# RISK FACTORS ASSOCIATED WITH BREAST CANCER AMONG WOMEN IN TRANS-NZOIA COUNTY, KENYA, 2015

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# Risk Factors Associated with Breast Cancer among Women in Trans-Nzoia County, Kenya, 2015

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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…….....

**Davies Michael Opili**

This thesis has been submitted for examination with our approval as the University supervisors.

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## DEDICATION

I dedicate this work to my family members who have been very supportive throughout the whole period of my studies. They have always been morally, socially and financially supportive to me.

## ACKNOWLEDGEMENT

I give all the Glory to God for continued strength and good health during entire period of my research process and I express my sincere thanks to many individuals who supported me along the way during the research journey.

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## TABLE OF CONTENTS

## LIST OF TABLES

## LIST OF FIGURES

## LIST OF APPENDICES

## ABBREVIATIONS AND ACRONYMS

**AI/ANs** American Indians and Alaska Natives

**APIs** Asian Pacific Islanders

**BMC** BioMed Central

**BMI** Body Mass Index

**BRCA1** Breast cancer type 1

**BRCA2** Breast cancer type 2

**CBE** Clinical and self-breast examination

**CI** Confidence Interval

**CSA** Cancer Society of America

**DES** Diethylstilbestrol

**DNA** Deoxyribonucleic Acid

**EBCTCG** Early Breast Cancer Trialists Collaborative Group

**EBV** Epstein–Barr virus

**ER** Estrogen receptor

**FNA** Fine-needle aspiration

**GLOBOCAN** Global Cancer

**HIV** Human immunodeficiency virus

**HPV** Human papillomavirus

**HR+** Positive hormone receptor

| | |
|---|---|
| **HRT** | Hormone replacement therapy |
| **IARC** | International Agency for Research on Cancer |
| **JAMA** | Journal of the American Medical Association |
| **JNCI** | Journal of the National Cancer Institute |
| **KEMRI** | Kenya Medical Research Institute |
| **MRI** | Magnetic resonance imaging |
| **NCI** | National Cancer Institute |
| **NHANES** | National Health and Nutrition Examination Survey |
| **NHBs** | Non-Hispanic blacks |
| **NHWs** | Non-Hispanic whites |
| **NSAIDs** | Non-Steroidal Anti-Inflammatory Drugs |
| **NSU** | National Screening Unit |
| **OR** | Odds Ratio |
| **P53** | Tumor protein |
| **PLCO** | Prostate, Lung, Colorectal and Ovarian |
| **PR** | Progesterone receptor |
| **PRECAMA** | Premenopausal Breast Cancer in Latin American Women |
| **SBE** | Self-breast examination |
| **SEER** | Surveillance, Epidemiology, and End Results |
| **SPSS** | Statistical Package for the Social Sciences |

| | |
|---|---|
| **US** | United States |
| **USA** | United States of America |
| **WHI** | Women's Health Initiative |
| **WHO** | World Health Organization |

## DEFINITION OF OPERATIONAL TERMS

**Behavioral factors:** are behaviors such as dietary or way of living that determines how the body organs function.

**Breast cancer:** is a disease where cells divide abnormally without control and invade other tissues damaging the genetic material called Deoxyribonucleic Acid

**Hormonal factors:** are substances that when consumed or injected lead to a change in the level of hormones in the body

**Reproductive factors:** are reproduction related factors that influence hormone related cancers such as breast cancer in this case.

**Risk factor:** is any attribute, characteristic or exposure of an individual that increases the likelihood of developing a disease or injury

## ABSTRACT

Breast cancer is a disease where cells divide abnormally without control. Several risk factors for breast cancer have been well documented. Kenya is currently ranked as one of the countries with the highest breast cancer rates in Africa and affects about 34 out of every 100,000 people. The objective of this study was to identify the risk factors associated with breast cancer among women in Trans-Nzoia County; 2015.Thestudy investigated the socio demographic characteristics, reproductive, hormonal and behavioral risk factors. The study was conducted between January and December 2015. A cross sectional study design was used to study a population aged 18 years and above who visited the Obstetrics and Gynecology clinic in Kitale District Hospital and were totaling to 360. A sample size of 150 was obtained using fisher's formula and simple random sampling used to select respondents. Data collection was conducted using a questionnaire administered to the respondents. Descriptive statistics and binary logistic regression analysis was used. The study found that the risk of breast cancer increases with age, never breastfed children and had consumed alcohol. The study found that age ($x^2$= 1.714), never breastfed($x^2$= 1.102, p=0.007) were statistically significant. The findings further revealed that alcohol consumption was statistically significant ($x^2$= 101.25, p=0.000) so to average daily alcohol consumption ($x^2$= 102.077, p=0.000).The study concluded that age of a woman was statistically significant with presence of breast cancer. It also concluded that reproductive, hormonal and behavioral risk factors were statistically significant in relationship with breast cancer presence. The study recommends women to breast feed children or at least 6 months, be periodically screened for breast cancer, avoid alcohol and smoking cigarette. The study recommended to the county Government to make breast cancer services accessible and affordable to the community and other researchers to carry out further research on breast cancer.

# CHAPTER ONE

# INTRODUCTION

This section provided background information of the topic, the problem statement and the justification of the study. The section also highlighted the research questions, the main objective and the specific objectives

## 1.1 Background information

Worldwide, breast cancer is the leading type of cancer in terms of the number of new cases; Approximately 2.1 million diagnoses were estimated in 2018, contributing about 11.6% of the total cancer incidence burden. Breast cancer is also ranked among the top five cancer types in terms of mortality and among the top three cancer types in terms of incidence. (WHO, 2018). The disease is the most frequently diagnosed cancer in the vast majority of the countries (154 of 185) and is also the leading cause of cancer death in over 100 countries. The main exceptions are Australia/New Zealand, Northern Europe, Northern America (where it is preceded by lung cancer), and many countries in Sub-Saharan Africa (because of elevated cervical cancer rates). Breast cancer incidence rates are highest in Australia/New Zealand, Northern Europe (the United Kingdom, Sweden, Finland, and Denmark), Western Europe (Belgium, with the highest global rates], the Netherlands, and France), Southern Europe (Italy), and Northern America. In terms of mortality, breast cancer rates show less variability, with the highest mortality estimated in Melanesia, where Fiji has the highest mortality rates worldwide.

Overall breast cancer death rates increased by 0.4% per year from 1975 to 1989, but since have decreased rapidly, for a total decline of 39% through 2018. As a result, 322,600 breast cancer deaths have been averted in US women through 2018. The decrease occurred in both younger and older women, but has slowed among women younger than 50 since 2007. From 2006 through 2018, breast cancer death rates declined annually by 2.6% in American Indians and Alaska Natives (AI/ANs), 1.8% in non-

Hispanic white (NHWs), 1.5% in non-Hispanic blacks (NHBs), 1.4% in Hispanics, and 0.9% in Asian Pacific Islanders (APIs) (Howlader *et al.*, 2016). Notably, the decline among AI/AN women began in 2005, more than a decade later than other racial and ethnic groups.

The decline in breast cancer mortality has been attributed to both improvements in treatment and early detection (Berry *et al*, 2015). However, not all women have benefited equally, as indicated by the striking divergence in mortality trends between black and white women beginning in the early 1980s. This disparity likely reflects a combination of factors, including differences in stage at diagnosis, obesity and comorbidities, and tumor characteristics, as well as access, adherence, and response to treatment (Iqbal *et al.,* 2015; Roberts *et al.*, 2015).It may also reflect differences in mammography screening. Although findings from national surveys indicate current screening rates are similar between black and white women, these estimates likely overestimate mammography rates, especially for blacks (Allgood *et al.*, 2014; Njai *et al.*, 2011). As treatment for breast cancers has improved, the racial disparity widened; in 2015, breast cancer death rates were 39% higher in black than white women.

Based on the most recent data, relative survival rates for women diagnosed with breast cancer are: 91% at 5 years after diagnosis, 86% after 10 years and 80% after 15 years. Breast cancer survival varies by stage at diagnosis. The overall 5-year relative survival rate is 99% for localized disease, 85% for regional disease, and 27% for distant-stage disease.17 Survival within each stage varies by tumor size. For example, among women with regional disease, the 5-year relative survival is 95% for tumors less than or equal to 2.0 cm, 85% for tumors 2.1-5.0 cm, and 72% for tumors greater than 5.0 cm. 31 (Cronin *et al.*, 2017).

While there remains a substantial gap, especially for late-stage diagnoses, the racial disparity seems to be narrowing. In the most recent period, the 5-year relative survival rate was 83% for black women and 92% for white women. The racial disparity in survival reflects later stage at diagnosis and poorer stage-specific survival in black

women as well as higher rates of more aggressive, triple negative breast cancer (CSA, 2018).

### 1.2.1 Global situation of breast cancer

In the United States, breast cancer is the second most common cancer diagnosed among women accounting for nearly 1 in 3 cancers. It is also the second leading cause of cancer death among women after lung cancer (DeSantis *et al.*, 2014). Meister and Morgan (2016) identified the risk factors for breast cancer to include dietary and exercise habits which can be modified, age, gender, or family history, which are not modifiable among women in America. Other speculated risk factors for breast cancer among women in America were; early age at menarche late age at menopause, late age at first full-term pregnancy, postmenopausal obesity, high-dose exposure to ionizing radiation early in life, ever having been pregnant, having only one pregnancy rather than many, not breast feeding after pregnancy, use of postmenopausal estrogen replacement therapy or postmenopausal hormone (estrogen/progestin) replacement therapy, use of oral contraceptives, prescribed diethylstilbestrol (DES), certain specific dietary practices (high intake of fat and low intakes of fiber, fruits, and vegetables), alcohol consumption, tobacco smoking, abortion, breast augmentation, low intake of phytoestrogens (estrogens from plant sources), and non-use of Non-Steroidal Anti-Inflammatory Drugs (NSAIDs).

Literature indicate that in New Zealand, breast cancer among women is affected by past history of breast cancer, selected precursor lesions of breast cancer and increased breast density (Weir *et al.*, 2017). This systematic review was conducted to estimate the level of increased breast cancer among women with defined risk factors as requested by the National Screening Unit (NSU), Ministry of Health. These risk factors included: previous breast cancer, at-risk lesions such as atypical ductal hyperplasia, lobular carcinoma in situ, lobular hyperplasia and sclerosingadenosis, increased breast density, childlessness, early menarche, postmenopausal obesity, exogenous hormone use, dietary factors and alcohol.

### 1.2.2 Regional situation of breast cancer

In East Africa, the breast cancer incidence rate estimate is 19.3 per 100,000 women (Ferlay *et al.,* 2015).Morse *et al.,* (2014) asserted that among women on Tanzania, limited disease awareness impact breast cancer stage-at-diagnosis. Among 225 respondents, 98.2% knew of breast cancer; 22.2% knew someone affected by breast cancer. On average, 30% of risk factors and 51% of symptoms were identified. Among 126 aware of breast self-exam, 40% did not practice it; only 0.9% underwent regular clinical breast examinations despite 68% being aware of the procedure. Among treatments, 87% recognized surgery, 70% radiation, and fewer systemic therapy. Preferred educational sources were group sessions, television/radio, and meetings with breast cancer survivors.

In Uganda, Galukande *et al.,* (2016) acknowledged that although in Uganda women have a lower incidence of breast cancer than in Canada, the USA, and Western Europe, the disease rate is rising steeply; it has nearly tripled in a short period of time from 11 per 100,000 in 1962 to 31 per 100,000 in 2016, and it is predicted to become the commonest non-HIV-related malignancy among Ugandan women within less than a decade.

### 1.2.3 Kenyan perspective of breast cancer

Breast cancer is the most prevalent cancer among Kenyan women, and constitutes a major public health problem (WHO, 2016). Although definite data are lacking for Kenya, estimates indicate that breast cancer accounts for about 23% of all cancers in the country Republic of Kenya Ministry of Public Health and Sanitation and Ministry of Medical Services (2017).Further, Eber-Schulz *et al.,* (2018) argued that of African countries, Kenya has among the highest risk of breast cancer. Breast cancer incidence and mortality rates also have increased significantly since 1980 rates.

In Trans-Nzoia County, crude data from health information system registry in 2015 showed breast cancer to be the second common female cancer after cervical cancer (16.4%) and (6%) respectively. This was a two year unpublished report covering July 2013 and June 2015(Cancer registers, Kitale District Hospital). These findings also concur with Kenya medical research institute report on newly diagnosed of breast cancer in health facilities (Mutuma & Korir, 2006). But discussions with clinicians indicate that this is underestimated due to lack of efficient population based data.

### 1.3 Diagnosis of breast cancer

The symptoms of breast cancer are a lump or mass, often painless, in the breast. Other symptoms and sign include breast discomfort, changes in structure of the breast/nipple, skin puckering or dimpling, redness on breast skin and clear or bloody fluids discharging from the nipple. Breast cancer is diagnosed by triple-diagnostics which refers to the triad of clinical breast examination, mammography, and biopsy (Parthasarathy & Rathnam, 2014). Breast imaging techniques like ultrasound and magnetic resonance imaging (MRI), may also be used as complements to mammography only among woman with high mammography density (Lokate *et al.*, 2013).

A breast biopsy is a test that removes tissue or sometimes fluid from the suspicious area. The removed cells are examined under a microscope and further tested to check for the presence of breast cancer. A biopsy is the only diagnostic procedure that can definitely determine if the suspicious area is cancerous. (NCI, 2018).Three types of biopsies exist: fine-needle aspiration, core-needle biopsy and surgical biopsy. In most cases, a fine needle aspiration is chosen when the lump is likely to be filled with fluid. If the lump is easily accessible or if the doctor suspects that it may be a fluid-filled cystic lump, the doctor may choose to conduct a fine-needle aspiration (FNA). During this procedure, the lump should collapse once the fluid inside has been drawn and discarded (Calhoun & Anderson, 2014). Core needle biopsy is the procedure to remove a small amount of suspicious tissue from the breast with a larger core (meaning hollow) needle. It is usually performed while the patient is under local anesthesia, meaning the breast is

numbed. As with a core-needle biopsy, a surgical biopsy is done while the patient is under local anesthesia. Typically, this test is performed in a hospital setting where an IV and medications are administered to make the patient drowsy (Wang, 2017).

### 1.3.1 Breast cancer screening

Breast cancer screening refers to testing otherwise-healthy women for breast cancer in an attempt to achieve an earlier diagnosis under the assumption that early detection will improve outcomes. A number of screening test have been employed including self-breast examination (SBE) clinical and self-breast examination (CBE**)** and mammography (Colditz *et al.*, 2015). Self-breast examination is a simple, quick examination done by the client herself that improves breast self-awareness and allows individuals who detect breast lumps early, to present to clinicians in good time for treatment when chance of complete cure is greater and done monthly at age above 20 years (Smith *et al.,* 2016).

Clinical breast examination is performed by a trained and skilled health care provider and it includes taking a detailed history and conducting a physical examination. During CBE the provider inspects the skin for changes and swellings, tethering of breast on the chest wall, palpates for lumps, checks for nipple discharge and advice clients on the next step. A suspicious lump or bloody nipple discharge requires additional evaluation by mammography or ultrasonography fine needle aspiration and cytology, individual less than 45 years be done every year and above 45 years after every two (2) years (Anderson *et al.,* 2013).

## 1.4 prevention and treatment of breast cancer

Breast cancer treatment includes local and systemic therapies. Surgery is one form of local therapy and is the primary treatment of breast cancer. Surgery is performed to remove the tumor and some surrounding tissues (breast-conserving surgery or partial mastectomy) or to remove the entire breast (total mastectomy).Varies factors are

considered to decide the type of surgery, including the size and location of the cancer, tumor stage, and if the patient can tolerate radiation therapy. Radiation is another form of local therapy, which is given to the residual breast tissue of a woman undergoing breast-conserving surgery in order to reduce the risk of local recurrence (Clarke *et al.,* 2015).

Although medical treatments may not be able to cure advanced cancer, some treatments may still be able to slow its growth or spread, sometimes for months or even years. Palliative care help manage cancer symptoms, which may include pain, and can reduce side effects from cancer treatments (Campion *et al.*, 2015). Palliative care involves a range of services offered by medical, nursing and allied health professionals, as well as volunteers and careers. It focuses on providing relief from the symptoms and stress of a serious illness whatever the diagnosis. The goal is to improve quality of life for both the patient and the family (Buss *et al.*, 2017).

The aim of prevention is to reduce the incidence of breast cancer by controlling exposure to establish its risk factors. However, reproductive related risk factors like advanced maternal age of first birth are not amenable in modern societies. Breast cancer prevention strategies have been restricted to established modifiable risk factors like physical activity, alcohol intake and use of exogenous hormones (oral contraceptives and hormone therapy) (Aresvik, 2016).

### 1.5 Statement of the problem

Kenya is currently ranked as one of the countries with the highest age specific rate of breast cancer in Africa (Bray *et al*, 2018). Breast cancer ranks as the fifth cause of death from cancer overall and it is the most frequent cause of cancer death in women in Kenya. This trend has been attributed to a change in the occurrence of established breast cancer risk factors that favours rising incidence. Further, breast cancer in the leading cancer in Kenya affecting 34 out of every 100,000 people (Ministry of Health, 2017).

Despite this trend in increase in breast cancer among women, most women do not understand the risk factors that contribute to breast cancer. More so, very few studies have been conducted on the topic therefore limited information about the risk factors for breast cancer among women. Most of these studies have been conducted in other countries (Chaubey & Walvekar, 2018; Das, Sen, Mukherjee, *et al*, 2012 and Vidya *et al.*, 2018) and therefore there is need to test the findings within Kenya. This study therefore sought to address this problem by investigating the risk factors for breast cancer among women of Trans-Nzoia County, Kenya.

### 1.6 Justification for the study

This study is importance as it might provide information on the risk factors associated with of breast cancer in Trans-Nzoia County. In availing this information, the county government might able to come up with policies that will aim at encouraging residents to be screened and treated for breast cancer. The government might also provide policies and programmes that aim at avoiding risk factors that are avoidable to reduce the incidences of breast cancer in the county.

The findings may also benefit the residents of Trans-Nzoia County be able to understand the risk factors of breast cancer. In doing so, they will be encouraged to avoid such behavioral practices that lead to breast cancer. They will also be encouraged to undergo regular breast cancer screening that aid in early detection of the disease. This will reduce the cost of breast cancer treatment if detected at an advanced stage.

### 1.7 Research questions

The research questions of the study were;

1) What are the socio demographic characteristics of respondents and how do they contribute to breast cancer among women in Trans-Nzoia County?
2) What reproductive factors contribute to breast cancer among women in Trans-Nzoia-County?

3) What are the hormonal factors that contribute to breast cancer among women in Trans-Nzoia County?
4) How do behavioral factors contribute to breast cancer among women in Trans Nzoia-County?

### 1.8 Main objective

The main objective of the study was to identify the risk factors associated with breast cancer among women of Trans-Nzoia County, 2015

#### 1.8.1 Specific objectives

The specific objectives of the study were;

1. To assess the socio demographic characteristics respondents and how they contribute to breast cancer among women in Trans-Nzoia County, 2015.
2. To determine the reproductive factors contributing to breast cancer among women in Trans-Nzoia County, 2015.
3. To assess the hormonal factors contributing to breast cancer among women in Trans-Nzoia County, 2015.
4. To evaluate the behavioral factors contributing to breast cancer among women in Trans-Nzoia County, 2015.

# CHAPTER TWO

# LITERATURE REVIEW

## 2.1 Background

Breast cancer is a disease where cells divide abnormally without control and invade other tissues damaging the genetic material called Deoxyribonucleic Acid (DNA) (Mandal & Banerjee, 2015). The majority of these tumors arise from the glandular tissue of the breast, or what is known as lobules, and also from the ducts that connect these lobules to the nipple (CSA, 2015). The differences in breast cancer incidence between developed and developing countries can partly be explained by dietary effects combined with later first childbirth, lower parity, and shorter breastfeeding (Peto, 2017). The increasing adoption of western life-style in low- and middle-income countries is an important determinant in the increase of breast cancer incidence in these countries.

The exact cause of Breast cancer is unknown but research recognize many risk factors such as positive family history, genetics, age, sex, alcohol consumption, cigarette smoking among others and are broadly classified as modifiable and non-modifiable. Other factors associated with increased breast cancer incidence include increased life expectancy, reduction in competing risk of mortality from infections, change in reproductive patterns, and changes in lifestyles (Naanyu *et al.,* 2015).

Several risk factors for breast cancer have been well documented. However, for the majority of women presenting with breast cancer it is not possible to identify specific risk factors (IARC, 2018). A familial history of breast cancer increases the risk by a factor of two or three. Some mutations, particularly in BRCA1, BRCA2 and p53 result in a very high risk for breast cancer. However, these mutations are rare and account for a small portion of the total breast cancer burden. Reproductive factors associated with prolonged exposure to endogenous estrogens, such as early menarche, late menopause, late age at first childbirth are among the most important risk factors for breast cancer.

Exogenous hormones also exert a higher risk for breast cancer. Oral contraceptive and hormone replacement therapy users are at higher risk than non-users. Breastfeeding has a protective effect (Lacey *et al*., 2016).

Generally, the risk factors for breast cancer can be broadly categorized into four types: behavioral risk factors that include tobacco use, harmful use of alcohol, unhealthy diet and physical inactivity; biological risk factors that include overweight, obesity, age, sex of the individual; environmental risk factors include exposure to environmental carcinogens such as chemicals agents  Certain viruses (Hepatitis B & C, HPV, EBV, HIV), bacteria and parasites; and genetic risk factors (MOH, 2017).

The detection of breast cancer is usually done through a screening examination, even before symptoms develop, or when the patient feels a lump in the breast. Typically, most of the breast masses can be seen on a mammogram, and the majority of breast lumps are found to be benign, which means that they are not cancerous, they do not grow out of control, or metastasize to other parts of the body, in other words, they are not life-threatening. To determine whether a lump is cancerous or not, a tissue biopsy is needed for microscopic analysis to reach a definitive diagnosis about the lump, the extent of spread, characters, and type of the lump. There are two ways to obtain the tissue biopsy for microscopic analysis, either by using fine needle aspiration or by surgical biopsy, and the decision to use either depends on the individual clinical factors and the availability of biopsy devices and resources (American Cancer Society, 2016).

So far the only breast cancer screening method that has proved to be effective is mammography screening. Mammography screening is very costly and is cost-effective and feasible in countries with good health infrastructure that can afford a long-term organized population-based screening programmes. Low-cost screening approaches, such as clinical breast examination, could be implemented in limited resource settings when the necessary evidence from ongoing studies becomes available (WHO, 2018).

## 2.2 Socio demographic characteristics of respondents

### 2.2.1 Age

According to Nuzhat and Abouzaid (2017), the risk of getting breast cancer increases with age. Nuzhat and Abouzaid (2017) found that 1.44% and 3.46% of women who are 40 and 60 years old respectively, will get breast cancer. Noone *et al.* (2017) further asserted that most breast cancers develop in older women; from 2002 to 2006, the median age at the time of breast cancer diagnosis was 61 years. Another study suggested that about 50% of breast cancers occur in women ≥65 years of age and >30% of breast cancers occur in women >70 years of age (Carey *et al.*, 2016).

Boyle and Levin (2018) argued that the risk of breast cancer development is increases with age and common in premenopausal and postmenopausal women greater incidence has been reported in premenopausal African American women, compared to Caucasian Americans).A woman is more than 100 times likely to develop breast cancer in her 60s than in her 20s (Margolese *et al*., 2014).

### 2.2.2 Level of education

A study conducted by Hussain *et al.* (2018) indicated that compared to women completing less than 9 years of education, university graduates were more likely to be diagnosed with breast cancer. Further, study revealed that compared to women completing less than 9 years of education, university graduates were associated with the highest survival following a breast cancer diagnosis. Other studies have reported a positive association between a high level of education and breast cancer risk (Gordon, 2015; Heck & Pamuk, 2017; Hemminki & Li, 2013; Pukkala & Weiderpass, 2016; Tavani *et al*., 2017).

On the other hand, some studies have reported inconsistent findings. In Norway, studies found no association between education and breast cancer survival (Lund & Jacobsen,

2014), while other studies report increased survival associated with higher (Carter *et al.*, 2018) or lower levels of education (Heck *et al.*, 2017).

### 2.2.3 Marital status

Hinyard *et al.* (2017) in their study on the effect of marital status on breast cancer-related outcomes in women under 65, established that unmarried women were 1.18 times more likely to be diagnosed at a later stage than married women. In adjusted analysis unmarried women were more likely to die of breast cancer. Further, Martínez *et al.* (2017) found that unmarried breast cancer patients have higher total mortality than married patients; the association varies by race/ethnicity, tumor subtype. Kato *et al.* (2014) on the other hand for no association between marital status and risk of breast cancer. Among the cases, studies, no increase in risk of breast cancer was established among the married or single women.

### 2.2.4 Work status

Timperi *et al.* (2013) found that employment status can affect quality of life and mortality in breast cancer survivors. Rix *et al.* (2017) established that Professionals, salaried employees and unskilled workers all had a slightly increased breast cancer risk. The risk of breast cancer was significantly increased in several groups of professionals such as lawyers, medical doctors, dentists and physiotherapists, nurses and clerks, but in only 2 groups of blue-collar workers: skilled tobacco workers and bookbinders.

With employment rates above 60% for women in the Netherlands, a large proportion of women diagnosed with breast cancer before age 55 is working. For those confronted with cancer, work offers a sense of control in insecure times (Islam *et al.*, 2014). Moreover, work gives meaning to life, may provide distraction from the disease and is positively associated with quality of life (Spelten *et al.*, 2015).

## 2.3 Reproductive risk factors

A study was conducted by Khalis *et al.* (2018) to determine the relationship between reproductive factors and breast cancer in Moroccan Women. This study found that early menarche and nulliparity significantly increased the risk of breast cancer while early age at first full term pregnancy reduced the risk of breast cancer significantly.

Kapil *et al.* (2014) also investigated the reproductive risk factors for breast cancer. The study found that age at first child birth, age at menarche and age at menopause are associated with the risk of breast cancer. Reproductive factors are known risk factors for breast cancer that probably act early in life. They point toward endogenous estrogens as likely player in the initiation, progression, and promotion of breast cancer

Gao *et al.* (2015) evaluated the association between reproductive factors with breast cancer in China. The study found that earlier menarcheal age, nulliparity, and later age at first live birth were associated with increased risk of breast cancer among both pre- and post-menopausal women, while never having breast-fed and later age at menopause were associated with elevated risk only among post-menopausal women.

Romieu *et al.* (2018) examined the relationship between reproductive factors and breast cancer subtypes. Older age at first full-term pregnancy, longer time between menarche and first full-term pregnancy and older age at last pregnancy were associated with an increased risk of estrogen receptor positive (ER+) tumors. Ever pregnant, number of childbirths and history of breastfeeding were inversely associated with the risk of ER+ tumor. Older age at menarche and longer duration of breastfeeding were inversely associated with estrogen receptor negative (ER-) tumors.

### 2.3.1 Pregnancy

Having a first child before age 35 and having a greater number of children is associated with decreased risk of HR+ breast cancer (Lambertini *et al.*, 2016) In contrast, there appears to be a transient increase in HR- breast cancer risk (lasting about 10 years)

following a full-term pregnancy, particularly among women who are older at first birth (Albrektsen *et al.*, 2015). Razif *et al.* (2017) sought to determine the reproductive for breast cancer risk in Kuala Lumpur, Malaysia and found that breast cancer was strongly related to parity and number of live births.

Several epidemiological studies have concluded that null parity, and delayed childbearing were associated with an increased risk for receptor-positive breast cancer, but not with receptor-negative breast cancer (Althuis *et al.,* 2014; Habel & Stanford, 2013; Stanford & Greenberg, 2018). However, in the prospective data from the Nurses' Health Study, the adverse effect of nulliparity was confined to $ER^+PR^+$ breast cancer and the adverse effect of delayed childbearing was observed for $ER^-$ $PR^-$ but not $ER^+PR^+$ breast cancer (Colditz *et al.*, 2014).

### 2.3.2 Age at menarche

Breast cancer risk increases slightly for each year earlier menstruation begins (by about 5%) and for each year later menopause begins (by about 3%) (Collaborative Group on Hormonal Factors in Breast Cancer, 2012).For example, breast cancer risk is about 20% higher among girls who begin menstruating before age 11 compared to those who begin at age 13. Likewise, women who experience menopause at age 55 or older have about a 12% higher risk compared to those who do so between ages 50-54.The increased risk may be due to longer lifetime exposure to reproductive hormones and has been more strongly linked to HR+ breast cancer than other subtypes (Anderson *et al.*, 2014).

### 2.3.3 Breast feeding

Most studies suggest that breastfeeding for a year or more slightly reduces a woman's overall risk of breast cancer, with longer duration associated with greater risk reduction (Faupel-Badger *et al.*, 2012). In a review of 47 studies in 30 countries, the risk of breast cancer was reduced by 4% for every 12 months of breastfeeding (Collaborative Group on Hormonal Factors in Breast Cancer, 2014). One possible explanation for this effect

may be that breastfeeding inhibits menstruation, thus reducing the lifetime number of menstrual cycles (Britt *et al.*, 2017). Another possible explanation relates to structural changes that occur in the breast following lactation and weaning (Faupel-Badger *et al.*, 2012).The protective effect may be stronger for or even limited to triple negative cancers (Sisti *et al.*, 2016).

### 2.4 Hormonal risk factors

It has been well documented that estrogen and progesterone are important in breast tumorigenesis (Bernstein & Ross, 2013; Henders *et al.*, 2014; Key & Pike, 2018) and their effects on the breast are mediated by their respective receptors, the estrogen receptor (ER) and the progesterone receptor (PR) (Gorski & Gannon 2016). Furthermore, it has been hypothesized that hormone-related risk factors that reflect exposure to estrogen and progesterone may be predominantly associated with breast tumors that express ER and PR, but not with those lacking ER and PR expression (Hildreth *et al.*, 2013).

Ma *et al.* (2006) evaluated the hormone related risk factors for breast cancer among women aged less than 50 years. The study identified such factors as age at menarche, pregnancy history, duration of breastfeeding, body mass index, combined oral contraceptive use, and alcohol consumption. The study found that the number of full-term pregnancies and recent alcohol consumption affect breast cancer risk in younger women predominantly through estrogen and progesterone mediated by their respective receptors. Late age at menarche and breastfeeding may act through different hormonal mechanisms.

#### 2.4.1 Hormone replacement therapy

Recent use of menopausal hormones (also referred to as hormone therapy or hormone replacement therapy) with combined estrogen and progestin increases the risk of breast cancer, with higher risk associated with longer use (Chlebowski *et al.*, 2013; Manson *et*

*al*, 2013). Risk is also greater for women who start hormone therapy soon after the onset of menopause compared to those who begin later (Beral *et al.*, 2017). Although discontinuation of hormone use diminishes breast cancer risk, some increase in risk seems to persist (Chlebowski *et al.*, 2015). The increased risk associated with estrogen and progestin therapy may be largely due to increased mammographic density (Boyd *et al.*, 2017).

Research shows that taking hormone replacement therapy (HRT) for a long time increases the risk of breast cancer. This is especially true for HRT that uses estrogen plus progestin (called combined HRT) (Colditz *et al.*, 2013). Jones *et al.* (2016) found that users of combined HRT for 5 years or longer have a higher risk for breast cancer. Roehm (2015) showed the risk for breast cancer went up by about 1% for every year that women took estrogen alone and about 8% for every year that they took combined HRT. The study also found that the risk was increased even with comparatively short-term use of combined HRT compared to a placebo. The higher risk appears to disappear a few years after stopping HRT.

The WHI study also showed that there was a significant drop in the rate of new cases of breast cancer from 2002 to 2004 among Canadian women aged 50–69 years. This drop coincided with a drop in combined HRT use. This trend was also seen in a number of other countries around the world, including the United States, Australia, Germany, the Netherlands, Switzerland and Norway (De *et al.,* 2016).

Xie *et al.* (2018) explored the racial differences in reproductive factors for breast cancer among women aged 55-74. Oral contraceptive use, advanced age at natural menopause were associated with increased risk of breast cancer in non-Hispanic Caucasians group. Long term use of menopausal hormone therapy (more than five years) was associated with increased risk of breast cancer in both of the non-Hispanic Caucasian group and the non-Hispanic Asian/Pacific Islander. Hispanics who tried to become pregnant for a year or more had increased risk of breast cancer than their counterparts without difficulty in

getting pregnancy. In addition, surgery induced menopause was found to be a protective factor for breast cancer in non-Hispanic Caucasian

### 2.3.2 Hormonal birth control- oral contraceptives

Studies suggest that recent use of oral contraceptives (combined estrogen and progesterone) is associated with a small increase in breast cancer risk, particularly among women who begin use before 20 years of age or before first pregnancy (Bassuk & Manson, 2015). Risk appears to diminish when women stop use, and after about 10 years, is similar to those who have never taken oral contraceptives. Most of this research considered high-dose estrogen formulations, which were more common in the past.

## 2.5 Behavioralrisk factors

### 2.5.1 Obesity

Postmenopausal breast cancer risk is about 1.5 times higher in overweight women and about 2 times higher in obese women than in lean women (La Vecchia *et al.,* 2017). This is likely due, in part, to higher estrogen levels because fat tissue is the largest source of estrogen in postmenopausal women, but may also be related to other mechanisms, including the higher levels of insulin among obese women (Gunter *et al.,* 2015; Picon-Ruiz *et al.*, 2017).) Obesity is a risk factor for type II diabetes, which has also been linked to increased risk for postmenopausal breast cancer (Tsilidis *et al.*, 2015).

### 2.5.2 Physical exercise

Women who get regular physical activity have a 10%-20% lower risk of breast cancer compared to women who are inactive (Pizot *et al.*, 2016). A greater reduction in risk is associated with increasing amounts of exercise and more vigorous activity; however, even smaller amounts of exercise, including walking, appear beneficial (Hildebrand *et al.*, 2013). An American Cancer Society study that included more than 73,000 postmenopausal women found that breast cancer risk was 14% lower among women

who reported walking 7 or more hours per week compared to women who walked 3 or less hours per week. The benefit may be due to the effects of physical activity on systemic inflammation, hormones, and energy balance (Neilson *et al.*, 2018; Pizot *et al.*, 2016).

### 2.5.3 Alcohol consumption

Numerous studies have confirmed that alcohol consumption increases the risk of breast cancer in women by about 7%-10% for each 10g (roughly one drink) of alcohol consumed per day on average(Liu *et al.*, 2015). Women who have 2-3 alcoholic drinks per day have a 20% higher risk of breast cancer compared to non-drinkers. There is also evidence that alcohol consumption before first pregnancy may particularly affect risk (Jayasekara *et al.*, 2016). One of the mechanisms by which alcohol increases risk is by increasing estrogen and androgen levels (Singletary & Gapstur, 2017). Alcohol use appears more strongly associated with increased risk for HR+ than HR- breast cancers (Jung *et al.*, 2015).

### 2.5.4 Cigarette smoking

Accumulating research indicates that smoking may slightly increase breast cancer risk, particularly long-term, heavy smoking and among women who start smoking before their first pregnancy (Courtney, 2015; Dossus *et al.*, 2017; Gaudet *et al.,* 2013; Macacu *et al.,* 2015; White *et al.*, 2017). The 2014 US Surgeon General's report on smoking concluded that there is suggestive but not sufficient evidence that smoking increases the risk of breast cancer (Courtney, 2015) A review by American Cancer Society researchers found that women who initiated smoking before the birth of their first child had a 21% higher risk of breast cancer than women who never smoked (Gaudet *et al.*, 2013). Some studies suggest secondhand smoke may increase risk, particularly for premenopausal breast cancer (Dossus *et al.*, 2017; Macacu *et al.*, 2015).

## 2.6 Conceptual framework

A conceptual framework represents the researcher's synthesis of literature on how to explain a phenomenon. It maps out the actions required in the course of the study given his previous knowledge of other researchers' point of view and his observations on the subject of research (Regoniel, 2015). Figure 2.1 presents the conceptual framework of the study.

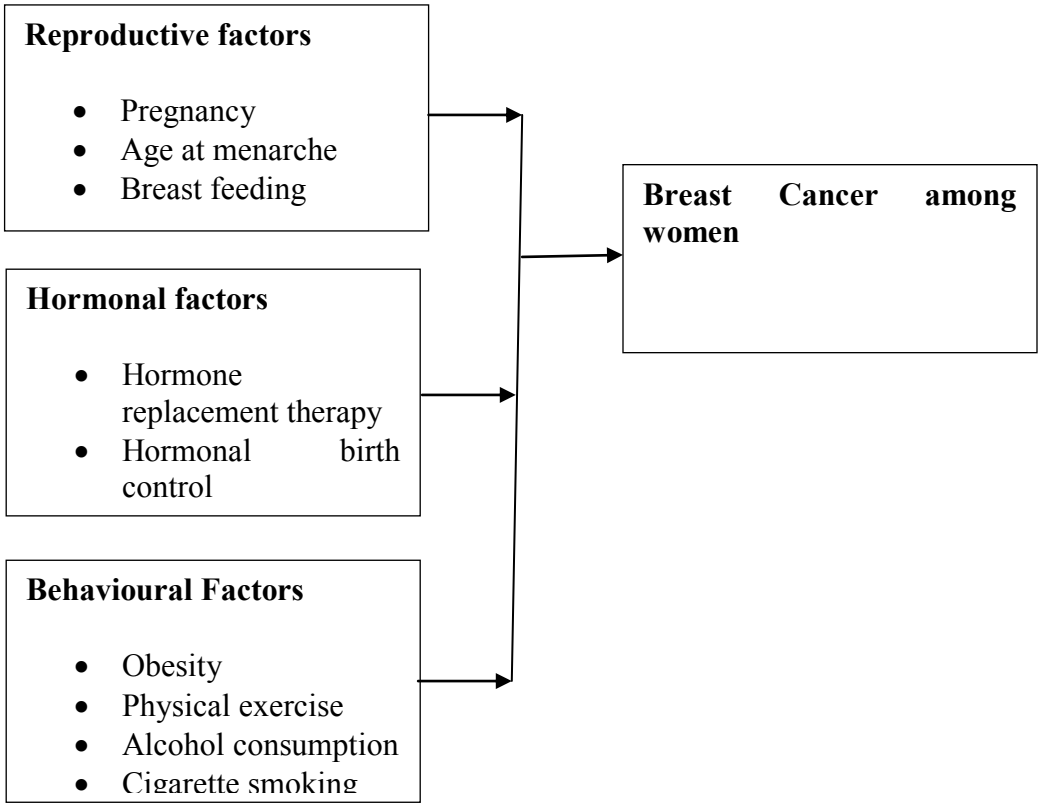


**Figure 2.1: Conceptual framework**

# CHAPTER THREE

# METHODOLOGY

## 3.1 Introduction

This section provided information on the methodology used in conducting this study. The chapter introduced the study site, explained the research design that was adopted, the inclusion and exclusion criteria for the study population, the determination of sample size, sampling procedure, data collection instruments and method of data and analysis and management. The chapter also provided and study variables, the ethical consideration and limitations and assumptions.

## 3.2 Study site

The study was conducted in Trans-Nzoia County, Kenya. Trans-Nzoia County lies on the western side of Mount Elgon in the former Rift Valley province, some 380 km north west of Nairobi. The county borders Bungoma to the west, Uasin-Gishu and Kakamega to the south, Elgeyo Marakwet to the east, West Pokot to the north and the republic of Uganda to North West. Trans-Nzoia covers an area of 2495.5 square kilometres. Trans-Nzoia County population is 818757 people. There are about 78 health institutions in Trans-Nzoia County - 1 District Hospitals, 2 Sub-District Hospitals and 33 Dispensaries. The county has 7 health centers, 28 medical clinics and about 6 nursing homes. Among the notable health facilities include Kitale District Hospital and Kapsara sub District Hospital.

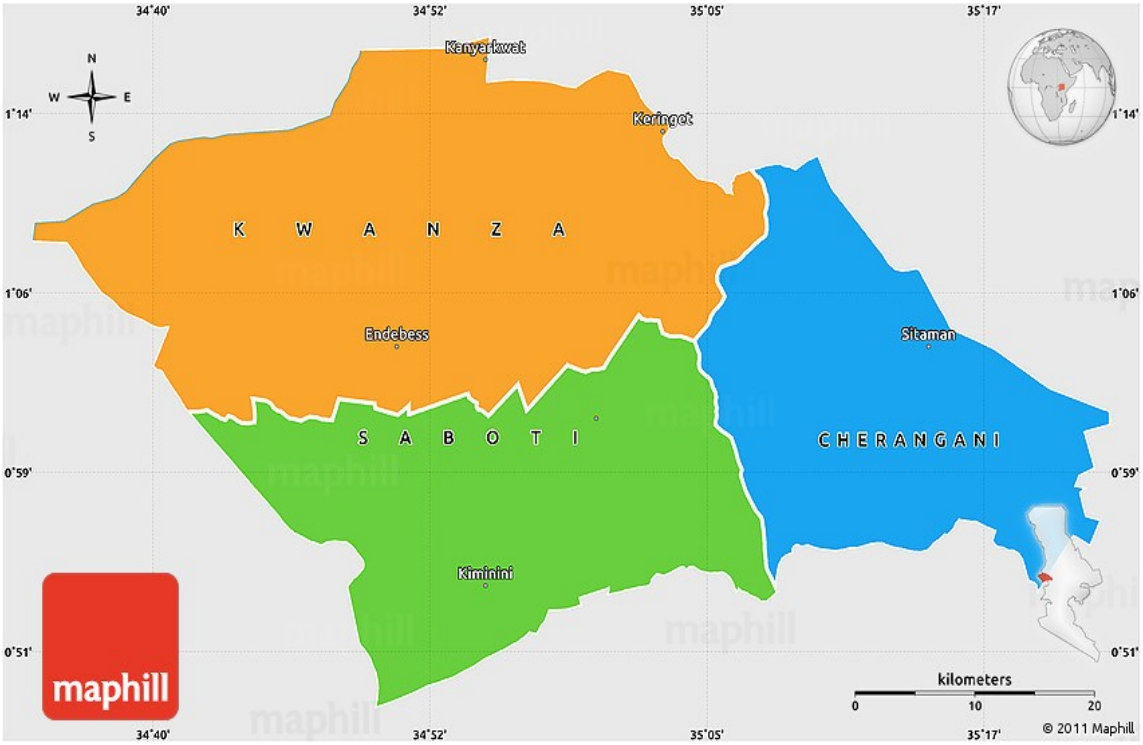


**Figure 3.1: Map of Trans-Nzoia County**

### 3.3 Study design

The study adopted across sectional research design. Cross sectional research design is a type of observational study that analyzes data from a population, or a representative subset, at a specific point in time. The design was therefore appropriate for analyzing the data from the population of women of Trans-Nzoia County who represented the population of all women in Kenya in 2015.

### 3.4 Study population

The study population included all women aged 18 years and above patients who visited the Obstetrics and Gynecology clinics in Kitale District Hospital in 2015.On average10 patients visit the clinic every week in the hospital translating to 360 patients for 9

months which is from April to December 2015. Therefore, the target population was 360.

### 3.4.1 Inclusion criteria

1. All women patients who are residents of Trans-Nzoia County
2. All women patients who consented to take part in the study

### 3.4.2 Exclusion criteria

1. All women patients who not consented to be part of the study
2. Al, women patients who are in critical condition
3. All women patients who are not residents of Trans-Nzoia County

### 3.5 Sample size determination

Sample size determination will involve the use of fisher's formula as follows

$$n=Z^2*p*(1-p)/d^2$$

n= sample size for a population larger than 10000

Z = Normal distribution Z score which is 1.96

P is the proportion to be estimated which is 0.5

d is the level of precision which is 0.05

Therefore,

$$n = \frac{1.96^2(0.5) * (0.5)}{0.06^2} = 267$$

Reducing this further since the study population was less than 10000, we got

$n_0 = n/ (1+ ((n -1)/ N))$

$n_0 = 267/ (1+ ((267 -1)/ 360))$

$n_0 = 150$

### 3.6 Sampling procedure

The sampling frame consisted of all the women patients who visited the Obstetrics and Gynecology clinic and were 360. A list of all the women patients was obtained from the registry book and sampling was done using simple random sampling to obtain the sample.

### 3.7 Data collection

Data collection was conducted using a questionnaire (Appendix II). The information that was gathered included the demographic characteristics of respondents, reproductive risk factors, hormonal risk factors and behavioral risk factors. The researcher visited the hospital and administer the questionnaires to the respondents who were asked to respond to the questionnaire after which they were returned (Appendix II).

### 3.8 Study variables

The study involved both independent and dependent variables.

#### 3.8.1 Independent variables

The independent variables were socio demographic characteristics of respondents, reproductive, hormonal and behavioral factors.

### 3.8.2 Dependent variable

The dependent variable was risk of breast cancer among women

### 3.9 Data analysis and management

After data was collected, coded and keyed in into computer and analyzed using statistical package for socio science (SPSS). Data analysis involved the use of descriptive statistics such as percentages, mean and standard deviation. Further data analysis was done through binary logistic regression analysis which was used to predict the odds of having breast cancer based on the risk factors. Chi square test was used to determine the relationship between the independent and the dependent variables (Categorical variables). The null hypothesis of the chi-Square test is that no relationship exists on the categorical variables in the population; they are independent. The chi-Square statistic is most commonly used to evaluate tests of independence when using a cross tabulation. Odds ratio was on the other hand used to quantify the strength of the relationship between the variables. The odds ratio is defined as the ratio of the odds of A in the presence of B and the odds of A in the absence of B, or equivalently (due to symmetry), the ratio of the odds of B in the presence of A and the odds of B in the absence of A.

### 3.10 Ethical considerations

The researcher first obtained approvals to conduct the study form the Ethical Research Committee (Appendix IV) of the Kenya Medical research Institute (KEMRI).Permission was also sought from Kitale District Hospital superintendent to obtain data from the respondents. Respondents were informed about data collection before consenting (Appendix I) to the study. Respondents were required not to indicate their names in the questionnaire for confidentiality purposes. Respondents were requested afterwards to sign an informed consent form (Appendix I).

### 3.11 Limitations and assumptions

The researcher encountered some unwillingness of some of the respondents to respond to the items in the questionnaire but this was addressed through assuring them that the information obtained will be confidential. The study assumed that the sample was adequate for the study and that was a good representation of the whole population. The study also assumed that the respondents would provide information that is correct.

# CHAPTER FOUR

# RESULTS

## 4.1 Introduction

This chapter discusses the results of the study conducted in Trans-Nzoia County in January to December, 2015. The results are arranged under themes reflecting the study objectives. The first section presents the descriptive statistics for demographic characteristics of the respondent's. The second section of the chapter presents the odds ratio regression analysis and chi square test results showing the relationship between the risk factors and breast cancer.

## 4.2 Sociodemographic characteristics

This section contains descriptive information regarding the background characteristics of the study respondents mainly the age, level of education of respondents, the marital status and the work status. Table 4.1 shows the socio demographic characteristics of the study respondents.

The results showed that out of the 150 respondents, the most 38(25.3%) were aged between 18 to 30 years. Those who were aged above 60 years were the least representing 16%. Regarding the respondents' level of education, those who had university education were 37 and were the most representing 24.7%.The category that had the least number were those who had attained secondary education as the highest level of education and were 24 (16%). Further, the results revealed that the majority of the respondents were single who were 63(42%) and the least the divorced who were 42 representing 28%. Furthermore, results revealed that most of the participants who were 32 were government employees representing 21.3% and the least were who students were 18 representing 12%.

**Table 4.1: Socio demographic characteristics**

| Age | Frequency | Percent |
|---|---|---|
| Between 18 to 30 | 38 | 25.3 |
| Between 31 to 40 | 29 | 19.3 |
| Between 41 to 50 | 31 | 20.7 |
| Between 51- 60 | 28 | 18.7 |
| Above 60 | 24 | 16 |
| **Average Mean** | | |
| **Level of education** | | |
| No formal schooling | 30 | 20 |
| Primary school | 30 | 20 |
| Secondary school | 24 | 16 |
| College | 29 | 19 |
| University37 | | 24.7 |
| **Average Mean** | | |
| **Marital Status** | | |
| Single | 63 | 42 |
| Married | 45 | 30 |
| Divorced | 42 | 28 |
| **Average Mean** | | |
| **Work Status** | | |
| Government employee | 32 | 21.3 |
| Non-government employee | 30 | 20 |
| Self employed | 25 | 16.7 |
| Student | 18 | 12 |
| Retired | 24 | 16 |
| Unemployed | 21 | 14 |
| **Average Mean** | | |

### 4.3 Risk Factors contributing to breast cancer

Odds ratio and chi square were used to test the association. For chi square test, to conclude a statistical relationship between the categorical variables, the p value of less than 0.05 is considered. An odds ratio (OR) on the other hand is a measure of association between an exposure and an outcome. The OR represents the odds that an

outcome will occur given a particular exposure, compared to the odds of the outcome occurring in the absence of that exposure. Odds Ratio (OR) of 1 was used to indicate that the variables are independent. On the other hand, OR > 1 was used to show that the presence of the independent variable raises the risk of breast cancer and an OR< 1 showed that the presence of the independent variable reduces the risk of breast cancer.

### 4.3.1 Socio demographic characteristics and women breast cancer

The study sought to assess whether demographic characteristics of study participants such as age, level of education, marital status and work status contributed to breast cancer.

The results in Table 4.2 showed that age is statistically significantly related to risk of breast cancer ($x^2$= 1.714, p=0.008). Further, in reference to women aged between 18 to 30 years, the results showed that the risk of breast cancer increased significantly by 1.061 times for those women aged between 31 to 40 years (OR=1.061,p=0.011). Furthermore, risk of breast cancer increased significantly by 1.221times for those women aged between 41-50 years (OR=1.221, p=0.002). Moreover, the risk of breast cancer increased significantly by 1.624 times for women aged between 51 to 60 years (OR=1.624, p=0.008). Finally, the risk of breast cancer increased significantly by 1.634 times for women aged above 60 years compared to those aged between 18-30 years (OR= 1.634, p=0.006).

The results also revealed that the level of education does not statistically and significantly relate with risk of breast cancer ($x^2$= 5.012, p=0.286). Marital status was also found to have no statistical significant relationship with risk of breast cancer ($x^2$= 44.64, p=0.107). More so, work status did not have a statistical significant relationship with risk of breast cancer($x^2$= 55.97, p=0.347).

**Table 4.2: Socio demographic characteristics and women breast cancer**

| Variable | Variable Level | Breast Cancer | No Breast Cancer | P Value | OR | Lower C.I | Upper C.I | $X^2$ |
|---|---|---|---|---|---|---|---|---|
| Age | Between 18 to 30 | 13(34.2%) | 25(65.9%) | Ref | | | | $X^2$=1.714, P=0.008 |
| | Between 31 to 40 | 12(41.4%) | 17(58.6%) | 0.011 | 1.061 | 0.253 | 1.929 | |
| | Between 41 to 50 | 10(32.3%) | 21(67.7%) | 0.002 | 1.221 | 0.335 | 4.453 | |
| | Between 51- 60 | 7(25%) | 21(75%) | 0.008 | 1.624 | 0.18 | 2.169 | |
| | Above 60 | 6(25%) | 18(75%) | 0.006 | 1.634 | 0.41 | 6.509 | |
| Level of education | No formal schooling | 13(35.1%) | 24(64.9%) | Ref | | | | $X^2$=5.012, P=0.286 |
| | Primary school | 7(23.3%) | 23(76.7%) | 0.5 | 1.489 | 0.468 | 4.74 | |
| | Secondary school | 12(40%) | 18(60%) | 0.452 | 0.665 | 0.229 | 1.927 | |
| | College | 9(37.5%) | 15(62.5%) | 0.918 | 0.94 | 0.286 | 3.086 | |
| | University | 6(20.7%) | 23(79.3%) | 0.179 | 2.304 | 0.682 | 7.776 | |
| Marital Status | Single | 33(52.4%) | 30(47.6%) | Ref | | | | X2=44.64, P=0.107 |
| | Married | 9(20%) | 36(80%) | 0.269 | 1.795 | 0.636 | 5.069 | |
| | Divorced | 16(30.8%) | 36(69.2%) | 0.493 | 0.726 | 0.29 | 1.814 | |
| Work Status | Government employee | 13(40.6%) | 19(59.4%) | Ref | | | | X2=55.97, p=0.347 |
| | Non-government employee | 3(15%) | 17(85%) | 0.097 | 3.797 | 0.785 | 18.363 | |
| | Self employed | 9(36%) | 16(64%) | 0.98 | 0.985 | 0.3 | 3.235 | |
| | Student | 6(33.3%) | 12(66.7%) | 0.687 | 1.332 | 0.33 | 5.377 | |
| | Retired | 10(41.7%) | 14(58.3%) | 0.507 | 0.661 | 0.195 | 2.244 | |
| | Unemployed | 7(33.3%) | 14(66.7%) | 0.419 | 1.656 | 0.487 | 5.626 | |

### 4.3.2 Reproductive factors and women breast cancer

The second objective was to determine how reproductive factors contribute to risk of breast cancer. The particular reproductive factors that were investigated were; age at menarche, pregnancy, age at first child, number of children and duration of breastfeeding. The results were presented in Table 4.3.

The results indicated that age at menarche has a statistically significant relationship with breast cancer ($x^2$=6.856, p=0.000). In reference to women who had menarche at age of below 13 years, the risk of breast cancer was seen to significantly increase by 13.878 times for women who had their menarche aged 13 years and above (OR= 13.878, p=0.000).

The results also showed that pregnancy had a statistically significant relationship with breast cancer (x2=0.683, p=0.042). In reference to women who had ever been pregnant, the risk of breast cancer increased significantly by 3.471 times for women who had never been pregnant (OR=3.471, p=0.027).

Additionally, results showed that the age one gave birth to first child is statistically and significantly related with breast cancer (x2=1.728, p=0.042). In reference to women who had their first child aged less than 35 years, the risk of breast cancer increased by 3.506 times but not significantly for women who had their first child aged 35 years and above (OR=3.506, p=. 0.103).

Furthermore, results revealed that the number of children a woman had had a statistically significant relationship with breast cancer (x2 =0.809, p=0.008). In reference to women who had 1 to 3 children, the risk of breast cancer decreased significantly by 0.93 times for women who had 4 to 6 children (OR=0.93, p=0.014). The risk of breast cancer also decreased significantly by 0.63 times for women who had 7 to 9 children (OR=0.63, p=0.016). Further, the risk of breast cancer decreased significantly by 0.598 times for women who had 10 children and above (OR= 0.598, p= 0.031).

Besides, the results indicated that the duration of breastfeeding had a statistically significant relationship with breast cancer ($x^2$= 1.102, p=0.007).In reference to women who breastfed for less than 12 months, the risk of breast cancer decreased significantly by 0.364 times for women who breastfed each child for 12 months and above (OR=0.364, p=0.002).

**Table 4.3: Reproductive factors and women breast cancer**

| Variable | Variable Level | Breast Cancer | No Breast Cancer | P value | OR | Lower C.I | Upper C.I | x2 |
|---|---|---|---|---|---|---|---|---|
| Age at menarche | Before 13 years | 46 (65.7%) | 24 (34.3%) | Ref | | | | x2= 6.856 p=0.000 |
| | 13 years and above | 2 (2.5%) | 78 (97.5%) | 0.000 | 13.878 | 2.4536 | 78.502 | |
| Pregnancy | Ever | 27 (35.1%) | 50 (64.9%) | Ref | | | | x2=0.683, p=0.049 |
| | Never | 21(28.8%) | 52 (71.2%) | 0.027 | 3.471 | 0.441 | 27.29 | $x^2$ =1.728 |
| Age at first child | Below 35 years) | 34(29.3%) | 82(70.7%) | Ref | | | | P=0.042 |
| | 35 years and above | 14 (41.2%) | 20(58.8%) | 0.103 | 3.506 | 0.777 | 15.824 | |
| Number of children | 0-3 children | 23(27.1%) | 62(72.9%) | Ref | | | | x2=0.8091 , p=0.008 |
| | 4-6 children | 6(25%) | 18(75%) | 0.014 | 0.93 | 1.828 | 195.98 | |
| | 7-9 children | 9(60%) | 6(40%0 | 0.016 | 0.63 | 0.686 | 31.255 | |
| | 10 children and above | 10(38.5%) | 16(61.5%) | 0.031 | 0.598 | 0.073 | 4.879 | |
| Duration of Breastfeeding | Less than 12 months | 36(32.1%) | 76(67.9%) | Ref | | | | x2=1.102, p=0.007 |
| | 12 months and above | 12(31.6%) | 26(68.4%) | 0.002 | 0.364 | 0.077 | 1.721 | |

### 4.3.3 Hormonal factors and women breast cancer

The third objective was to assess the hormonal factors contributing to breast cancer among women in Trans-Nzoia County. Results were presented in Table 4.4.

The results in Table 4.4 revealed that use of menopausal hormone has a statistically significant relationship with breast cancer ($x^2$ =1.025, p=0.004).In reference to women who had used the menopausal hormone, the risk of breast cancer decreased significantly by 0.058 times when one had never used menopausal hormone (OR=0.058, p=0.019).

The age one started using menopausal hormone had statistically significant relationship with breast cancer ($x^2$= 1.45, p=0.009). In reference to women who started using menopausal hormone soon after the onset of menopause, the risk of breast cancer reduces significantly by 0.456 times for women who started using menopausal hormone later after onset of menopause (OR=0.456, p=0.006).

The results further revealed that use of contraceptives has a statistically significant relationship with breast cancer ($x^2$= 44.24, p= 0.000). In reference to women who had ever used contraceptive, the risk of breast cancer decreased significantly by 0.0831 times for women who had never used contraceptives (OR = 0.831, p=0.000).

The results moreover, indicated that the age one started using contraceptives had no statistically significant relationship with breast cancer ($x^2$= 0.169, p=0.681). On the other hand, results showed that the stage one started using contraceptive had a statistically significant relationship with breast cancer ($x^2$ =1.639, p=0.024). In reference to women who started using contraceptives before first child, the risk of breast cancer reduced significantly by 0.038 times for women who started using contraceptives after first pregnancy (OR= 0.038, p= 0.03).

**Table 4.4: Hormonal factors and women breast cancer**

| Variable | Variable Level | Breast Cancer | No Breast cancer | P value | OR | Lower C.I | Upper C.I | x2 |
|---|---|---|---|---|---|---|---|---|
| Use of Menopausal hormone | | | | | | | | $x^2$=1.025 |
| | Ever | 19 (32.8%) | 39(67.2%) | Ref | | | | p=0.004 |
| | Never | 29(31.5%) | 63(68.5%) | 0.019 | 0.058 | 0.359 | 1.112 | |
| Age started menopausal hormones | | | | | | | | $x^2$=1.45 |
| | Never used | 29(31.5%) | 63(68.5%) | Ref | | | | p= 0.009 |
| | Soon after menopause | 10(37%) | 17(63%) | Ref | | | | |
| | Later after menopause | 9(29%) | 22(71%) | 0.006 | 0.456 | 0.111 | 1.871 | |
| Contraceptives | | | | | | | | $x^2$=44.24 |
| | Ever | 43(57.3%) | 32(42.7%) | Ref | | | | p=0.000 |
| | Never | 5(6.7%) | 70(93.3%) | 0.000 | 0.831 | 0.499 | 3.538 | |
| Age stated using contraceptives | Before 20 years of age | 19(30.12%) | 44(69.8%) | Ref | | | | $x^2$=0.169 p=0.681 |
| | 20 years and above | 29(33.3%) | 58(66.7%) | 0.487 | 0.738 | 0.314 | 1.737 | |
| When started using contraceptives | | | | | | | | $x^2$= 1.639 |
| | Before first pregnancy | 25(35.2%) | 46(64.8%) | Ref | | | | p= 0.024 |
| | After first pregnancy | 23(29.1%) | 56(70.9%) | 0.03 | 0.038 | 0.45 | 1.397 | |

### 4.3.4 Behavioral factors and women breast cancer

The fourth objective was to evaluate the behavioral factors contributing to breast cancer among women in Trans-Nzoia County. The results obtained were presented in Table 4.5.

The results showed that obesity has a statically significant relationship with breast cancer ($x^2$=0.289, p=0.0009). In reference to women who had a BMI of less than 30, the risk of breast cancer increased significantly by 1.208 times for women who had a BMI of 30 and above (OR= 1.208, p=0.018).

The results also indicated that exercise has a statistically significant relationship with breast cancer ($x^2$= 0.113, p=0.037). In reference to women who ever got involved in vigorous or moderate activities, the risk of breast cancer increased significantly by 2.258 times for women who did not get involved in vigorous or moderate activity (OR= 2.258, p=0.037).

The number of days involved in moderate or vigorous activity also had a statistically significant relationship with breast cancer ($x^2$ =4.172, p=0.024). In reference to women who got involved in moderate or vigorous activity for 0-3 days, the risk of breast cancer decreased significantly by 0. 669 times for women who did vigorous or moderate activities 2 to 3 days a week (OR= 0.669, p= 0.002). The risk of breast cancer also decreased significantly by 0.696 times for women who were involved in vigorous or moderate activity for 4 to 5 days a week (OR= 0.696, p=0.003). Further, the risk of breast cancer decreased significantly by 0.999 times for women who were involved in vigorous or moderate activity for 6 to 7 days (OR =0.999, P=0.033).

Furthermore, results revealed that alcohol consumption had a statistically significant relationship with breast cancer ($x^2$= 101.25, p=0.000). In reference to women who had ever consumed alcohol, the risk of breast cancer decreased significantly by 92.5 times for women who had never consumed alcohol (OR =92.5, p= 0.001). Additionally, results indicated that the average daily alcohol consumption had a statistically significant relationship with breast cancer ($x^2$= 102.077, p=0.000). In reference to women who consumed less than one bottle daily, the risk of breast cancer increased significantly by 1.013 times for women who consumed an average 2 to 3 bottles daily (OR=1.013, p= 0.024). The risk of breast cancer further increased significantly by3.032 times for women who consumed on average 4 to 5 bottles daily (OR=3.032, p=0.001).

Moreover, results revealed that cigarette smoking had statistically significant relationship with breast cancer ($x^2$ = 78.55, p=0.000). In reference to women who had ever smoked, the risk of breast cancer decreased significantly by 0.773 times for women who had never smoked (OR= 0.773, p=0.006).

In addition, results revealed that the number of days one smoked per week had a statistically significant relationship with breast cancer ($x^2$ = 90.14, p=0.000). In reference to women who smoked for 0 to 1 days a week, the risk of breast cancer increased significantly by 0.106 times for women who smoked for 2 to 3 days a week (OR= 1.106, p=0.025). Moreover, the risk of breast cancer increased significantly by 2.352 times for women who smoked for 4-5 days a week (OR= 2.352, p=0.011). More so, the risk of breast cancer increased significantly by 3.031 times for women who smoked for 6-7 days a week (OR= 3.031, p=0.036).

Finally, the results in Table 4.5 indicated that the stage when one started smoking had a statistically significant relationship with breast cancer ($x^2$ = 88.87, p=0.000). In reference to women who started smoking before first pregnancy, the risk of breast cancer decreased significantly by 0.25 times for women who started smoking after first pregnancy compared to those who started smoking before first pregnancy (OR=0.25, P=0.044).

## Table 4.5: Behavioural factors and women breast cancer

| Variable | Variable Level | Breast Cancer | No Breast Cancer | P value | OR | Lower C.I | Upper C.I | $X^2$ |
|---|---|---|---|---|---|---|---|---|
| BMI | Below 30 | 26(30.2%) | 60(69.8%) | Ref | | | | $X^2$=0.289 P=0.009 |
| | 30 and Above | 22(34.4%) | 42(65.6%) | 0.018 | 1.208 | 0.02 | 2.161 | |
| Ever involved in vigorous or moderate activity | Yes | 24(33.3%) | 48(66.7%) | Ref | | | | $x^2$=0.113, p=0.037 |
| | No | 24(30.8%) | 54(69.2%) | 0.037 | 2.258 | 0.357 | 14.299 | |
| Number of days involved in vigorous or moderate exercise | 0-1 days | 15(33.3%) | 30(66.7%) | Ref | | | | $x^2$=4.172 p=0.024 |
| | 2-3 days | 14(41.2%) | 20(58.8%) | 0.002 | 0.669 | 0.06 | 8.098 | |
| | 4-5 days | 11(35.5%) | 20(64.5%) | 0003 | 0.696 | 0.033 | 13.561 | |
| | 6-7 days | 8(20%) | 32(80%) | 0.033 | 0.999 | 0.305 | 31.513 | |
| Ever Consumed Alcohol | Ever | 44(84.6%) | 8(15.4%) | Ref | | | | $x^2$=101.25 p=0.000 |
| | Never | 4(4.1%) | 94(95.9%) | 0.001 | 92.50 | 7.094 | 1206.289 | |
| Average Daily Consumption | Less than or 1 Bottle | 18(16%) | 95(84%) | 0.493 | Ref | | | $x^2$=102.077, p=0.000 |
| | 2-3 Bottles | 15(83.3%) | 3(16.7%) | 0.024 | 1.013 | 1.003 | 4.398 | |
| | 4-5 bottles | 15(78.9%) | 4(21.1%) | 0.001 | 3.032 | 3.025 | 4.354 | |
| Ever Smoked | Ever(Reference) | 42(76.4%) | 13(23.6%) | Ref | | | | $x^2$=78.55, p= 0.000 |
| | Never | 6(6.3%) | 89(93.7%) | 0.006 | 0.773 | 0.005 | 5036.309 | |
| Number of days smoked per week | 0- 1 day(Reference) | 20(17.1%) | 97(82.9%) | Ref | | | | $x^2$= 90.14 p=0.000 |
| | 2-3 days | 13(81.2 %) | 3(18.8%) | 0.025 | 1.016 | 0 | 18.557 | |
| | 4-5 days | 8(88.9%) | 1(11.1%) | 0.011 | 2.352 | 0 | 1795.737 | |
| | 6-7 days | 12(92.3%) | 1(7.7%) | 0.036 | 3.031 | 0 | 52.279 | |
| | Never smoked | 4(4.3%) | 88(95.7%) | | | | | $x^2$=88.87, p=0.000 |
| When started smoking | Before first pregnancy(Reference) | 21(63.6%) | 12(36.4%) | | Ref | | | |
| | After first pregnancy | 23(92%) | 2(8%) | 0.044 | 0.25 | 0.163 | 31.003 | |

# CHAPTER FIVE

# DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

## 5.1 Introduction

This section presents a discussion of the findings of the study as provided in chapter four. This was done in line with the study objectives.

## 5.2 Sociodemographic characteristics and women breast cancer

The study found that most of the study participants were aged 41 years to 50 years while those aged between 18-30 years and above 60 years were the least. Secondly, those who had university education were the most while those who had attained secondary education as the highest level were the least. Further, the majority of the participants were divorced while those who were married at the time of the study had the least percentage. Finally, the participants who were self-employed were the most and those who were students at the time of the study were the least.

On the relationship between the demographic characteristics and Presence of Breast Cancer among women in Trans-Nzoia County, Kenya, 2015, first, the study found that age had a statistically significant relationship with breast cancer. This implied that the risk of breast cancer increased with increase in age. The older one becomes, the higher the chances of suffering from breast cancer. This is due to the abnormal changes that occur in the breast through the aging process that are due to the hormonal changes such as the decreasing levels of oestrogen. The breast becomes more fatty and breast lumps may develop which can turn out to be cancerous. The findings agreed with those of Nuzhat and Abouzaid (2017), who found that the risk of getting breast cancer increases with age and Noone *et al.* (2017) who also asserted that most breast cancers develop in

older women. Boyle and Levin (2018) also argued that the risk of breast cancer development increases with age.

### 5.3 Reproductive factors and women breast cancer

On the relationship between Reproductive Factors and Presence of Breast Cancer among women in Trans-Nzoia County, Kenya, 2015, the study established that age at menarche, pregnancy, age at which one gave birth to first child, the number of children a woman had and the duration of breastfeeding have a statistically significant relationship with breast cancer. This is associated with the longer duration of exposure to reproductive hormones which are considered to trigger breast 5cancer growth and development. Women who start menstruating at a younger age have a longer period between breast development and first full term pregnancy. During this period, the immature breast are overactive and more sensitive to hormonal changes. Later age at pregnancy and never giving birth also increase the exposure time to the hormones oestrogen and progesterone. Therefore, this long duration being exposed to hormones and high sensitivity triggers breast cancer development. On the other hand, early age at first full term pregnancy and breastfeeding decreases the exposure to the hormones and also make the breasts to mature making the breasts less sensitive to the hormones. This is according to Kapil*, et al* (2014) who asserted that endogenous estrogens are likely player in the initiation, progression, and promotion of breast cancer.

These findings are consistent with those of Anderson, *et al* (2014) who established that breast cancer risk is higher among girls who begin menstruating before age 11 compared to those who begin at age. The results also concur with those of Khalis *et al.* (2018) who found that early menarche significantly increased the risk of breast cancer. Other studies with similar findings included Gao *et al,* (2015) who associated increased risk of breast cancer with earlier menarcheal age and that nulli parity, was associated with increased risk of breast cancer and Romieu *et al.* (2018) who found that older age at menarche was inversely associated with breast cancer. The findings also concurred with those of Althuis *et al*. (2014); Habel and Stanford (2013) and Stanford and Greenberg (2018)

who established that null parity is associated with an increased risk for receptor-positive breast cancer.

Giving birth to first child at an older age of above 35 years, increased the risk of breast cancer. This is also as a result of the increased exposure to reproductive hormones that trigger breast tumor development. The findings were consistent with those of Gao *et al,* (2015) who associated later age at first live birth with increased risk of breast cancer. The findings also agree with Romieu *et al.* (2018) who established that older age at first full-term pregnancy was associated with an increased risk of breast cancer. The findings also were consistent with Albrektsen *et al*. (2015) who argued that there was a transient increase in breast cancer risk particularly among women who are older at first birth.

Giving birth to many children was seen to reduce the risk of breast cancer. This can further be attributed to the little duration that one is exposed to the reproductive hormones. These findings were consistent with Lambertini *et al*, (2016) who associated having a greater number of children with decreased risk of HR+ breast cancer.

Breastfeeding for a short duration, increased the risk of developing breast cancer. This is because breastfeeding prevents menstruation and therefore there is little exposure to the reproductive hormones during the breastfeeding period. Faupel-Badger *et al,* (2012) also associated this with the structural changes that occur in the breast following lactation and weaning. These findings are in line with Faupel-Badger *et al.* (2012) who established that breastfeeding for a year or more slightly reduces a woman's overall risk of breast cancer, with longer duration associated with greater risk reduction. A study by the Collaborative Group on Hormonal Factors in Breast Cancer (2014) also established that the risk of breast cancer was reduced by 4% for every 12 months of breastfeeding.

### 5.4 Hormonal factors and women breast cancer

The study results established that use of menopausal hormone, age one started using menopausal hormone, use of contraceptives and the stage one started using

contraceptive had statistically significant relationship with breast cancer. On the other hand, the age one started using contraceptives did not have a statistically significant relationship with breast cancer.

Using menopausal hormones for women at the menopausal stage, increases their chances of developing breast cancer. This is associated with the increased amount of estrogen and progesterone in the body which trigger breast tumor development (Bernstein & Ross, 2013; Henderson *et al.*, 2014; Key & Pike, 2018). The findings were in line with those of Chlebowski *et al.* (2013) who established that menopausal hormones increases the risk of breast cancer.

Women who start using menopausal hormones immediately after the onset of menopause, are at a higher risk of developing breast cancer. This can also be attributed to the long duration of exposure to estrogen and progesterone hormones. These findings were consistent with those of Beral *et al.* (2017) who asserted that the risk of breast cancer is greater for women who start hormone therapy soon after the onset of menopause compared to those who begin later. Colditz *et al.* (2013) also indicated that taking hormone replacement therapy (HRT) for a long time increases the risk of breast cancer.

Using contraceptives increased the risk of breast cancer. This is particularly true for those contraceptives that contain hormones which promote breast tumorigenesis. These findings are in line with those of Bassuk and Manson (2015) who asserted that use of oral contraceptives (combined estrogen and progesterone) is associated with a small increase in breast cancer risk. Findings also agree with Ma *et al.* (2006) who established that combined oral contraceptive use increases breast cancer risk.

Starting using contraceptives before first pregnancy was found to increase the risk of breast cancer. The findings concur with those of Bassuk and Manson (2015) who asserted that use of oral contraceptives (combined estrogen and progesterone) is

associated with a small increase in breast cancer risk, particularly among women who begin use before 20 years of age or before first pregnancy.

### 5.5 Behavioural factors and women breast cancer

In relation to the relationship between behavioural factors and breast cancer, the study found that obesity, exercise, the number of days involved in moderate or vigorous activity, alcohol consumption, average daily alcohol consumption, cigarette smoking, the number of days one smoked per week and the stage when one started smoking had a statistically significant relationship with breast cancer.

Being obese increases the chances and risk of developing breast cancer. This is likely due, in part, to higher estrogen levels because fat tissue is the largest source of estrogen in postmenopausal women, but may also be related to other mechanisms, including the higher levels of insulin among obese women (Gunter *et al.,* 2015; Picon-Ruiz *et al.*, 2017). These findings concur with La *et al.* (2017) who established that breast cancer risk is higher in overweight women and obese women than in lean women.

Women who failed to get involved in exercises were found to have a higher risk of breast cancer compared to those who did at least some moderate or vigorous activities. The benefit may be due to the effects of physical activity on systemic inflammation, hormones, and energy balance Neilson *et al.* (2018) and Pizot *et al.* (2016). Exercising helps lower the level of oestrogen in the blood and other cancer related factors such as insulin. The fat cells produce the hormones oestrogen in women in menopause therefore less fats as a result of exercising reduces the level of oestrogen produced. The findings agree with those of Pizot *et al.* (2016) who established that women who get regular physical activity have a 10%-20% lower risk of breast cancer compared to women who are inactive Hildebrand *et al.* (2013) further asserted that a greater reduction in risk is associated with increasing amounts of exercise and more vigorous activity; however, even smaller amounts of exercise, including walking, appear beneficial. Increasing the number of day's one get involved in exercising reduces the risk of breast cancer. These

results agree with those of Neilson *et al.* (2018) who reported that breast cancer risk was lower among women who reported walking 7 or more hours per week compared to women who walked 3 or less hours per week.

Consuming alcohol according to the study findings also increases the risk of developing breast cancer. This is also explained by the increase in the level of oestrogen in the blood due to alcohol. Alcohol is also seen to lead to DNA damage which increases risk of breast cancer. This is in line with Liu *et al.* (2015) who found that alcohol consumption increases the risk of breast cancer. The study also confirmed that increasing the amount of alcohol consumption increases the risk of breast cancer among the women. These findings agree with Jayasekara *et al.* (2016) who established that women who have 2-3 alcoholic drinks per day have a higher risk of breast cancer compared to non-drinkers.

Cigarette smoking also increased the risk of breast cancer among women. These findings agreed with those of Courtney (2015);Dossus *et al.* (2017); Gaudet *et al.* (2013); Macacu *et al.* (2015); White *et al.* (2017) who asserted that smoking may slightly increase breast cancer risk, particularly long-term, heavy smoking and among women who start smoking before their first pregnancy. Increasing the number of days one smokes in a week and staring smoking before pregnancy also increased the risk of breast cancer. These findings were in line with Courtney (2015); Dossus *et al.* (2017); Gaudet *et al.* (2013); Macacu *et al.* (2015); White *et al.* (2017) who established that smoking may slightly increase breast cancer risk, particularly long-term, heavy smoking and among women who start smoking before their first pregnancy.This chapter presented the conclusion of the study based on the study findings, the chapter also highlighted the recommendations that were based on the study conclusions.

### 5.6 Conclusions

The study objective was to identify the risk factors associated with breast cancer among women of Trans-Nzoia County, 2015. The factors that were examined included the socio demographic characteristics, reproductive, hormonal and behavioural factors.

The study concluded that age of a woman has a statistically significant relationship with breast cancer. The older a woman gets the more the risk of breast cancer. The study on the other hand concluded that the level of education, the marital status and the work status of a woman does not have a statistically significant relationship with breast cancer. Therefore, the study concluded that a woman's education level, their marital status and the work status does not determine have any effect on risk of breast cancer.

The study also concluded that the reproductive factors that is pregnancy, menarche and breastfeeding have a statistically significant relationship with breast cancer. The study on the same concluded that never being pregnant, starting menstruation before the age of 13 years, having the first child after the age of 35 years, having few children and breastfeeding for a shorter duration increases the risk of breast cancer.

Further, the study concluded that hormonal factors such as use of menopausal hormone and contraceptives have a statistically significant relationship with breast cancer. Ever using menopausal hormones and starting using the menopausal hormones immediately after the onset of menopause as well as using contraceptives and starting the use of contraceptives before first pregnancy increases the risk of breast cancer.

Moreover, the study concluded that behavioural factors such as obesity, exercise, alcohol consumption and cigarette smoking have a statistically significant relationship with breast cancer. Being obese, not being involved in exercises and further reducing the number of days of exercising increases the risk of breast cancer. Further, consuming alcohol, increasing the amount of daily alcohol consumption also increases the risk of breast cancer. Furthermore, smoking cigarette and smoking for many days a week as well as starting to smoke before first child also increases the risk of breast cancer.

### 5.7 Recommendations

Following the study findings, we recommend that women be encouraged to do periodic screening of breast cancer, breastfeed their children for at least 6 months, Women should

also avoid drinking alcohol and smoking cigarette and be encouraged to do some form physical of exercise

The study recommends the Trans-Nzoia County Government health officials to have programs for raising awareness on the risk factors associated with breast cancer among women and encouraged to go routine breast cancer screening. They should also encourage women with close families having breast cancer to seek medical attention.

The study also recommends County government of Trans-Nzoia to make breast cancer services affordable and accessible for purposes of breast cancer screening and treatment. This can be done by setting up cancer awareness and treatment and palliative centers in each of the county constituencies which will ensure that the women have ease accessing these services and encourage more women to be screened for breast cancer. The study recommends Trans-Nzoia County Government to set aside a budget specifically for breast cancer awareness campaigns, screening and treatment and for setting up breast cancer lobby groups.

This study recommends future scholars to consider replicating this study to other counties in Kenya. Other studies could also examine other risk factors associated with breast cancer among women such as diet, stress, anxiety as behavioral factors, gender, family history of breast cancer and race.

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## APPENDICES

### Appendix I: Consent Form for Risk factors associated with breast cancer among women in Trans-Nzoia County, Kenya, 2015

| | | |
|---|---|---|
| Davies M. Opili | Principle Investigator | Jkuat, ItromidKemri |

Telephone contact for principle investigator: +254723176610,
Email:mode630@gmail.com, P.O Box 39 Kitale.

**Introduction**

I would like to tell you about a study being conducted by a researcher from JKUAT, ITROMID KEMRI who is a student to find out if you would participate. The purpose of this consent form is to give you the information you will need to help you decide whether or not to participate in study. Please read or listen to the form as it is read to you carefully. You may ask questions about the purpose of the research, what we would ask you to do, the possible risks and benefits, your rights as a volunteer, and anything else about the research or this that is not clear. When all your questions have been answered, you can decide whether you want to be in study or not .This process is called "informed consent".

**Why is this study being done?**

You are being asked to participate in this study because you are a key stake-holder in reduction of breast cancer among women drinkers and non-drinkers. The purpose of this study is to collect information about the risk factors associated with breast cancer among women in Trans-Nzoia County, 2015.The process of this study may not be beneficial to you individually except for providing an opportunity for you to share your knowledge and to contribute to this process .We hope that this research will help provide a clear

understanding the risk factors of breast cancer among women, utilization of screening services and understanding any gaps to pave way for future better practices.

**Who takes care of the cost of this study?**

This is study individually funded by principle investigator

**How many people will take part in this study?**

**150** people will take part in this study consisting of **50 c**ases and **100** controls.

**What will happen if you take part in study?**

Here is what will happen if you agree to take part in the study:

- I will request that you give verbal consent then agree to participate in the study by signing the consent form that will be provided to you in front of a witness
- I will ask to be silent while I read through all questions in the questionnaire.
- I may have a few questions of clarification for you. Then you will decide to participate or not
- If you give your permission, I would interview you by asking structured questions and I will be writing down your responses to the questions asked.

**How long you be in the study?**

Participation in the study will take about 15 minutes

**Can you stop being in the study?**

Yes. You can decide to stop at any time. Tell me if you wish to stop being in the study. Also, I may stop you from taking in this study at any time if I believe it is in your best interests.

**What risks can you expect from being in study?**

- Social risks. One potential risk of study participation includes social risks (e.g. risks to reputation) if information you reveal during the observation or the interview were to be disclosed outside of the research team, We will do our best to ensure that your personal information is kept private.
- Risk of discomfort. Some of the questions in the interview may make you uncomfortable or upset. You are free to refuse to answer any question you do not wish to answer, or stop the interview at any time without affecting your participation in study.
- Potential loss of privacy or confidentiality. One potential risk of study involvement is loss of privacy .Your information will be handled with as much privacy as possible .In order to protect your name, only your ID number will be used. Information identifying you will be kept in a secure location. All identifying information will be omitted from any data distributed to others, or any publications to result from this study.
- None of the question you will be asked will be personal or sensitive in nature except for the details about who you are .We will not identify you by name but will identify you by a code and use a master log which will only be accessed by a limited number of investigators/staff. You may refuse to answer any question(s) and stop the interview at any time.

**Are there benefits to taking part in this study?**

There will be no direct benefit to you from participating in this study. The study will help us know the prevalence of breast among alcohol and non-alcohol drinkers in TRANS NZOIA County. It will also improve the quality cancer screening services.

**What other choices do I have if I do not take part in this study?**

You are free to decide whether to participate in this study. If you choose not to participate there is no penalty.

**What are the cost of taking part in this study?**

There will be no monetary costs to you as a result of taking part in this study it will require about 15 minutes or so of your time.

**Will you be paid for taking part in the study?**

You will not be paid for taking part in the study.

**What are your rights if I take part in this study?**

Taking part in this study is your choice. You may choose whether to take part in this study .Nor what decision you make there will be no penalty to you .If you decide to join and later decide you do not want to continue with the study there will also be no penalty.

**Procedures**

We plan to interview a maximum of **150 individuals** who are our study respondents .These will involve patients attending gynecology clinics. We wish to ask questions on if to the best of your knowledge, you have ever taken alcohol, for how long, how much, when started and type takes.

Ask are you questioned we will also take notes during interview. We will collect some basic information about you ,your gender, your professional qualifications .The interview will involve sitting during the interview and taking notes but I will speak do my best not to interfere with you as you answer questions asked.

**What is the time commitment for this study?**

The interview will last approximately 15 minutes

**Is there any alternative to participation?**

If you choose not to participate, you will not be affected in any way.

Other information

You will not benefit individually by participating in this study .You may contribute important information that may be useful for us and enable us to know prevalence of

women breast cancer and provide possible opportunity for the improvement of cancer screening services. You will also have an opportunity to discuss your opinions on the subject and to contribute to discussion on women breast cancer.

We will keep the questions and files from the study in locked cabinets during the study (up to 2 years).We will write down all that is said in the discussions and there will be no link to you other than initials/ code number identification put on the questionnaire. Once we have gathered and analyzed all the information we need from the questionnaire we will erase or destroy the codes. No information which would identify you personally will be released to anyone other than Jkuat, Kenya Medic al Research Institute and the MOH .We will keep your identify as a research subject confidential .However no system of protecting your confidentially can be completely secure, so it is still possible that someone could find out you were in this study and could find out information about you.

You may refuse to participate and you may withdraw from the study at any time without penalty.

You are free to ask questions of the investigator both before consenting to participate and at any time thereafter.

You can contact the Ethics Review Committee, Kenya Medical Research Institute at tel.020-272-2541 or 202-272-6781 or on email ercadmin@kemri.org, if you have questions about your rights as a participant in this study.

I confirm that I have explained the detail of study to the participant.

---

Investigator's Signature Date

_____

_____

Investigator's Signature Date

Witness signature_____

Date_____

Respondent Signature_____

Date_____

Thumb print _____

**Appendix II: Questionnaire**

Kindly respond to the items in this questionnaire as correct as possible. The responses given will be treated with utmost confidentiality.

**Section A: Demographic information**

1. How old are you?

   i. Between 18 to 30 ☐
   ii. Between 31 to 40 ☐
   iii. Between 41 to 50 ☐
   iv. Between 51- 60 ☐
   v. Above 60

2 What is the highest level of education you have completed?

   i. No formal schooling ☐
   ii. Primary school ☐
   iii. Secondary school ☐
   iv. College ☐
   v. University ☐

3. What is your marital status?

   i. Single ☐

   ii. Married ☐

   ii. Divorced ☐

4. Which of the following best describes your main work status?

Government employee - ☐

Non-government employee ☐

Self employed ☐

Student ☐

Retired ☐

Unemployed ☐

**Section B: Reproductive Factors**

1) At what age did your menstrual cycle begin?

Before 13 years of age ( )

13 years of age and above ( )

Have you ever been pregnant?

Yes ☐

No ☐

2) If yes, at what age did you get your first child?

Below 35 years

35 years and above

3) How many children do you have?

……
……

4) How many months did you breastfeed each of your children?

……
…….....

**Section C: Hormonal Factors**

5) Have you ever used any menopausal hormone?
6) If yes, at what stage did you start the use of the menopausal hormone?

Soon after menopause ( )

Later after menopause ( )

Have you ever used oral contraceptives?

Yes ( )

No ( )

If yes, at what age did you start using oral contraceptives?

Before 20 years of age

20 years and above

Did you start using oral contraceptives after first pregnancy or before?

Before first pregnancy

After first pregnancy

**Section D: Behavioural Factors**

What is your BMI?

Below 30 ( )

30 and Above ( )

Does your work involve vigorous or moderate intensity activity that causes small increase of breathing or heart rate such as a brisk walking for at least 10 minutes continuously?

No ☐

Yes ☐

25. In a typical week on how many days do you do vigorous or moderate intensity sports fitness or recreational activ☐☐

Have you ever consumed alcohol?

Yes ( )

No ( )

If yes, how much alcohol do you consume every day? …….

How often in a week did you consume alcohol?.....

Have you ever smoked?

Yes ( )

No ( )

If yes, how often in a week did you smoke?.....

……
……

When did you start smoking?

Before fist birth ( )

After first birth ( )

**Section E: Breast Cancer**

Have you ever been diagnosed with breast cancer?

Yes ( )

No ( )

**Thank You**

## Appendix III: Publication



IISTE

Academic Paper Acceptance Letter

Dear Davies Opili, Lucy Ndahi, Yeri Kombe.,

It's my pleasure to inform you that, after the peer review, your paper,

**RISK OF FEMALE BREAST CANCER IN ALCOHOL CONSUMPTION IN A COMMUNITY OF TRANS NZOIA COUNTY, KENYA**

has been ACCEPTED with content unaltered to publish with **Journal of Health, Medicine and Nursing,** ISSN 2422-8419.

In order to fit into the publishing and printing schedule, please re-submit your complete publication package by directly replying this acceptance email within 15 days so we can make your article available online/print in the next issue (usually at the end of each month) . If you failed to prepare your complete files on time, the publication of your article might be delayed.

Though the reviewers of the journal already confirmed the quality of your paper's current version, you can still add content to it, such as solidifying the literature review, adding more content in the conclusion, giving more information on your analytical process and giving acknowledgement.

To help the editor of the journal process your final paper quickly, you need to prepare your paper based on the attached "publication_package_instruction.pdf".

Again, thank you for working with IISTE. I believe that our collaboration will help to accelerate the global knowledge creation and sharing one step further. IISTE looks forward to your final publication package. Please do not hesitate to contact me if you have any further questions.

Sincerely,

Alexander Decker,

Adecker

Saturday, June 17, 2017

Editor-in-Chief
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**The indexation of the journal**

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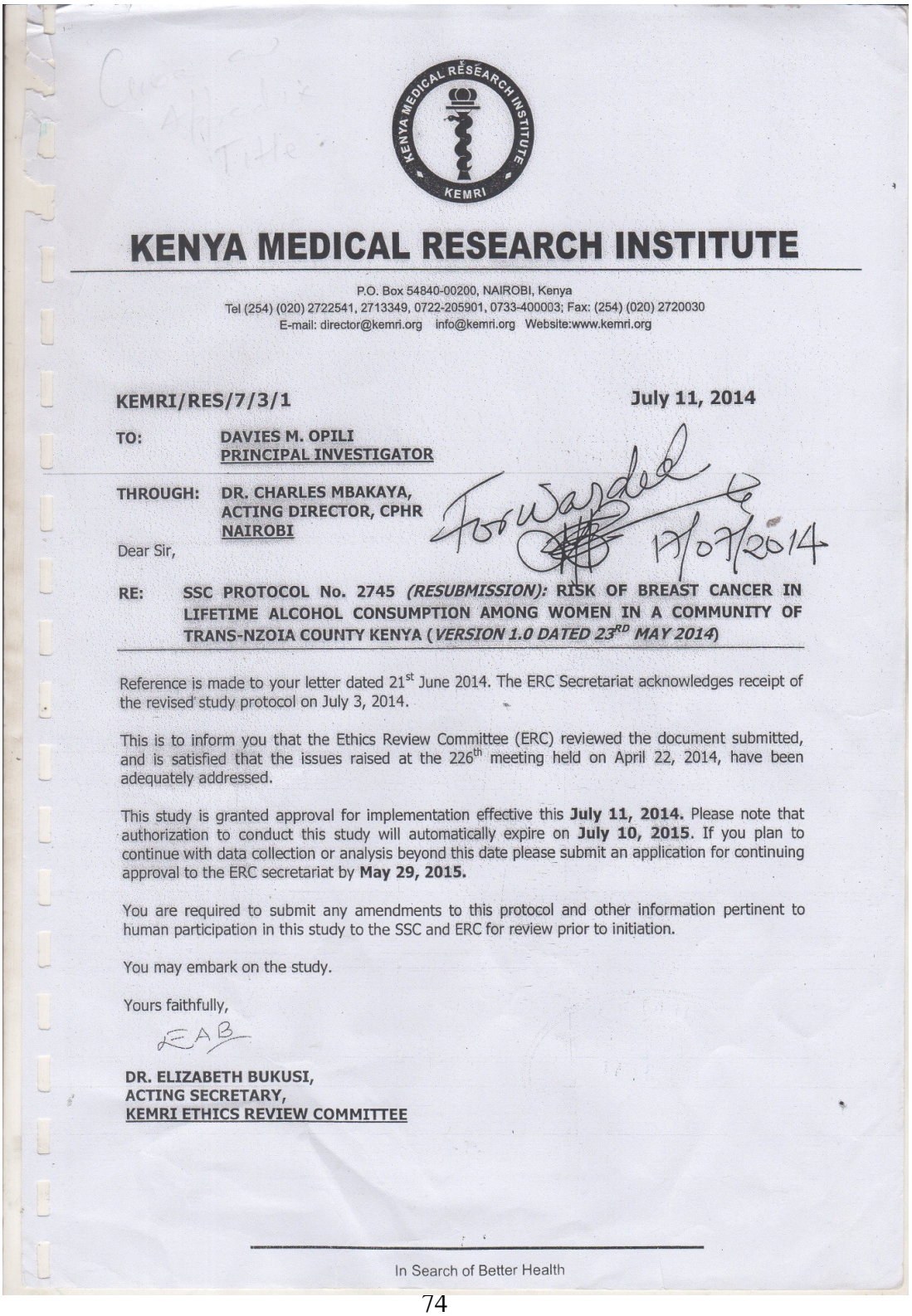
## Appendix IV: Ethical Approval Letters



# KENYA MEDICAL RESEARCH INSTITUTE

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**KEMRI/RES/7/3/1** **July 11, 2014**

**TO:** **DAVIES M. OPILI**
**PRINCIPAL INVESTIGATOR**

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

Forwarded 17/07/2014

Dear Sir,

**RE:** **SSC PROTOCOL No. 2745 *(RESUBMISSION):* RISK OF BREAST CANCER IN LIFETIME ALCOHOL CONSUMPTION AMONG WOMEN IN A COMMUNITY OF TRANS-NZOIA COUNTY KENYA (*VERSION 1.0 DATED 23RD MAY 2014*)**

Reference is made to your letter dated 21st June 2014. The ERC Secretariat acknowledges receipt of the revised study protocol on July 3, 2014.

This is to inform you that the Ethics Review Committee (ERC) reviewed the document submitted, and is satisfied that the issues raised at the 226th meeting held on April 22, 2014, have been adequately addressed.

This study is granted approval for implementation effective this **July 11, 2014.** Please note that authorization to conduct this study will automatically expire on **July 10, 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 29, 2015.**

You are required to submit any amendments to this protocol and other information pertinent to human participation in this study to the SSC and ERC for review prior to initiation.

You may embark on the study.

Yours faithfully,

EAB

**DR. ELIZABETH BUKUSI,**
**ACTING SECRETARY,**
**KEMRI ETHICS REVIEW COMMITTEE**

Appendix IV: - Ethical Approval Letters

# KENYA MEDICAL RESEARCH INSTITUTE

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KEMRI/SSC/102586 13th March, 2014

Davies Opili

Thro'
Director, CPHR
NAIROBI

Forwarded
18/03/2014

REF: SSC No. 2745 (Revised) – Risk of Female Breast Cancer in Lifetime Alcohol Consumption in a Community of Trans-Nzoia County, Kenya

Thank you for your letter dated 10th March, 2014 responding to the comments raised by the KEMRI SSC.

I am pleased to inform you that your protocol now has formal scientific approval from SSC.

The SSC however, advises that work on the proposed study can only start after ERC approval.

Sammy Njenga, PhD
SECRETARY, SSC