hazitatolewa bila ya kibali cha maandish. Majina yako hayatatumiwa kwenye ripoti yoyote ya zoezi hili, ama katika maripoti mengine, uchapishaji wala uwasilisho. Ikiwa viongozi wa Chuo cha Sayansi ya Afya, (KEMRI), ama Chuo Kikuu cha Jomo Kenyatta cha Kilimo na Teknolojia watathmini rekodi za zoezi hili, watahifadhi faragha yako.

Ushirika katika Utafiti

Ushirika ni kwa hiari na hamna hatari zozote . kushiriki au kutoshiriki katika zoezi hili ni uamuzi wako. Unaweza kujiondoa kutoka zoezi hili wakati wowote utakapotaka kutoka, na hii haitaathiri ushirika wa baadaye au mahusiano na mtu yeyote au taasisi yoyote.

Hakuna jibu sahihi au mbaya. Uwazi na uaminifu wa maoni yako ni muhimu sana. Kama huelewi swali ama jambo, tafadhali uliza mpelelezi kwa ufafanuzi.

Mawasiliano na Maswali

Mtafiti mkuu wa zoezi hili ni Diana Rose Kerubo Memba. Unaweza uliza maswali unayo kwa sasa, ama kama utakuwa na maswali baadaye, unahimizwa kuwasiliana naye kupitia nambari yake ya simu: 0733 965 202 ama barua ya pepe: dianamemba@ymail.com

Kama una maswali au wasiwasi kuhusu zoezi hili na ungependa kuzungumza na mtu mwingine isipokuwa mtafiti, unahimizwa kuwasiliana na wafuatao:

Mkurugenzi, Chuo cha Sayansi ya Afya,

Chuo Kikuu cha Jomo Kenyatta cha Kilimo na Teknolojia,

Nambari ya posta 62000 00200,

Nairobi.

Simu: 067 – 52711,

Barua pepe: itromid@nairobi.mimcom.net

AU

Ofisi ya ITROMID-KEMRI,

Taasisi ya Utafiti Wanatibabu Kenya

Nambari ya posta 54840-00200

Nairobi.

Simu: 020-2722541/4

Barua pepe: itromid@nairobi.mimcom.net

Na muhimu zaidi, wasiliana na:

Katibu KEMRI,

Kamati ya Kitaifa ya Mapito ya Kimadili,

Simu: (020) 2722541, 2726781;

Barua pepe: ercadmin@kemri.org

Sehemu B: Uagano

Nimesoma fomu niliyopatiwa na nimekuwa na nafasi ya kuuliza maswaliyanayohusiana nayo. Kila swali nililokuwa nalo limejibiwa kwa utoshelezi wangu.

Jina la mshiriki (kwa hiari) _____

Saini _____ Tarehe: _____

Jina la anayepata idhini _____

Saini _____ Tarehe _____

Appendix III: SSC Approval

KENYA MEDICAL RESEARCH INSTITUTE

P.O. Box 54840-00200, NAIROBI, Kenya
Tel (254) (020) 2722541, 2713349, 0722-205901, 0733-400003; Fax: (254) (020) 2720030
E-mail: director@kemri.org info@kemri.org Website:www.kemri.org

KEMRI/SSC/103129 4th September, 2014

Diana Memba

Thro'
Director, CPHR
NAIROBI

Forwarded 9/12/2014

REF: SSC No. 2659 (Amendment) – Socio-demographic factors associated with Breast cancer among females screened for breast cancer at Thika Level 5 hospital, Thika

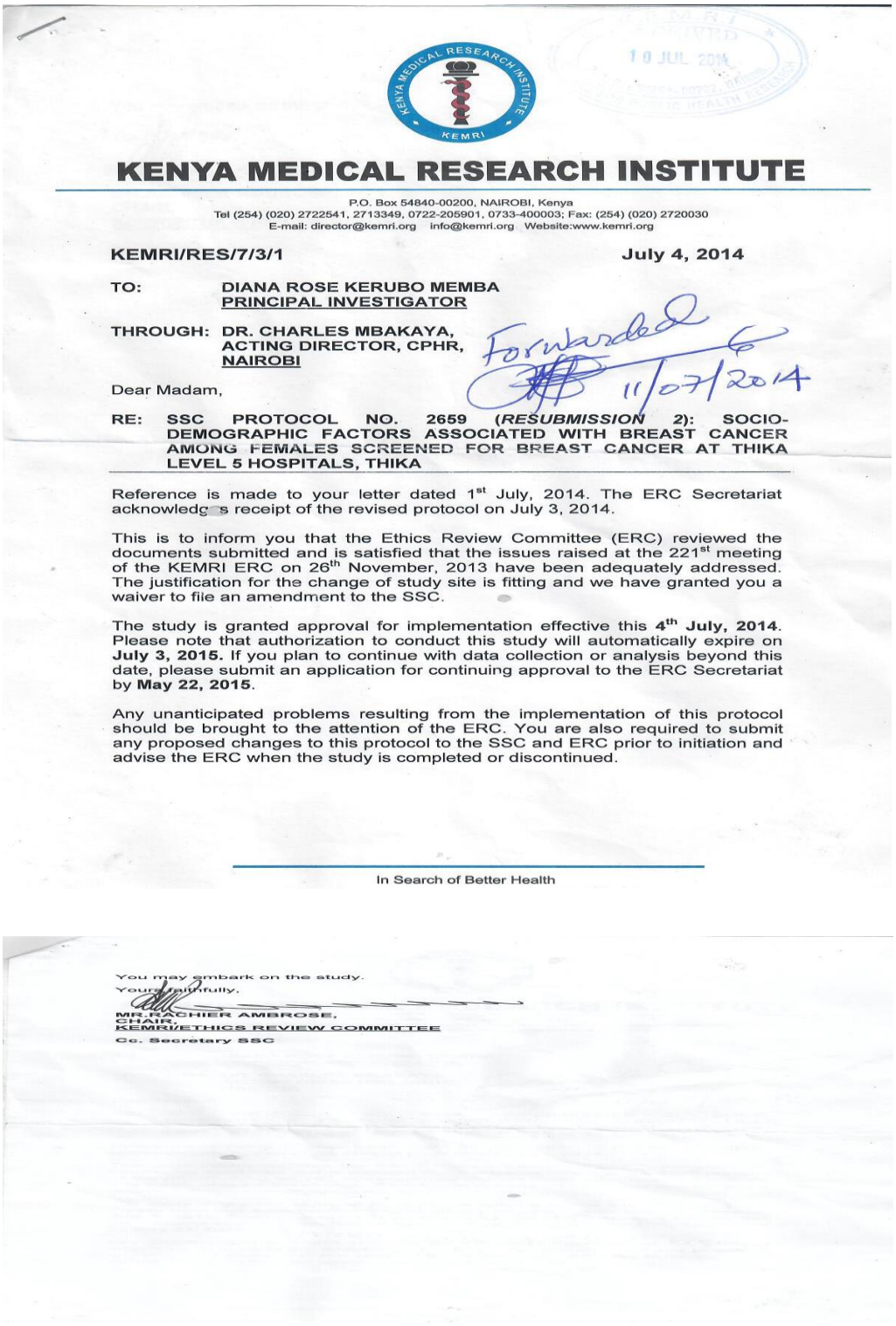
I am pleased to inform you that the above mentioned proposal, in which you are the PI, was discussed by the KEMRI Scientific Steering Committee (SSC), during its 218th meeting held on 2nd September, 2014 has since been approved for implementation by the SSC.

Kindly submit 4 copies of the amended protocol to SSC within 2 weeks from the date of this letter i.e., 18th September, 2014 for onward transmission to the ERC.

We advise that work on this project can only start when ERC approval is received.

Sammy Njenga, PhD
SECRETARY, SSC

Appendix IV: Kemri ERC approval



KENYA MEDICAL RESEARCH INSTITUTE

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Tel (254) (020) 2722541, 2713349, 0722-205901, 0733-400003; Fax: (254) (020) 2720030
E-mail: director@kemri.org info@kemri.org Website:www.kemri.org

KEMRI/RES/7/3/1 July 4, 2014

TO: DIANA ROSE KERUBO MEMBA
PRINCIPAL INVESTIGATOR

THROUGH: DR. CHARLES MBAKAYA,
ACTING DIRECTOR, CPHR,
NAIROBI

Forwarded
11/07/2014

Dear Madam,

RE: SSC PROTOCOL NO. 2659 (*RESUBMISSION 2*): SOCIO-DEMOGRAPHIC FACTORS ASSOCIATED WITH BREAST CANCER AMONG FEMALES SCREENED FOR BREAST CANCER AT THIKA LEVEL 5 HOSPITALS, THIKA

Reference is made to your letter dated 1st July, 2014. The ERC Secretariat acknowledges receipt of the revised protocol on July 3, 2014.

This is to inform you that the Ethics Review Committee (ERC) reviewed the documents submitted and is satisfied that the issues raised at the 221st meeting of the KEMRI ERC on 26th November, 2013 have been adequately addressed. The justification for the change of study site is fitting and we have granted you a waiver to file an amendment to the SSC.

The study is granted approval for implementation effective this **4th July, 2014**. Please note that authorization to conduct this study will automatically expire on **July 3, 2015.** If you plan to continue with data collection or analysis beyond this date, please submit an application for continuing approval to the ERC Secretariat by **May 22, 2015**.

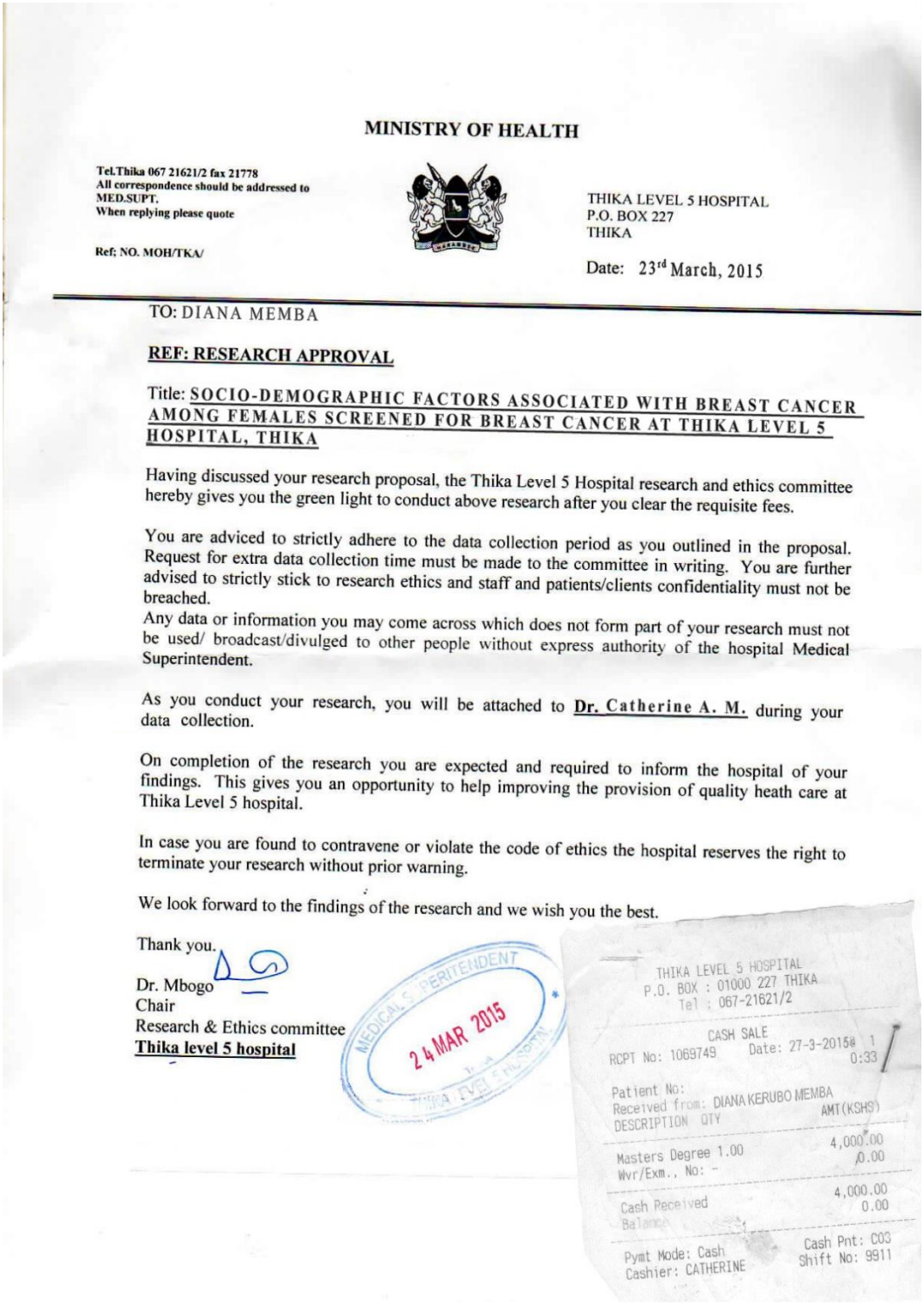
Any unanticipated problems resulting from the implementation of this protocol should be brought to the attention of the ERC. You are also required to submit any proposed changes to this protocol to the SSC and ERC prior to initiation and advise the ERC when the study is completed or discontinued.

In Search of Better Health

You may embark on the study.
Yours faithfully,

MR.RACHIER AMBROSE,
CHAIR,
KEMRI/ETHICS REVIEW COMMITTEE
Cc. Secretary SSC

Appendix V: Thika Level 5 Hospital Approval



MINISTRY OF HEALTH

Tel.Thika 067 21621/2 fax 21778
All correspondence should be addressed to MED.SUPT.
When replying please quote

Ref: NO. MOH/TKA/

THIKA LEVEL 5 HOSPITAL
P.O. BOX 227
THIKA

Date: 23rd March, 2015

TO: DIANA MEMBA

REF: RESEARCH APPROVAL

Title: **SOCIO-DEMOGRAPHIC FACTORS ASSOCIATED WITH BREAST CANCER AMONG FEMALES SCREENED FOR BREAST CANCER AT THIKA LEVEL 5 HOSPITAL, THIKA**

Having discussed your research proposal, the Thika Level 5 Hospital research and ethics committee hereby gives you the green light to conduct above research after you clear the requisite fees.

You are adviced to strictly adhere to the data collection period as you outlined in the proposal. Request for extra data collection time must be made to the committee in writing. You are further advised to strictly stick to research ethics and staff and patients/clients confidentiality must not be breached.
Any data or information you may come across which does not form part of your research must not be used/ broadcast/divulged to other people without express authority of the hospital Medical Superintendent.

As you conduct your research, you will be attached to **Dr. Catherine A. M.** during your data collection.

On completion of the research you are expected and required to inform the hospital of your findings. This gives you an opportunity to help improving the provision of quality heath care at Thika Level 5 hospital.

In case you are found to contravene or violate the code of ethics the hospital reserves the right to terminate your research without prior warning.

We look forward to the findings of the research and we wish you the best.

Thank you.

Dr. Mbogo
Chair
Research & Ethics committee
Thika level 5 hospital

MEDICAL SUPERITENDENT
24 MAR 2015
THIKA LEVEL 5 HOSPITAL

THIKA LEVEL 5 HOSPITAL
P.O. BOX : 01000 227 THIKA
Tel : 067-21621/2

CASH SALE
RCPT No: 1069749 Date: 27-3-2015@ 10:33

Patient No:
Received from: DIANA KERUBO MEMBA

DESCRIPTION	QTY	AMT(KSHS)
Masters Degree	1.00	4,000.00
Wvr/Exm., No: -		0.00
Cash Received		4,000.00
Balance		0.00

Pymt Mode: Cash Cash Pnt: C03
Cashier: CATHERINE Shift No: 9911

Appendix VI: Serving size charts

Serving-Size Comparison Chart

FOOD	SYMBOL	COMPARISON	SERVING SIZE
Milk & Milk Products			
Cheese (string cheese) 		Pointer finger	1½ ounces
Milk and yogurt (glass of milk) 		One fist	1 cup
Vegetables			
Cooked carrots 		One fist	1 cup
Salad (bowl of salad) 		Two fists	2 cups
Fruits			
Apple 		One fist	1 medium
Canned peaches 		One fist	1 cup
Grains, Breads & Cereals			
Dry cereal (bowl of cereal) 		One fist	1 cup
Noodles, rice, oatmeal (bowl of noodles) 		Handful	½ cup
Slice of whole wheat bread 		Flat hand	1 slice
Meat, Beans & Nuts			
Chicken, beef, fish, pork (chicken breast) 		Palm	3 ounces
Peanut butter (spoon of peanut butter) 		Thumb	1 tablespoon

For meat group, 1 and half ounces = 42.52428 grams = Half a palm

¼ cup

½ cup

1 cup

1 ½ cup

¼ cup

½ cup

1 cup

1 ½ cup

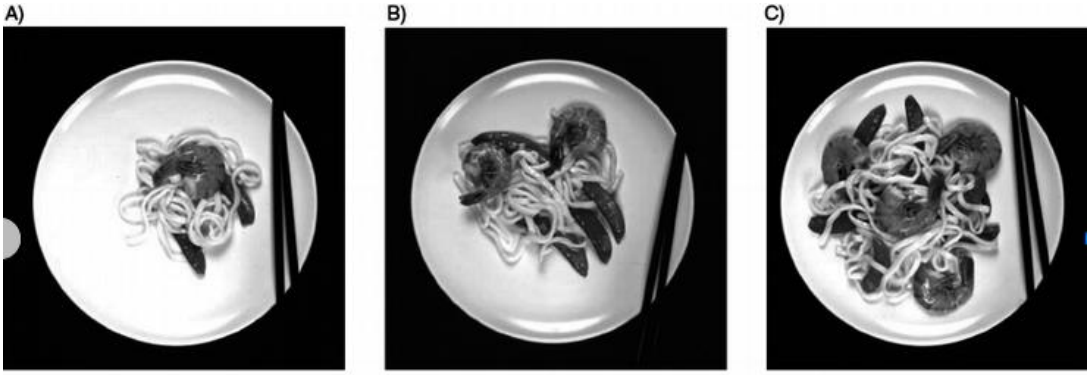
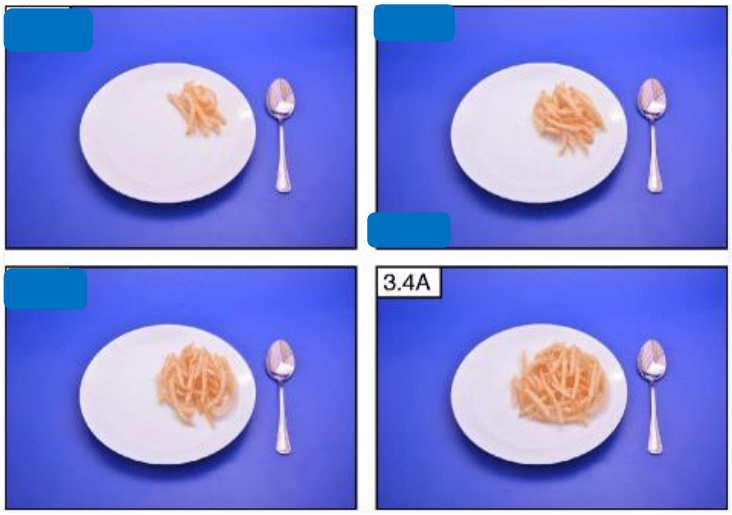


Photo "A" is ½ cup or less
Photo "B" is 1 cup
Photo "C" is 2 cups or more



Appendix VII: Structured Questionnaire

1. Kindly indicate your age _____
2. Place of residence _____
3. Rural residence_____
4. Height: _____ Weight: _____
5. What is your race?

   African ☐ White ☐ Other _____

6. What is the highest level of education that you have attained? (kindly tick)

   1) None ☐
   2) Primary ☐
   3) Secondary school ☐
   4) College education ☐
   5) University education ☐

7. What is your current employment status? (kindly tick where appropriate)

   1) Unemployed ☐
   2) Student ☐
   3) Self-employed ☐ specify your occupation_____
   4) Employed ☐ specify your occupation_____
   5) Retired ☐ specify your former occupation_____

8. Kindly tick appropriately the income bracket that you fall in: (Kshs. Per month)
    1) 0 - 20,000 ☐
    2) 20,001 – 40,000 ☐
    3) 40,001 – 60,000 ☐
    4) 60,001 – 80,000 ☐
    5) 80,001 and above ☐
9. What is your current marital status?
    1) Single ☐
    2) Married ☐
    3) Cohabiting ☐
    4) Divorced ☐
    5) Widowed ☐

Family History

10. Have any of your following close relatives had breast cancer (age at diagnosis is needed, please estimate if unsure):

Mother ☐ age at diagnosis _____

Sister ☐ age at diagnosis _____how many? _____

Daughter ☐ age at diagnosis _____how many? _____

Grandmother (Maternal) ☐ age at diagnosis _____

Grandmother (Paternal) ☐ age at diagnosis _____

Other _____ age at diagnosis _____

Physical History

11. (Please estimate if unsure) Childbearing age at first birth _____ number of pregnancies_____ number of children _____
12. Did you breastfeed your children? Yes ☐ No ☐

    If yes, for how long (months/years per child)

    Child 1_____child 2_____child 3_____child 4_____

    child 5_____child 6_____child7_____child 8_____

    child 9_____ child 10_____

13. Have you taken oral contraceptives or other hormonal contraceptives in the past?

    Yes ☐ No ☐

    If yes, for how long? _____ Name of contraceptive _____

14. Are you currently taking oral contraceptives? Yes ☐ No ☐

    If yes, for how long? _____ Name of contraceptive _____

    If no, estimate the duration of use _____ Name of contraceptive _____

15. Which best choice describes your bra wearing habits? (Please Choose One)

    1) Rarely or never ☐
    2) Less than 12 hours a day ☐

3) More than 12 hours a day ☐
4) Pretty much anytime I am not in bed ☐
5) All day long and usually when I am in bed ☐

16. What is your current favorite sleeping position (if you had surgery it would be since your surgery has healed)? (kindly choose one)

1) I am not sure ☐
2) On your right side ☐
3) On your left side ☐
4) On your front ☐
5) On your back ☐

17. Do you engage in any of the following physical activities?(please indicate where appropriate)

1) Running☐ times per week ☐ Duration per session ☐ (hrs/min)
Intensity (mark one): moderate ☐ or vigorous ☐
2) Walking☐ times per week ☐ Duration per session ☐ (hrs/min)
Intensity (mark one): moderate ☐ or vigorous ☐
3) Swimming☐ times per week ☐ Duration per session ☐ (hrs/min)
Intensity (mark one): moderate ☐ or vigorous ☐
4) Jogging☐ times per week ☐ Duration per session ☐ (hrs/min)
Intensity (mark one): moderate ☐ or vigorous ☐
5) Gardening☐ times per week ☐ Duration per session ☐ (hrs/min)
Intensity (mark one): moderate ☐ or vigorous ☐
6) House work☐ times per week ☐ Duration per session ☐ (hrs/min)
Intensity (mark one): moderate ☐ or vigorous ☐

7) Cycling☐ times per week ☐ Duration per session ☐ (hrs/min)
Intensity (mark one): moderate ☐ or vigorous ☐

8) Dancing☐ times per week ☐ Duration per session ☐ (hrs/min)
Intensity (mark one): moderate ☐ or vigorous ☐

9) Skipping☐ times per week ☐ Duration per session ☐ (hrs/min)
Intensity (mark one): moderate ☐ or vigorous ☐

10) Other_____times per week ☐ Duration per session ☐ (hrs/min)
Intensity (mark one): moderate ☐ or vigorous ☐

18. Have you ever had a needle breast biopsy? Yes ☐ No ☐

If yes, how many? _____

19. Did (any of) the breast biopsy show abnormal cell? Yes ☐ No ☐ Don't know ☐

If yes, for how long? _____

Menstrual History

20. How old were you when you first had your periods? _____years
21. Do you still experience your periods? Yes ☐ No ☐

If No, state the age at which the periods stopped _____

22. Do you still have your ovaries? Yes ☐ No ☐

Were both ovaries removed? Yes ☐ No ☐ If yes, at what age? _____

23. Are you or have you taken any medication (hormone replacement therapy) to relieve symptoms of menopause? Yes ☐ No ☐

If yes, for how long? _____

Diet

24. Please check the option that best describes your diet habits

I eat a variety of meat, dairy, eggs, fruits, vegetables and grains ☐

I eat mostly fruits, vegetables and grains with occasional meat, dairy or eggs ☐

I eat fruits, vegetables, grains, dairy and eggs but no meat (vegetarian) ☐

I eat fruits, vegetables and grains but no dairy, eggs or meat (vegan) ☐

Other (please explain) _____

25. How often do you eat (please tick where appropriate and indicate the number of times):

	Never	Daily	Weekly	Monthly	How many times?
1) Cooked vegetables	☐	☐	☐	☐	_____
2) Raw vegetables	☐	☐	☐	☐	_____
3) Vegetable juice	☐	☐	☐	☐	_____
4) Whole fruits (e.g. banana)	☐	☐	☐	☐	_____
5) Fruit salads	☐	☐	☐	☐	_____
6) Fruit juice	☐	☐	☐	☐	_____

7) Rice and Spaghetti	☐	☐	☐	☐	_____
8) Beans	☐	☐	☐	☐	_____
9) Githeri	☐	☐	☐	☐	_____
10) Ugali	☐	☐	☐	☐	_____
11) Porridge	☐	☐	☐	☐	_____
12) Bread	☐	☐	☐	☐	_____
13) Red meat(e.g. beef)	☐	☐	☐	☐	_____
14) White meat(e.g. fish)	☐	☐	☐	☐	_____
15) Milk	☐	☐	☐	☐	_____
16) Yoghurt	☐	☐	☐	☐	_____
17) Eggs	☐	☐	☐	☐	_____
18) Cheese	☐	☐	☐	☐	_____
19) Margarine	☐	☐	☐	☐	_____
20) Sugary (E.g. cakes, ice-cream)	☐	☐	☐	☐	_____
21) Oily/fatty foods (E.g. chips, mandazi)	☐	☐	☐	☐	_____

26. This question seeks to determine how much (serving) of the following foods you take.

    A serving – It is a single portion of food or drink.

    Please tick what serving you take per meal.

    1) Vegetable group (3-5 servings recommended per day)

	¼ cup (little)	½ cup (moderate)	1 cup (much)	1 ½cup (a lot)
Cooked vegetables	☐	☐	☐	☐
Raw vegetables	☐	☐	☐	☐
Vegetable juice	☐	☐	☐	☐

2) Fruits group (2-4 servings recommended per day)

	Small	Medium	Large	How many?
Fruit salad	☐	☐	☐	☐
Fruit juice	☐	☐	☐	☐
Whole fruit (e.g Banana)	☐	☐	☐	☐

3) Grains Group (6-11 servings recommended per day)

	¼ cup (little)	½ cup (moderate)	1 cup (much)	1 ½cup (a lot)
Rice	☐	☐	☐	☐
Beans	☐	☐	☐	☐
Githeri	☐	☐	☐	☐
Ugali	☐	☐	☐	☐

Cereals	☐	☐	☐	☐
Porridge	☐	☐	☐	☐
	1slice	2 slices	3 slices	4 slices
Bread	☐	☐	☐	☐

4) Meat group(2-3 servings recommended per day)

1 ½ ounces	3 ounces	6 ounces	9 ounces
(42.45g)	(85.05g)	(169.8g)	(254.7g)

Red meat				
(e.g. beef)	☐	☐	☐	☐
White meat				
(e.g. fish)	☐	☐	☐	☐

5) Other animal products group(2-3 servings recommended per day)

	¼ cup (little)	½ cup (moderate)	1 cup (much)	1 ½cup (a lot)
Milk	☐	☐	☐	☐
Yogurt	☐	☐	☐	☐

Eggs How many? _____

1 ½ ounces	3 ounces	6 ounces	9 ounces
(42.45g)	(85.05g)	(169.8g)	(254.7g)

Cheese ☐ ☐ ☐ ☐

1teaspoon 2teaspoon 1 ½ tablespoon 2tablespoon

Margarine ☐ ☐ ☐ ☐

6) Sugary group (Recommended to be used sparingly)

¼ cup (little) ½ cup (moderate) 1 cup (much) 1 ½cup (a lot)

(E.g. cakes,ice-cream) ☐ ☐ ☐ ☐

7) Oily/fatty foods group (Recommended to be used sparingly)

(E.g. chips, mandazi) ☐ ☐ ☐ ☐

27. Have you ever smoked cigarettes? Yes ☐ No ☐

If yes, for how long? _____ Cigarettes per day _____ name of cigarette _____

28. Have you used tobacco in any other form? Yes ☐ No ☐

If yes, kindly specify in which form _____

29. Are you exposed to indoor tobacco smoke at home or work place? Yes ☐ No ☐

If yes, for how long? (Kindly choose one) ☐ < 1hr a day ☐1-5hrs a day ☐> 5hr a day

30. Have you ever drunk alcohol? Yes ☐ No ☐

If yes, for how long? _____

Glasses per week _____ or bottles per week_____ Name/brand of alcohol _____

31. Would you be willing to be contacted by us via telephone for a follow-up or subsequent survey on your breast health? No Thank You ☐ Yes please ☐

    at the following mobile phone number _____

Thank you for participating in this study

Appendix VIII: Muundo wa Dodoso

1. Tafadhali andika umri wako _____
2. Pahali unapoishi _____
3. Makaazi ya kjijini_____
4. Urefu: _____ Uzito: _____
5. Wewe ni?(chagua moja)

   muafrika ☐ Mzungu ☐ Nyingine _____

6. Umesoma hadi kiwango kigani cha elimu? (tafadhali weka alama kwenye jibu)

   1) Sijasoma ☐
   2) Shule ya msingi ☐
   3) Shule ya upili ☐
   4) Chuo kikuu ☐

7. Je, hali yako ya ajira ikoje kwa sasa? (tafadhali weka alama kwenye jibu)

   1) Sijaajiriwa ☐
   2) Mwanafunzi ☐
   3) Nimeajiriwa ☐ andika kazi yako_____
   4) Nimejiajiri ☐ andika kazi yako_____
   5) Nimestaafu ☐ andika kazi uliyokuwa ukifanya_____

8. Tafadhali chagua kipato ambacho unapata: (shilling ya Kenya kwa mwezi)

   1) 0 - 20,000 ☐
   2) 20,001 – 40,000 ☐
   3) 40,001 – 60,000 ☐

4) 60,001 – 80,000 ☐
5) 80,001 na zaidi ☐

9. Hadhi ya ndoa

1) Hujaolewa ☐
2) Umeolewa ☐
3) Nyingine (eleza)_____

Historia ya Familia

10. Je, kuna yeyote kati ya hawa ndugu wa karibu,aliwahi kuwa na kansa ya matiti (umri wa utambuzi unatakikana, tafadhali kisia kama huna uhakika):

Mama ☐ umri wa utambulizi _____

Dada ☐ umri wa utambulizi _____ wangapi? _____

Binti ☐ umri wa utambulizi _____ wangapi? _____

Bibi (Uzazi) ☐ umri wa utambulizi _____

Bibi (Kibaba) ☐ umri wa utambulizi _____

wengine _____ umri wa utambulizi _____

Historia ya Kimwili

11. (Tafadhali kisia kama huna uhakika) Umri uliozaa mtoto wa kwanza _____ nambari za mimba_____ nambari za watoto _____

12. Je, uliwahi nyonyesha watoto wako? Ndio ☐ La ☐

Kama jibu ni ndio, ulinyonyesha kwa muda gani (miezi/miaka kwa kila mtoto)

Mtoto 1_____ Mtoto 2_____ Mtoto 3_____ Mtoto 4_____Mtoto 5_____ Mtoto 6_____ Mtoto 7_____ Mtoto 8_____ Mtoto 9_____ Mtoto 10_____

13. Umewahi kutumia tembe au homoni za kupanga uzazi?

Ndio ☐ La ☐

Kama jibu ni ndio, umekuwa ukitumia kwa muda gani? _____ Jina ya tembe_____

14. Je, unatumia tembe za kupanga uzazi kwa sasa? Ndio ☐ La ☐

Kama jibu ni ndio, umekuwa ukitumia kwa muda gani? _____ Jina ya tembe_____

Kama jibu ni la, kisia muda uliyotumia tembe hizo _____ Jina ya tembe_____

15. Chaguo gani bora kinachoelezea tabia yako ya uvaaji wa bra? (tafadhali chagua moja)

1) Mara chache au kamwe huvai ☐
2) Chini ya masaa 12 kwa siku ☐
3) Zaidi ya masaa 12 kwa siku ☐
4) Kila wakati siko kitandani ☐
5) Kila siku na kawaida nikiwa kitandani ☐

16. Ni mtindo gani wa kulala unayopenda kwa sasa (kama uliwahi fanyiwa upasuaji itakuwa tangu upasuaji upone)? (tafadhali chagua moja)

1) Sina uhakika ☐
2) Upande wako wa kulia ☐
3) Upande wako wa kushoto ☐
4) Upande wa kifua ☐
5) Upande wa mgongo ☐

17. Je, wewe hufanya zoezi gani kati ya haya? (tafadhali jibu ipasavyo)

1) Kukimbia ☐ ☐mara kwa wiki

Muda kwa kila kipindi ☐ (masaa/dakika)
Kiwango (chagua moja): wastani ☐ au kiwango cha juu ☐

2) Kutembea ☐ ☐mara kwa wiki

Muda kwa kila kipindi ☐ (masaa/dakika) Kiwango (chagua moja): wastani ☐ au kiwango cha juu ☐

3) Kuogelea ☐ ☐mara kwa wiki

Muda kwa kila kipindi ☐ (masaa/dakika) Kiwango (chagua moja): wastani ☐ au kiwango cha juu ☐

4) Kukimbia upole ☐ ☐mara kwa wiki

Muda kwa kila kipindi ☐ (masaa/dakika)

Kiwango (chagua moja): wastani ☐ au kiwango cha juu ☐

5) Kazi ya shamba ☐ ☐mara kwa wiki

Muda kwa kila kipindi ☐ (masaa/dakika)

Kiwango (chagua moja): wastani ☐ au kiwango cha juu ☐

6) Kazi ya nyumba ☐ ☐mara kwa wiki

Muda kwa kila kipindi ☐ (masaa/dakika)

Kiwango (chagua moja): wastani ☐ au kiwango cha juu ☐

7) Kuendesha baisikeli ☐ ☐mara kwa wiki

Muda kwa kila kipindi ☐ (masaa/dakika)

Kiwango (chagua moja): wastani ☐ au kiwango cha juu ☐

8) Dansi ☐ ☐mara kwa wiki

Muda kwa kila kipindi ☐ (masaa/dakika)

Kiwango (chagua moja): wastani ☐ au kiwango cha juu ☐

9) Kuruka ☐ ☐mara kwa wiki

Muda kwa kila kipindi ☐ (masaa/dakika)

Kiwango (chagua moja): wastani ☐ au kiwango cha juu ☐

10) Zoezi nyingine_____ ☐mara kwa wiki

Muda kwa kila kipindi ☐ (masaa/dakika)

Kiwango (chagua moja): wastani ☐ au kiwango cha juu ☐

18. Je, ushawahi kufanyiwa biopsy ya shindano ya matiti? Ndio ☐ La ☐

Kama jibu ni ndio, umefanyiwa mara ngapi? _____

19. Je, biopsy ya matiti ilionyesha seli zisizokuwa za kawaida? Ndio ☐ La ☐ Sijui ☐

Kama jibu ni ndio, zilionyesha kwa muda gani? _____

Historia ya Hedhi

20. Ulikuwa na umri ngapi ulipopata hedhi yako ya kwanza? miaka _____
21. Je, bado huwa unapata hedhi? Ndio ☐ La ☐

Kama jibu ni la, andika umri yenye kipindi cha hedhi kilikoma _____

22. Je, bado unazo ovari zako? Ndio ☐ La ☐

Ni ovari zote zilitolewa? Ndio ☐ La ☐ Kama jibu ni ndio, andika umri wako zilipotolewa? _____

23. Je, unatumia au umetumia dawa (tiba ya homoni) ya kukabiliana na dalili za kumaliza kipindi cha hedhi na kuzaa? Ndio ☐ La ☐

    Kama jibu ni ndio, unatumia au umetumia kwa muda gani? _____

    Chakula

24. Tafadhali weka alama kwa chaguo bora kinachoelezea tabia yako ya kula

    Mimi hula aina nyingi ya nyama, maziwa, mayai, mboga na nafaka
    ☐

    Mimi hula kwa zaidi matunda, mboga, nafaka na nyama kiasi, maziwa ama mayai
    ☐

    Mimi hula matunda, mboga, nafaka, maziwa na mayai lakini sili nyama
    ☐

    Mimi hula matunda, mboga na nafaka lakini sili maziwa, mayai ama nyama
    ☐

    Nyingine (tafadhali elezea) _____

25. Ni mara ngapi wewe hula (tafadhali chagua jibu ipasayo na uandike ni mara ngapi):

	Kamwe	Kila siku	Kila wiki	Kila mwezi	Mara ngapi?
1)	Mboga zilizopikwa	☐	☐	☐	☐	_____
2)	Mboga zisizopikwa	☐	☐	☐	☐	_____

3) Juisi ya mboga					
4) Saladi ya matunda	☐	☐	☐	☐	_____
5) Juisi ya matunda	☐	☐	☐	☐	_____
6) Tunda nzima(ndizi)	☐	☐	☐	☐	_____
7) Nafaka	☐	☐	☐	☐	_____
8) Wali	☐	☐	☐	☐	_____
9) Maharagwe	☐	☐	☐	☐	_____
10) Ugali	☐	☐	☐	☐	_____
11) Githeri	☐	☐	☐	☐	_____
12) Uji	☐	☐	☐	☐	_____
13) Mkate	☐	☐	☐	☐	_____
14) Nyama nyekundu(ng'ombe)	☐	☐	☐	☐	_____
15) Nyama nyeupe(samaki)	☐	☐	☐	☐	_____
16) Maziwa	☐	☐	☐	☐	_____
17) Mtindi	☐	☐	☐	☐	_____
18) Mayai	☐	☐	☐	☐	_____
19) Jibini	☐	☐	☐	☐	_____
20) Siagi	☐	☐	☐	☐	_____
21) Chakula cha sukari (keki, biskuti)	☐	☐	☐	☐	_____
22) Chakula cha mafuta (vibanzi,maandazi)	☐	☐	☐	☐	_____

26. Swali hili linakusudia kuamua ni kiasi gani vya vyakula vifuatavyo unavyo tumia.

Kihudumio – ni kipimo kimoja cha chakula au kinywaji.

Tafadhali chagua kihudumio cha chakula unachokula kwa kila kipindi.(1 = kidogo, 2 = wastani, 3 = nyingi, 4 = nyingi zaidi),

1) Kikundi cha mboga (vihudumio 3-5 vilivyopendekezwa kwa siku)

	Kikombe¼(kidogo)	kik.½(wastani)	kik.1(nyingi)	vik.1½ (nyingi zaidi)
Mboga zilizopikwa	☐	☐	☐	☐
Mboga zisizopikwa	☐	☐	☐	☐
Juisi ya mboga	☐	☐	☐	☐

2) Kikundi cha matunda (vihudumio 2-4 vilivyopendekezwa kwa siku)

Saladi ya matunda	☐	☐	☐	☐
Juisi ya matunda	☐	☐	☐	☐
	Ndogo	wastani	kubwa	ngapi?
Tunda nzima(ndizi)	☐	☐	☐	☐

3) Kikundi cha nafaka (vihudumio 6-11 vilivyopendekezwa kwa siku)

	Kikombe¼(kidogo)	kik.½(wastani)	kik.1(nyingi)	vik.1½ (nyingi zaidi)
Wali	☐	☐	☐	☐

Maharagwe	☐	☐	☐	☐
Ugali	☐	☐	☐	☐
Githeri	☐	☐	☐	☐
Nafaka	☐	☐	☐	☐
Uji	☐	☐	☐	☐
	Kipande1	vipande2	vipande3	vipande4
Mkate	☐	☐	☐	☐

4) Kikundi cha Nyama (vihudumio 2-3 vilivyopendekezwa kwa siku)

	Wakia1 ½	wakia3	wakia6	wakia9
Nyama nyekundu (ng'ombe)	☐	☐	☐	☐
Nyama nyeupe (samaki)	☐	☐	☐	☐

5) Kikundi cha bidha za wanyama (vihudumio 2-3 vilivyopendekezwa kwa siku)

	Kikombe¼(kidogo)	kik.½(wastani)	kik.1(nyingi)	vik.1½ (nyingi zaidi)
Maziwa	☐	☐	☐	☐
Mtindi	☐	☐	☐	☐

Mayai ngapi?_____

	Wakia1 ½	wakia3	wakia6	wakia9

Jibini ☐ ☐ ☐ ☐

Kijiko kidogo1 kij. kidogo2 kij. kikubwa1 ½ kij. kikubwa2

Siagi ☐ ☐ ☐ ☐

6) Kikundi cha Chakula cha sukari (ilipendekezwa kutumiwa kwa haba)

Kikombe¼(kidogo) kik.½(wastani) kik.1(nyingi) vik.1½ (nyingi zaidi)

(keki, biskuti) ☐ ☐ ☐ ☐

7) Chakula cha mafuta (ilipendekezwa kutumiwa kwa haba)

Kikombe¼(kidogo) kik.½(wastani) kik.1(nyingi) vik.1½ (nyingi zaidi)

(vibanzi,maandazi) ☐ ☐ ☐ ☐

27. Je, umewahi kuvuta sigara? Ndio ☐ La ☐

Kama jibu ni ndio, umevuta kwa muda gani? _____ Sigara ngapi kwa siku _____

Jina ya sigara _____

28. Je, umewahi kutumia tumbako katika fomu nyingine? Ndio ☐ La ☐

Kama jibu ni ndio, tafadhali andika ni katika fomu gani haswa_____

29. Je, wewe hupumua moshi ta tumbako nyumbani ama kazini? Ndio ☐ La ☐

    Kama jibu ni ndio, umekuwa ukipumua kwa muda gani? (Tafadhali chagua moja)

    ☐ chini ya saa 1 kwa siku ☐ masaa 1-5 kwa siku ☐ zaidi ya masaa 5 kwa siku

30. Je,umewahi kunywa pombe? Ndio ☐ La ☐

    Kama jibu ni ndio, umekunywa kwa muda gani? _____

    Glasi ngapi kwa wiki _____ ama chupa ngapi kwa wiki_____

    Jina ya pombe _____

31. Je, ungependa tuwasiliane nawe baadaye kupitia simu, kuhusu afya yako ya matiti?
    La,Asante ☐ Ndio tafadhali ☐

    Kupitia nambari hii ya simu _____

Asante kwa kushiriki katika zoezi hili.