FACTORS INFLUENCING BREAST CANCER SCREENING PRACTICE AMONG WOMEN ATTENDING UNIVERSITY TEACHING HOSPITAL, RWANDA

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Factors influencing Breast Cancer screening practice among women attending Kigali University Teaching Hospital, Rwanda

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DECLARATION

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

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This thesis has been submitted for examination with my/our approval as University Supervisor

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DEDICATION

I dedicate this work to my beloved parents Mr. and Mrs. Joseph Tanui, my husband and my Children: Carine, Kelvin and Neville for their unfailing love, moral support and encouragement during my study.

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ABBREVIATIONS AND ACROMYMS

BCIEA Breast Cancer Initiative East Africa

BHE Breast health education

BSE Breast self-exam

CBE Clinical breast exam

CHUB Centre Hospital University Butare

CHUK Centre hospital university Kigali

HBM Health belief model

KFH King Faisal Hospital

KMH Kanombe Military Hospital

NCD Non communicable diseases

RBC Rwanda Biomedical Centre

SECD Socio- economical cultural and Demographic

WHO World Health Organization

DEFINITIONS OF TERMS

Breast cancer screening practice	The measure of the women population's use of the breast cancer screening available to them.
Breast cancer screening	Is the medical screening of asymptomatic, apparently healthy women for breast cancer in an attempt to achieve an earlier diagnosis.
Breast cancer	Is a malignant growth that begins in the tissues of the breast and is characterized by abnormal cells multiplying in an uncontrolled manner
Breast self-examination	A diagnostic technique regularly performed by a woman on her breast to check for lumps or other changes.
Clinical breast examination	A physical exam of the breast carried out by a health care provider to test out for lumps or new changes.
Mammogram	A photograph of a woman's breasts made by X-rays
Practice	This is the action taken by individual respondent to go for breast cancer screening. For this study practice meant utilization of breast cancer screening.
Screening	Examination involving diagnostic techniques or physical test to detect the presence of breast cancer.

ABSTRACT

Globally, breast cancer is the most frequent cancer and the leading cause of cancer related deaths among women. In poor resource settings, it is often diagnosed late due to low rates of breast cancer screening. To more successfully detect breast cancer disease early enough, it is vital to know the reason women do not practice breast cancer screening. Hence, this study assessed factors influencing practice of breast cancer screening among women attending University teaching Hospital Kigali, Rwanda. A cross-sectional study was conducted among 384 women who were selected conveniently as they came to the hospital. A pre-tested structured questionnaire and three key informants were used to collect data. The key informants were selected among the gynaecology health providers who had more than five years' experience and interviewed after consenting to take part in this study. Both descriptive and inferential statistics were utilized during data analysis. Majority of respondents (n=217, 56.5%) were aged between 30-39years with about half of them (n=206, 53.6%) having attained a university education. A large percentage (n=347, 90.4%) of respondents were married and most of respondents (n=353, 91.9%) belonged to middle income status. Women who practices breast cancer screening had a lowest number among the respondents (n= 136, 35.2%). (n=235, 61.2%) of the respondents had limited knowledge on breast cancer screening; similarly, knowledge on breast cancer risks was also low 85.2%. The results from the Multivariate analysis on factors showed that respondents aged 30-39 years [AOR=3.62; 95%CI=1.80-7.29; p<0.001],Marital status[AOR=5.37; 95% CI=2.18 - 13.26; p<0.01] level of screening awareness [AOR=17.23; 95%CI=7.62 - 38.99; p<0.05],consequences of presenting with advanced breast cancer [AOR=4.29; 95% CI=2.21 - 8.33; p<0.01] and lastly regular follow up by nurses at the facility[AOR=3.05; 95% CI=1.31 - 7.10; p<0.05] were factors that influenced practice of breast cancer screening. All the informants pointed out level of awareness and knowledge on breast screening as the most factors affecting ability of women to undertake breast cancer screening. Majority of women had not been screened for breast cancer of which a significant number were not even aware of breast cancer screening and hence there is need to intensify efforts towards promoting awareness and early regular screening of breast cancer among women.

CHAPTER ONE

INTRODUCTION

1.1 Background to the study

Breast cancer is a growth that forms in the tissues of the breast, commonly in the ducts (tubing that carry milk to the2 nipple) and lobules (glands that produce milk (Mittra, 2011). Breast cancer occurs in both males and females, although breast cancer in men is considered rare (Brandt, 2016).Breast cancer is the most common cancer in women globally, equally in the developed and developing countries. The majority of deaths (269 000) occur in low- and middle-income countries, where most women with breast cancer are diagnosed in late stages (Shrivastava et al., 2013)

Global studies have been carried out on breast cancer screening and its barriers. For example, a study carried in Hispanic showed that a range of economic, cultural, and communication obstacles appeared to complicate breast cancer screening among Hispanic women.(Kim & Lee, 2015).

In Asia, breast cancer stands the foremost cause of cancer-related deaths, in addition in recent years its incidences is outdoing cancer of the uterine cervix.On the contrary, (Parkin et al., 2010) saw a steady upsurge in breast cancer mortality rates among Zimbabweans and native South Africans. A study done in Kenya showed that greatest Kenyan women perceive the diagnosis of breast cancer as death sentence, hence deferring their health seeking actions for screening regularly (Wiysonge et al., 2013)

In Rwanda a study done by (Mody et al., 2013) on characteristics and presentation of breast cancer patients showed that the average of age for breast cancer was 48.5 years. Eighty-five percent presented with more than 12 weeks' delay after an abnormality was noted. There is no current data that is published on the prevalence of BC in the Rwanda, the incidental BC rate is increasing.

Breast cancer remains significant public health problem in Rwanda. It is the most common cancer diagnosed for women at health facilities in Rwanda of which one out of every ten women is diagnosed with advanced breast cancer. Despite survival rates being low ranging from 10 to 40 per cent, in settings where early detection and basic treatment are available and accessible, the five-year survival rate for early-localized breast cancer exceeds 80 per cent, according to the World Health Organization.

Currently, data from Rwanda's Butaro Cancer Centre indicates breast cancer accounts for 40.3 per cent of all diagnosed cancers. It is therefore necessary to obtain information about the factors that influence screening, their distribution and how important they are in decision making about participation in breast cancer screening.

1.2 Statement of the problem

Breast cancer remains important public health problem in Rwanda and is the most common cancer diagnosed for women at health facilities in Rwanda(Ntirenganya et al., 2014).Currently, Data from Rwanda's Butaro Cancer Centre statistics indicates that breast cancer accounts for 40.3 per cent of all detected malignancies.

Despite the benefits associated to regular breast screening services, few women actually do self-breast exam or even have their breast screened by healthcare provider. In fact a majority do not even know how to do BSE (Brandt et al., 2016). This made it very important study to Rwandan context to investigate the extent to which women in Kigali city practice breast screening services and the factors that influence use of this service will be of great importance to the researcher.

1.3 Justification of the study

Continuous increase in patients with breast cancer in Rwanda is alarming and the worst is that they seek help when already in advanced stage 3 or 4 of the sickness (Ntirenganya et al., 2014). This is disturbing and besides it has prompted many deaths to occur. Kigali University Teaching Hospital (CHUK) was purposively chosen due to the fact that it's

the largest teaching and referral public Hospital. It is the main hospital in Kigali city, providing both inpatient and outpatient services for a large population and it offers Breast cancer screening services like Mammogram among others.

It is hoped that the findings of this study will lead to recommendations that will enable the Ministry of Health to re-engineer breast cancer screening program in Rwanda with the aim of increasing uptake of more women consistently. This will hint to early proof of identity of those at risk of developing breast cancer and early interventions taken, in that way dropping the incidence of the disease as well as decreasing mortality and morbidity resulting from it (Siegel et al., 2013).

This will go a long way in enabling the Ministry of Health and the Rwandan government in achieving its fight against this fatal disease. The investigator expanded information on the study and fulfilled the academic necessities .The institution profited from results of these study since policy makers will now promote programs that will aid in utilization of screening services regularly by women and hence decrease late stage diagnosis of breast cancer which will prevent mortality rate.

1.4 Research questions

i. What is the level of awareness on breast cancer screening among women attending Kigali university teaching Hospital?
ii. What is the proportion of women practising breast cancer screening to those who don't attending Kigali university teaching Hospital?
iii. What factors are associated with practice of Breast Cancer Screening among women attending Kigali university teaching Hospital Kigali?

1.5 Objectives of the study

1.5.1 General Objective

To determine factors influencing breast cancer screening practice among women attending Kigali University Teaching Hospital, Rwanda.

1.5.2 Specific objectives:

i. To determine the level of awareness on breast cancer screening among women attending Kigali university teaching Hospital.
ii. To determine the proportion of women who practice breast cancer screening to those who did not at Kigali university teaching hospital.
iii. To establish factors associated with Breast Cancer Screening practice among women attending Kigali university teaching Hospital.

CHAPTER TWO

LITERATURE REVIEW

2.1 Breast Cancer Awareness

Breast cancer awareness refers to a woman's information on breast cancer screening, its risks and treatment as described by the American Cancer Society. It is a predisposing variable that determines women's breast cancer screening compliance. (Kim & Lee, 2015) reported breast cancer awareness is important because women who have an appropriate amount of breast cancer information are more aware of their risk for breast cancer and are more likely to comply with breast cancer screening.

Breast cancer understanding is one factor influencing the possibility of women practising breast cancer screening techniques like: breast self-examination, clinical breast exam, and screening mammography. Empirically, breast cancer awareness has been directly correlated with breast self-examination(Hossain et al., 2014). Research findings have shown a positive relationship between breast cancer knowledge and the frequency of breast self-examination (Bizimana et al., 2015).(Noroozi& Tahmasebi, 2011) describes breast cancer awareness as the best predictor of breast self-examination. Proponents of the theory says that breast cancer awareness has a positive relationship with breast cancer screening. They believe that as a woman's breast cancer knowledge is increased, her breast cancer screening practices will increase as well.

Opponents of the assumption that breast cancer knowledge has affirmative relationship with breast cancer screening think that breast cancer knowledge does not always translate into practice. Opponents believe that women who are informed about breast cancer and breast cancer screening may still not practice breast cancer screening (Apffelstaedt et al., 2014) ,stated that biomedical awareness, which is the type of information linked to biomedical and epidemiological based in order relating to breast cancer risk and screening guidelines, does not transform into actual practice. These

researchers believe a discrepancy exists between women's awareness on breast cancer screening methods and their actual practices (Shrivastava et al., 2013)

Women's awareness on breast cancer is not sufficient to clarify their breast cancer screening compliance. However, without breast cancer awareness, women are unable to consciously comply with recommended breast cancer screening. Given the lack of definitive data related to breast cancer awareness affecting breast cancer screening compliance in sub Saharan women (Rwandan women included) and the high mortality rates among African women who have breast cancer, it is important to develop a better understanding of the relationship between breast cancer awareness and the breast cancer screening practices of this population.

2.1 Breast Cancer screening practice

The eventual goal of primary detection through screening is to avoid or interruption the growth of disease. Compliance with the breast cancer screening methods recommended by the American Cancer Society and the National Cancer Institute appears to be the best way to detect breast cancer early (Brouwers et al., 2011) Proponents of breast cancer screening argue that there is a critical point in breast cancer development when screening is easier and more effective (Patel et al., 2013) The critical point refers to an early development stage when treatment is easier and more effective than at a later development stage. Many experts believe that breast cancer mortality among women particularly African women could be significantly reduced if breast cancer screening recommendations were effectively used (Pace & Keating, 2014)

2.2.1 Breast self-examination (BSE)

BSE is based on the concept that women themselves first notice the majority of breast cancers and has been recommended as a breast cancer screening technique. Presently, BSE is promoted to women as a convenient, low-risk, and low-cost self-screening procedure for detecting tumors at the smallest palpable size and at a more clinically

treatable stage (Bleyer & Welch, 2012). Despite the reported awareness and BSE being recommended for over thirty years, the literature indicates that fewer than thirty-six percent of all women complete this procedure monthly.The researchers did not take into consideration the amount of time needed for an individual to become confident in her ability to perform BSE once she has received training or how different age groups may respond to BSE training differently. Addressing these flaws could have an impact upon the findings of both trials.

2.2.2 Clinical Breast Examination (CBE)

Clinical breast examination is identical to breast self-examination except the examination is done by a trained professional. CBE is recommended annually for women age 40 and over (Tarver, 2012). Although CBE is a recommended breast cancer screening technique, it has not been well evaluated in the literature. Studies that access the efficacy of CBE are combined with mammography. Trials, which compared CBE to no screening, have not been conducted (Hajian-Tilaki & Auladi, 2014) Consequently, trial findings cannot be attributed to CBE alone.

2.2.3 Mammography:

Although it is now widely available and recommended for women over the age of 40, until the early 1980's, mammography was not used for widespread screening (Bleyer & Welch, 2012). Mammography itself is not new. It was developed shortly after Roentgen's discovery of radiography in the late 1800s and was used in the differential diagnosis of breast masses in symptomatic women (Bleyer & Welch, 2012). Regular mammography has been shown to reduce mortality from breast cancer in women aged 50 and older (Oeffinger et al., 2015)

(Desantis et al., 2014), compared the adherence to breast cancer screening guidelines among 154 low-income African-American women aged 40-65. Even though sixty-three percent of all respondents practised monthly breast self-examination, seventy six percent

had received a yearly CBE and only twenty percent had received a mammogram. Breast cancer screening was lower than recommended (Sarma, 2015). This finding raise more questions related to breast cancer screening among women worldwide today particularly African women. For instance, why did such a low percentage of African American women in her study adhere to breast cancer screening guidelines? How possibly will these women be encouraged to carry out breast cancer screening according to the guiding principle?

Variables linked to Breast Cancer Screening by Women linked with breast cancer screening conformity include demographic factors (age, income, and education), breast cancer knowledge(Lee-Lin et al., 2012a), and person breast cancer risk factors (Ban & Godellas, 2014). Studies that access these variables amid African women have focused mostly on specific groups, such as low-income women. In Rwanda for instance only few hospitals have mammogram machine in the whole country and this could be a contributing factor to underutilization.

The (Apffelstaedt et al., 2014)grades breast changes such as a lump or thickening, puffiness, lumpiness, skin irritation, alteration, retraction, scaling, pain, tenderness or nipple discharge as likely symptoms for breast cancer. Women usually identify their own symptoms first (Sarma, 2015). Women themselves identify more than ninety percent of breast cancers, either through chance or breast self-examination (BSE) (Schwartsmann, 2001). The American Cancer Society recommends that women aged 20 and older perform BSE every month, 2-3 days after their menstrual period. Post-menopausal women should accomplish BSE the same time each month. Further breast cancer screening practice endorsements by the American Cancer Society and the National Cancer Institute include an annual clinical breast examination (CBE) for women aged 40 and older, a screening mammogram every 2 years for women amongst the ages of 40 and 49, and a yearly screening mammogram for women 50 and over (Siegel et al., 2013)

2.2.4 Theoretical Framework

The theoretic framework used for the study was adapted from the Andersen's Behavioral Model of Health Services Utilization(Anderson et al., 2006). Andersen's Behavioral Model for Health Services Utilization is adapted to explain the practice of breast cancer screening among women attending hospitals (Pace et al., 2015)

2.2.5 Conceptual Framework

The purpose of the model was to discover conditions that either facilitate or impede the utilization of health care services. This model also recognizes that personal health practices such as breast cancer screening interact with the use of formal health services such as breast self-examination (BSE) training, clinical breast examination (CBE), and screening mammography (Aday, L. & Awe,, 1997) Health Services Utilization provides a framework to describe those variables (Ban & Godellas, 2014)les that inhibit or facilitate an individual's breast cancer screening practice. The model contains two major components: characteristics of the population at risk and utilization of health care services.

This model was primarily established in the late 1960's to support health care specialists appreciate why entities use health amenities and to aid health care professionals develop policies to endorse justifiable access (Babitsch et al., 2012) as well as foresee health services utilization. The behaviour constituent of this model advises that individuals' use of health services is a purpose of their disposition to use services, which permit or obstruct use, and their necessity for care. Andersen at first developed and empirically tried the form in a nation state wide own interview of 2,367 families in 1964(Kim & Lee, 2015) (Anders. The model planned and combined as election of correlates of health and health care behaviour from the dissimilar literatures in sociology, psychology, economics, and medicine into disposing, enabling, and need predictors of utilization (Boene et al., 2014)

However, each constituent might be considered of as making an independent input to predicting use. On the other hand, the model suggests a useful process or casual gathering where the prompting factors force is exogenous, some permitting assets are needed but not sufficient situations for use and some requirement must be clear for use to basically take place. The utilization of health services is careful in terms of its type, function, and period interval concerned. The type of utilization states to the kind of service established, such as BSE, CBE, and screening mammography.

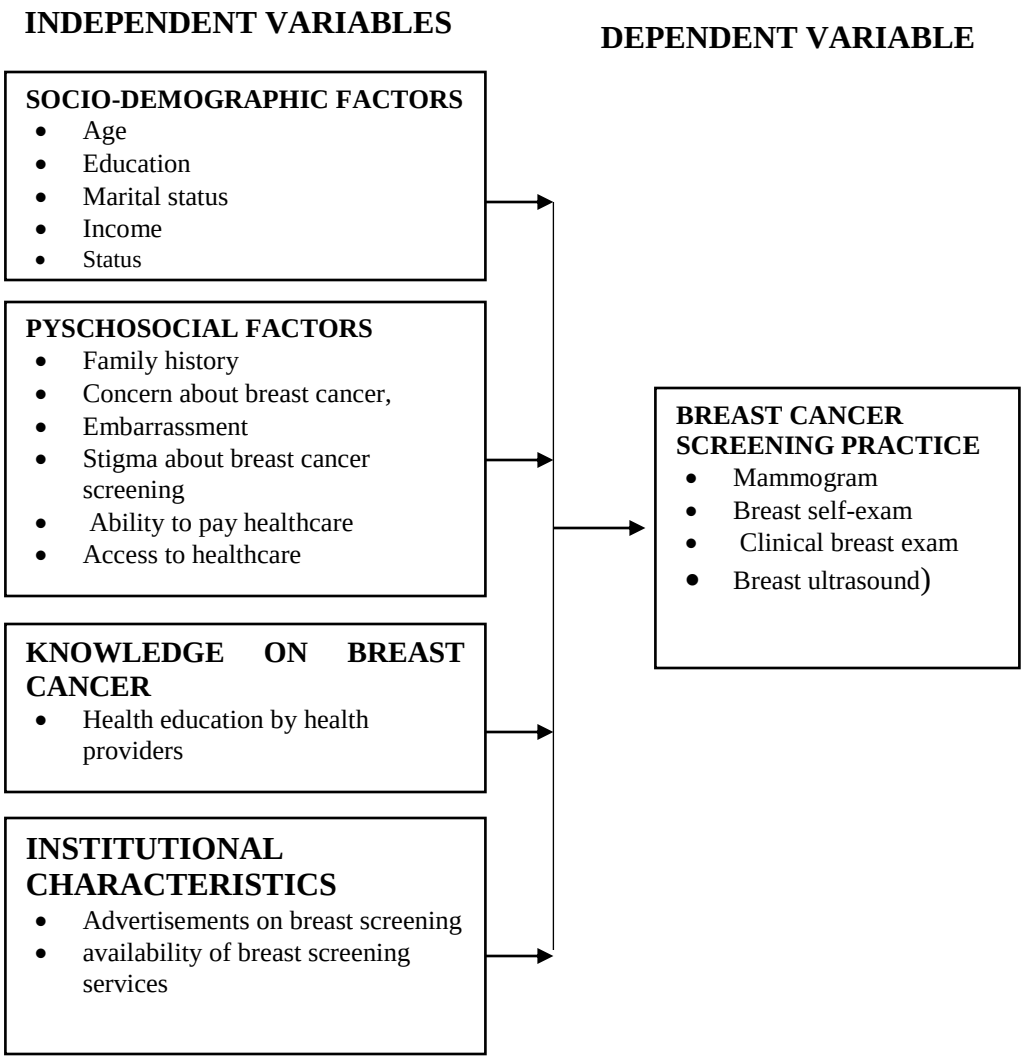


Figure 2.1: Conceptual framework adopted from Andersen's Behavioural Model of Health Services Utilization

Source**:** (Anderson et al., 2006)**.**

2.3 Predisposing Factors associated with breast cancer:

Breast cancer is a multifaceted disease known to be caused by both Internal and external risk factors including tobacco, alcohol, numerous chemical substances, radiation, and some infectious organisms. Investigators have acknowledged prime risk factors, which are assumed to subsidize to a fairly small breast cancer risk (approximately ten-fifteen

percent). These factors are gender, age, family history, reproductive and menstrual history and history of breast disease (Colditz, G., Willett, W., Hunter, D., Stampfer, M., Manson, J., Hennekens, C. &, 1993)

2.3.1 Gender

Basically being a woman is the foremost risk factor for developing breast cancer. Male breast cancer is rare(Tarver, 2012); less than one percent of all breast cancers occur in men (White et al., 2017).Approximately 1,600 new cases of male breast cancer were detected in the United States in 1998, and about 400 men pass away from the sickness (DeSantis et al., 2011) In disparity, 175,000 new cases of female breast cancer were detected in 1998, with almost 44,500 deaths (Tarver, 2012)Breast cancer is almost 100 times more common among women than men(Tarver, 2012)

2.3.2 Age

Breast cancer risk upsurges with age (American Cancer Society, 2016). Breast cancer affects 1 out of 2,525 women aged 30-39. The popular (75%) of breast cancer cases has been stated for women over age 50 (Tarver, 2012) Women aged 20-29 accounts for less than one percent of breast cancer cases ((DeSantis et al., 2011). The researchers found out that two extremes of age groups either young women (20-30 years of age) or older women (over - 17 - 60 years of age) to be vulnerable to greater mortality and an increase in incidence (Abdullah et al., 2011)

2.3.3 Family History

Family history has also been identified as a risk factor. Family is mostly well-defined as biological lineages. Having lone first-degree relative (mother, sister, or daughter) with breast cancer nearly doubles a woman's danger, and having two first-degree relatives raises her risk for breast cancer fivefold(Tarver, 2012). Consequently, women who have one or more first-degree lineages with breast cancer have two to five periods the risk of increasing breast cancer than women who do not have hereditary risk factors. The risk

discussed by a family history has been considered in both case-control and cohort studies, using volunteer and population-based trials with generally steady results(Oeffinger et al., 2015)

In a combined analysis of 38 studies, the absolute risk of breast cancer conferred by a first-degree relative with breast cancer was two percent (Gøtzsche & Jorgensen, 2013). A risk of two percent is moderately high, even though the single still has a ninety-eight percent chance of not receiving breast cancer. Nevertheless, a breast cancer risk of 1.7 percent or higher is cautiously high and is the indicator for Breast Cancer Prevention Trials conducted by the NCI (Brandt et al., 2016). Risk differs with the age at which the affected relative was detected. The younger the age diagnosed, the greater the risk posed to relatives (Bleyer & Welch, 2012)

When assessing family history risk for breast cancer, the accuracy and completeness of the family history data are important. A described family history risk may be flawed, or the individual may be uninformed of relatives affected with cancer. When a stated family history risk is mistaken or based on estimation, single breast cancer risk may be indecent, overvalued or underrated. A comparison of self-reported family history with data from the Utah Population Database indicates a sensitivity of eighty-three percent for a reported family history of breast cancer (Brandt et al., 2016) meaning that eighty-three percent of all reports are accurate.

In a Canadian study, exactness of a stated family history of breast cancer was measured through assessment of medical records of relatives stated as affected for a repeated sequence of women with breast cancer and for a population-based sample of women without breast cancer (Youlden et al., 2012)Between the family history reports evaluated, sixteen percent reported a first-degree comparative with breast cancer; ninety-one percent of verifiable histories were confirmed. Amongst controls, nine percent reported a first-degree relative with breast cancer; ninety-seven percent of conformable histories were established(Youlden et al., 2012). This clarifies that whether a study practices self-reported data or medical records, erroneousness may happen when get into

a woman's family history risk; on the other hand, fewer wrongness occur when medical records are used contrasted with self-reported data. It may be determined that when judging women's family history risk for breast cancer, medical records deliver the utmost correct data.

2.3.4 Other Risk Factors

Additional breast cancer risk issue is radiation exposure. Notes in Hiroshima/Nagasaki survivors and in women who have received therapeutic radiation treatments to the chest and upper back recognized increased breast cancer risk as an effect of such exposure(Marsh et al., 2014). The implication of this risk factor in Rwandan women is indistinct. A second breast cancer risk factor is way of life. Numerous lifestyle factors are related with breast cancer risk; these include weight gain, obesity, fat intake, and level of physical activity. Weight gain and being overweight are usually documented risk factors for breast cancer, with overweight women greatest normally observed to be at increased risk of post-menopausal breast cancer(Carmichael & Bates, 2004). This risk is believed to be due to oestrogen from oestrogen replacement therapy being reserved by fat cells.

It is significant to note that having a risk factor, or even several, does not unavoidably mean that a woman will develop breast cancer. Rwandan women with one or more breast cancer risk factors may or may have not essentially developed the disease. In disparity, some women who have developed breast cancer have no seeming risk factors (Desantis et al., 2014)Consequently, when a woman with breast cancer has a risk factor; there is no definitive way to prove that the risk factor actually caused her cancer (Hossain et al., 2014) Since the specific agents which cause breast cancer have not been delineated and risk factors have only a minimal contribution to development of the disease early, detection is a key to breast cancer survival.

2.4 Socio-Demographic Factors

Demographic factors allude to a woman's potential abilities and barriers regarding her breast cancer screening compliance (Mupepi et al., 2011). Generally, demographic - factors influencing breast cancer screening have included income, education, and age. Research about income and breast cancer screening time after time show that low-income women conform less with screening than their more wealthy counterparts (Ntirenganya et al., 2014). Little research regarding Rwandan women with an income status other than low-income has been conducted or reported in the literature (Mody et al., 2013). Furthermore, research regarding education and breast cancer screening consistently shows that low educational attainment is related to low screening compliance(Mody et al., 2013) Some research regarding age and breast cancer screening practice show age to be a predictor of breast cancer screening; however, other research states that age is not a predictor of breast cancer screening practice.

2.4.1 Income

Low-income women are not as likely to practice breast cancer screening as women with incomes greater per year (Ntirenganya et al., 2014). (Garbers et al., 2003) reported that only eight to twenty-two percent of low-income women receive regular breast cancer screenings. (Ogundiran et al., 2012) argued that breast cancer screening practices among lower income African women is the result of financial constraints. Therefore, a Rwandan woman's decision to practice breast cancer screening may depend on whether she can take time off from work or has adequate health insurance.

In a study conducted by (Bollen et al., 2007), income was found to be a predictor of screening histories. Overall, upper-income women were significantly more likely to have received a breast examination within the past year than were lower-income women. (Bener et al., 2002) found support for the influence of income on breast cancer screening practice. They reported breast cancer screening conformity to be lower amongst women with lower incomes than for women with top incomes. (Noroozi & Tahmasebi, 2011)

found lower income to be related to a decrease in access to CBE and mammography screenings. Additionally,(Brandt et al., 2016) stated that lower income was the strongest predictor of non-compliance with nearly eighty percent of women in their study who were below poverty, never having had a CBE or mammogram, compared to fifty percent of women in the highest income category. (Ntirenganya et al., 2014) also stated that women least likely to practice breast cancer screening were those of low socio-economic status.

In contrast, (Ntirenganya et al., 2014) stated that women of low-income status were more likely to comply or just as likely to comply with breast cancer screening recommendations as were women of other income levels. This is supported by results from a study conducted by (Cancer screening behaviors of low-income women: The impact of race, 1997) that reported women with low income do practice breast cancer screening and also suggested that early detection as well as appropriate therapy may help reduce the mortality among women, thereby offsetting the effect of income.

2.4.2 Education

Low educational attainment is an under recognized problem in health care today (Anderson et al., 2006). The National Adult Literacy Survey found that twenty one percent of adults do not have a high school education and another twenty-seven percent have only a high school education (Peek & Han, 2004). This suggests that between twenty-one to twenty-seven percent of adult women may not be able to understand breast cancer screening guidelines because of their educational

2.5 Summary

Breast cancer is the second leading cause of cancer deaths among women in the world, sub Saharan Africa included. The American Cancer Society has estimated that one out of every nine women will develop breast cancer sometime during her life. The mortality of breast cancer has steadily increased for women worldwide. Current research has

shown that many African women have their breast cancers detected at a later stage when their chance of survival is poorest (National Cancer Institute, 1999).Current research has not identified the cause of this phenomenon. According to the National Cancer Institute, death rates could be abridged by as much as thirty percent throughout breast cancer screening compliance.

Despite the evidence supporting breast self-examination (BSE), clinical breast examination (CBE), and screening mammography, many women do not comply with recommended breast cancer screening practices. Though most women aged 40 and over are aware of CBE, recent data from the National Cancer Institute have shown that only forty-five to fifty five percent have them once a year. Finally, though mammography screening has doubled in the past decade in developed countries, it still remains a problem to most developing countries. The literature does not report what specific percentage of Rwandan women who utilize CBE or screening mammography. Studies have been conducted in order to determine the reasons for the underutilization of or noncompliance with the recommended breast cancer screenings.

Data have reported that demographic factors such as age, race, religion, economic status, and education level significantly relate to a woman's compliance with breast cancer screening practices (Wilf-Miron et al., 2011).Data also show that breast cancer knowledge and awareness is related to breast cancer screening utilization (Hossain et al., 2014).

Other data show that individual breast cancer risk is significantly related to compliance with breast cancer. Inconsistencies are present in the literature. It does not appear that breast cancer can be prevented. The only mechanism to increase a Rwandan chance of survival is through breast cancer screening. Although the literature identifies factors related to mammography screening in general populations, little attention has been paid to variables related specifically to breast cancer screening in Rwandan women. The current study is the first to study this population to find out what factors influences utilization of breast cancer screening services

CHAPTER THREE

MATERIALS AND METHODS

3.1 Study site

The study was conducted in Kigali city. Kigali is the Capital City of the Republic of Rwanda and it has a land coverage area of 281.9 mi² with an estimated population of one million people. The City of Kigali is divided into three (3) Districts. It is presently inhabited by approximately 1 million inhabitants. Nyarugenge district was randomly chosen for this study. It has 7 Hospitals and Kigali University Teaching Hospital (CHUK) was purposively chosen due to the fact that it's the largest teaching and referral public Hospital. It is the main hospital in Kigali city, providing both inpatient and outpatient services for a large population and it offers Breast cancer screening services like Mammogram among others.

Map of Kigali city showing location of CHUK hospital location.

Figure 3.1: Map location of CHUK Hospital

3.2 Study population

The population comprised of all women attending Gynaecology clinics at CHUK hospital. The point of recruitment of the study population was within the health facility. The facility has a high women attendance rate for the gynaecology clinics

3.2.1 Inclusion criteria:

Inclusion criteria are the characteristics that the respondents must have in order to be included in the study (Trochim, 2006)The respondents meet the following criteria: All women aged above 18 years who attended the gynaecology department at the CHUK hospital and who consented to participate in the study. A gynaecologist and two nurses with at least 5years' experience at the CHUK hospital were selected as the key informants.

3.4.2 Exclusion criteria

Exclusion criteria are the characteristics that the respondents lack in order not to be included in the study (Trochim, 2006).All women aged below 18 years who attended CHUK hospital was excluded from the study, since they couldn't give consent to participate in such study without consent from their guardian. Women above 18 years who attended the selected hospital who refused to consent to participate in the study were also excluded

3.3 Variables

3.3.1 Dependent variables

Breast cancer screening practice (Clinical Breast Exam, Breast Self-Exam and Mammogram)

3.3.2 Independent Variables

- Socio- Demographic factors
- Level of awareness

3.4 Study design

Descriptive cross sectional study design was utilized which adopted both quantitative (through self-administered questionnaire) and qualitative (through key informants approaches)

3.5 Sampling

Convenience sampling was used to obtain the required number of respondents from the sampling frame. A sample size of 384 was used for the quantitative and 3staffs from the hospital for qualitative.

3.6 Data collection tools

All the women who consented were issued with pretested self-administered questionnaire (Appendix I) and the key informants from the health center were interviewed (Appendix II). Pretested self-administered questionnaires (Appendix I) were used. The questionnaire had two parts which asked respondents about their background information (socio demographic characteristics) and factors associated with breast cancer screening practice. KIs (Appendix II) were used to get information of the subject matter from the experts.

3.7 Sample size determination

Prior to this study, studies done in Rwanda did not reveal the prevalence of breast cancer screening among women. Therefore the prevalence was assumed to be 50%.This was determined using the formula by Fisher's et al. (1998).

n = Z^2pqD/d^2

Where; n = the desired sample size

Z = the standard normal deviate 1.96 at 95% confidence interval

P =assumed prevalence of practice of breast cancer screening is50% among women attending CHUK=0.5

q = 1-0.5 = 0.5

D=design effect = 1

d =level of statistical significance set at 0.05

n = (1.96)2 × 0.5 × (1-0.5)/ (0.05) ^2 =384

Sample size was=384

Three key informants were selected based on years of experience at the hospital gynaecology clinics and those above 5 years were considered for the study

3.8 Data analysis

The data collected was analysed using the Statistical Package for Social Sciences (SPSS) version 19.0. Descriptive statistics were used in analysis to give proportions and frequencies (CI=95%). For **objective one**: the overall awareness score among the participants was assessed using the seven (7) statements whose responses and scores were structured as follows:

- What is cancer (An abnormal growth of cells which are malignant =1; Untreatable disease = 1; A virus = 0; and Do not know = 0)
- Likely age to develop breast cancer in years (20s =1; 30s = 2; 40s= 3; 50s =4 and Do not know = 0)

- Nothing causes breast cancer; it just happens (Yes =0; No = 1; Do not know= 0)
- Heredity causes breast cancer (Yes =1; No = 0; Do not know= 0)
- Bad Nutrition causes breast cancer (Yes =0; No = 1; Do not know= 0)
- Changes in breast size are a symptom of breast cancer (Yes =1; No = 0; Do not know= 0)
- A lump or thickening of the breast is a symptom of breast cancer (Yes =1; No = 0; Do not know= 0)

The overall score was generated by aggregating the scores. The maximum attainable score was 10 and the minimum score was 0. The aggregate was converted into percentages and the level of awareness was classified as follows: Low (> 50%), Moderate (50-69%) and High (70% and above). **Objective 2**: The dependent variable which is utilization of breast cancer screening was assessed using the following parameters breast self-exam, ever done mammogram and examination by doctors/nurses. If respondents did one of the three parameters, then they are classified as using/utilization breast cancer screening. **Objective 3** was analyzed by using Pearson's Chi-square to determine the degree of association between independent and dependent variable. Bivariate analysis of the association between breast cancer screening utilization, socio demographic factors and level of awareness was performed Multivariate analysis with reduced model was used to confirm the significant variables. Levels of significance at $P \leq 0.05$ were considered and proved difference within parameters of estimates.

Key informants: Key informants were selected based on years of experience at the hospital gynaecology clinics and those with above 5 years of work at the clinic were considered for the study: two nurses and one gynaecology doctor that had worked in the hospital for more than five years at gynaecology clinics were selected and requested voluntarily to participate. The interviews focused on the objectives of this study; they were asked to draw on their own understanding and experience and reflect on those for others. Thus, these interviews provided a "clear view" of the practice of breast cancer

screening at CHUK, Hospital, Rwanda. Three themes emerged from initially “piling” things that went together into codes; then subsequent organization of codes into themes based on topics that were repeated across interviews; and then later collapsing of seven initial themes into three major themes that were relevant for the objectives of the study.

3.9 Ethical considerations

The researcher was granted approval of this thesis from the Health sciences department from the Jomo Kenyatta University of Agriculture and Technology (Kigali campus) REF: ERC letter (appendix 6) and from heath research Ethics committee at CHUK (appendix 7) which was granted and hence data collected. The purpose of research was explained to the respondents then written consent (both English and local Kinyarwanda language) was sought from them before collecting data. Two trained assistant data collectors first gave the written consent (Appendix 1) to respondents and enrolled those who consented voluntarily. Information obtained from the respondents was handled with maximum confidentiality and that no damage was tolerable on the data.

CHAPTER FOUR

RESULTS

4.1 Response rate

The study targeted sample size of 384 respondents from which all questionnaires were filled making a response rate of 100

4.2 Socio-demographic characteristics of respondents

This study enrolled 384 women from age 18 and above who had attended gynecology clinics. (n=217, 56.5%) were within the age group of 30-39 years followed by those aged 20-29 years (n=29, 33.6%). However, there were only (n=38, 9.9%) aged 40 years and above. Concerning level of education, about half (n=206, 53.6%) attained university education and almost a quarter attended (n=98, 25.5%) attended secondary school while the least percentage attended primary school (n=29, 9.9%). (n=347 (90.4%) of the respondents were married. The income status was also examined and most respondents (n=353, 91.9%) were in middle income status. The socio-demographic and economic characteristics are summarized in Table 4.1

Table 4.1: Socio-demographic characteristics of respondents

Variables (n=384)	Freq	%
Age in years		
20-29	129	33.6
30-39	217	56.5
40 and above	38	9.9
Level of education		
Primary	29	7.6
Secondary	98	25.5
College	51	13.3
University	206	53.6
Marital status		
Married	347	90.4
Single/widowed	37	9.6
Income status		
Low income status	27	7.0
Middle income status	353	91.9
High income status	4	1.0

4.3 Level of awareness on breast cancer and screening

4.3.1 Level of awareness on breast cancer screening

Table 4.2 shows the distribution of breast cancer screening awareness among respondents. Respondents (n=235, 61.2%) had never heard of any breast cancer screening while the remaining (n=149, 38.8%) indicated otherwise. The table further shows that (n=274, 71.4%) never heard of breast self-examination and about three quarter (n=292, 76.0%) never heard mammogram.

The level of awareness was determined by assigning scores of '1' and '0' to the response category 'ever heard' and 'never heard' respectively (See Appendix 5). The overall score was generated by aggregating the scores. The maximum attainable score was 3 and the minimum score was 0. The aggregate was converted into percentages and the level of awareness was classified as follows: low (<50%), moderate (50-69%) and high (70% and above).

As indicated in Table 4.2, majority of the respondents (n=235, 61.2%) had low level of b/c screening awareness followed by moderate level of awareness (n=96, 25.0%) while only (n=53, 13.8 %) had high level of breast cancer screening awareness.

Table 4.2: Level of awareness on breast cancer screening

Variables (n=384)	**Yes**		**No**	
	Freq	**%**	**Freq**	**%**
Ever heard of breast cancers Screening.	149	38.8	235	61.3
Ever heard of breast self-examination	110	28.6	274	71.4
Ever heard of mammogram	92	24	292	76
			Freq	**%**
Level of awareness on the breast cancer screening	Low		235	61.2
	Moderate		96	25.0
	High		53	13.8

4.3.2 Source of information about breast cancer screening

Among those who had information about breast cancer and screening, the highest percentage (39.6%) obtained the information through the internet and friends. Considerable percentage (30.9%) of the respondents obtained information about breast cancer and screening from the healthcare providers and about a quarter through the radio (Figure 3).

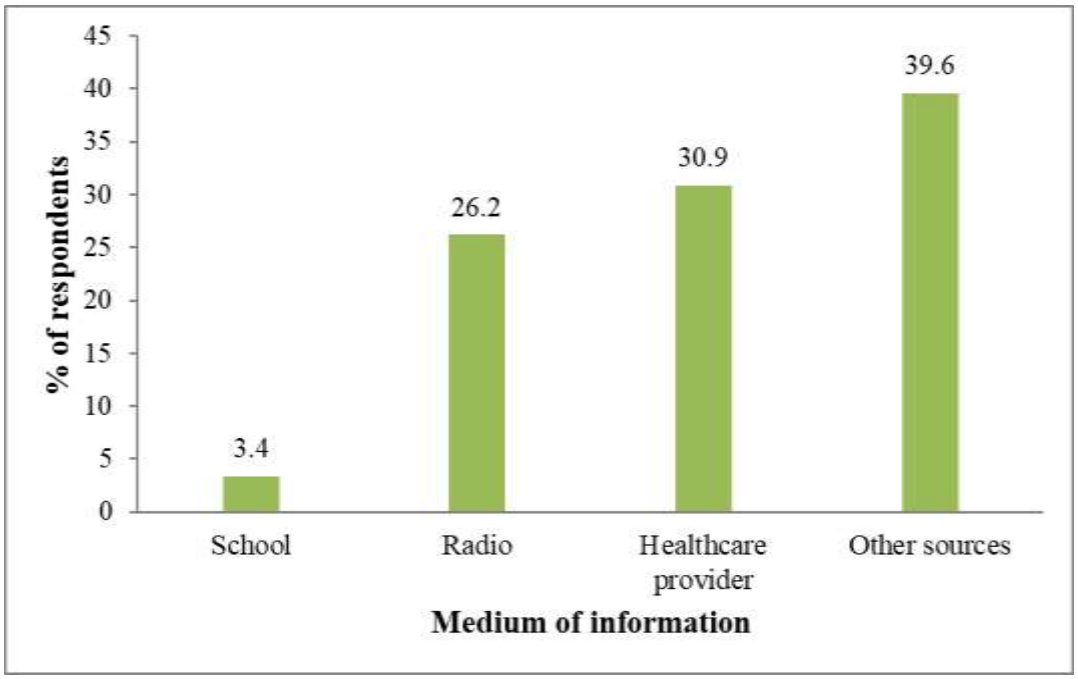


Figure 4.1: Source of information about breast cancer and screening

4.3.3 Awareness on the risk factors/causes of breast cancer

As indicated in the Table 4.3 below, the highest percentage (n=119, 31%) of the respondents defined cancer as untreatable disease followed by those who defined as an abnormal growth of cells which are malignant (n=108, 28.1%). However, (n=87, 22.7%) did not know what cancer is and (n=70, 18.2%) indicated it is a virus. (n=298 77.6%) of the respondents did not know the likely age to develop breast cancer.

Table 4.3: Awareness on the risk/causes of breast cancer

Variables (n=384)	Freq	%
An abnormal growth of cells which are malignant	108	28.1
Untreatable disease	119	31.0
A virus	70	18.2
Don't know	87	22.7
Likely age to develop breast cancer in years		
20	7	1.8
30	9	2.3
40	35	9.1
50 and above	35	9.1
Don't know	298	77.6

4.3.3.1 Awareness on the risk factors/causes of breast cancer

About two third of the respondents (n=263, 68.5%) believed that cancer cannot just happen without any underlying cause. The (n=149, 38.8%) of the respondent's did not know whether heredity causes breast cancer while (n=117, 30.5%) indicated it is not caused by heredity and (n=118, 30.7%) claimed heredity causes breast cancer. Majority (n=230, 59.9%) reported that bad nutrition causes breast cancer. About one third (n=124,32.3%) acknowledged that changes in breast size are a symptom of breast cancer, however the remaining indicated either it was not a symptom for cancer or did not know. Similarly, almost half of the respondents (n=191, 49.7%) did not know whether a lump or thickening of the breast is a symptom of breast cancer.

Table 4.4: Awareness on the risk/causes of breast cancer

Variables(n=384)	Agree		Neutral		Disagree	
	Freq	%	Freq	%	Freq	%
Nothing causes breast cancer; it just happens	30	9.4	85	22.1	263	68.5
Heredity causes breast cancer	118	30.1	149	38.8	117	30.5
Bad nutrition causes breast cancer	230	59.9	94	24.4	60	15.6
Changes in breast size are a symptom of breast cancer	124	32.3	168	43.8	92	24.0
A lump or thickening of the breast is a symptom of breast cancer	111	28.9	191	49.7	82	21.4

4.2.4 Level of awareness on the breast cancer risk

4.2.4: Level of awareness on breast cancer risks/factors or causes

The level of awareness on the breast cancer risk factors or causes was assessed using the seven (7) statements presented in Table 4.3 and the score assessment is presented in Appendix (5). The maximum attainable score was 10 and the minimum score was 0. The aggregate was converted into percentages and the level of awareness was classified as follows: Low (< 50%), Moderate (50-69%) and High (70% and above).

85.2% of the respondents had low level of awareness on the breast cancer risk factors/causes. However, 9.6% and 5.2% had moderate and high level of awareness on the same (Figure 4.2).

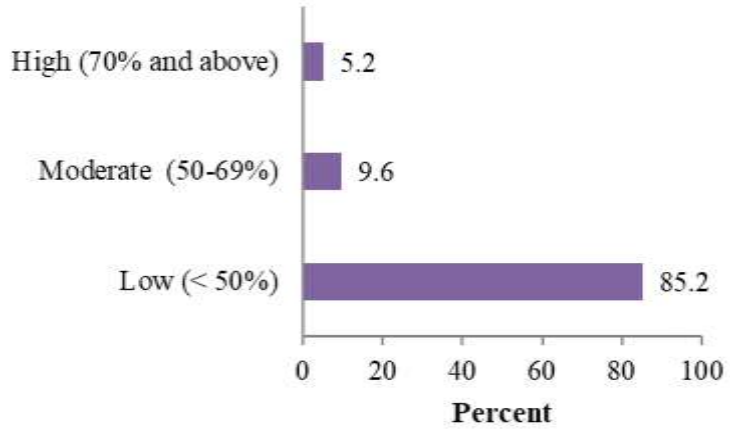


Figure 4.2: Level of awareness on the breast cancer risk factors or causes

4.4 Breast cancer screening practice

4.4.1 Breast cancer screening practices

The distribution of breast cancer screening practices is summarized in Table 4.5.The respondents (n=323, 84.1%) never practiced self-breast examination. Among those who ever practiced breast self-examination, (n=38, 62.3%) used to do it every month. Respondents were asked whether examined by doctors/nurses, about three quarter (n=284, 74.5%) indicated that their breasts had never been examined by doctor/nurse. Among those who examined by doctor/nurse, most (n=72, 73.5%) of them were examined when they had problems. The table further shows that large percentage (n=350, 91.1%) of the respondents never did mammogram while the remaining (n=34, 8.9%) indicated otherwise. When asked how frequently the mammogram was done, about a quarter (n=9, 26.5%) reported every 2 years but majority (n=24, 70.6%) indicated others. The main reason for not doing mammogram was that there was nothing wrong with them (n=278, 79.4%) followed by no breast cancer in the family (n=45, 12.9%) and afraid of finding a problem (n=27, 7.7%).

Table 4.5: Breast cancer screening practices

Variables (n=384)	Freq	%
Ever done breast self-exam		
Yes	61	15.9
No	323	84.1
Frequency of self-breast examination (n=61)		
Once a month	38	62.3
Once a year	4	6.6
Once every 2 years	9	14.8
Only when having a problem	10	16.4
Breast examined by doctor/nurse		
Yes	98	25.5
No	286	74.5
How often breast are examined by Doctor/Nurse		
Every year	12	12.2
Every two years	14	14.3
Only when there is a problem	72	73.5
Ever been done mammogram		
Yes	34	8.9
No	350	91.1
Frequency of mammogram (n=34)		
Only when a have a problem	1	2.9
Every 2 years	9	26.5
Others	24	70.6
Reasons for never had mammogram (n=350)		
Nothing wrong with me	278	79.4
Never had breast cancer in our family	45	12.9
Afraid of finding a problem	27	7.7
Willingness to do mammography if not done (n=350)		
Within 30 days	39	11.1
Within 6 months	22	6.3
Not willing	289	82.6

4.4.2 Practice of breast cancer screening

The dependent variable which is practice of breast cancer screening was assessed using the following parameters breast self-exam, ever done mammogram and examination by doctors/nurses. If respondents did one of the three parameters then they were classified as using/practising breast cancer screening.

The proportion of breast cancer screening practice in this study was found to be (n=136, 35.2 %.) However, the remaining (n=248, 64.8%) had never done any kind of breast cancer screening as indicated in Figure 5

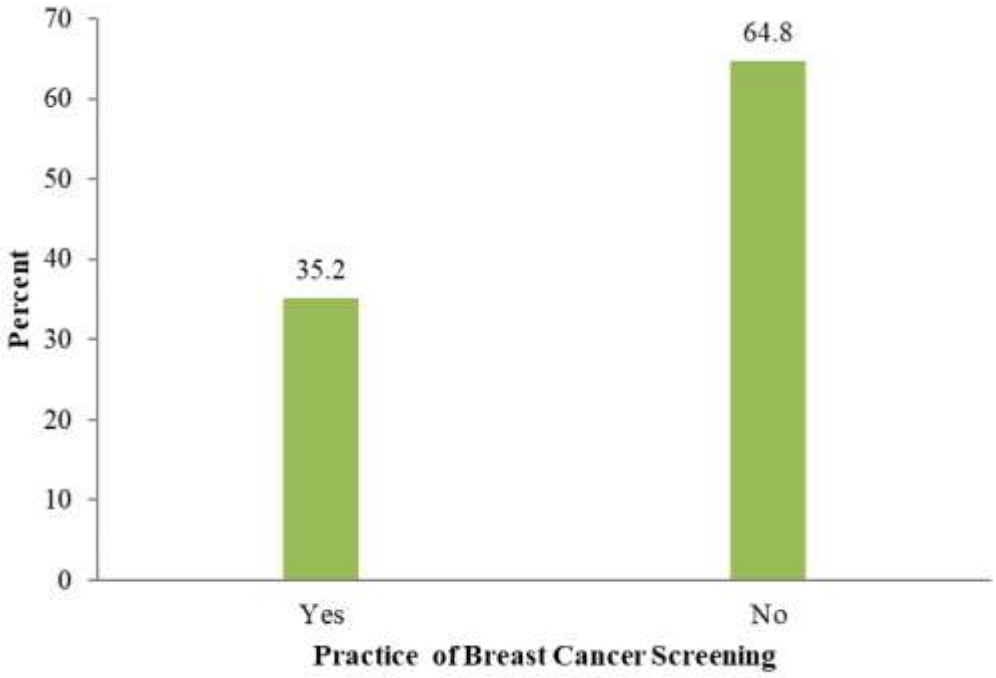


Figure 4.3: Practice of breast cancer screening

4.4.3 Variables that influenced decision for clinical breast examination and mammogram

About half of the respondents (n=205,53.4%), (n=193,50.3%), (n=192,50.0%) and (n=179,46.6%) disagreed that family history of breast cancer, serious concern that a mammogram will be painful, concern about the embarrassment of having a mammogram and distance to screening facilities influence for clinical breast examination and mammogram/ breast scan use respectively. However, majority (n=227, 59.1%) and (n=207,53.9%) agreed that consequence of presenting with advanced cancer

and cultural practices can influence them for clinical breast examination and mammogram/ breast scan use respectively in Table 4.6.

(n=237, 61.7%) and (n=223, 58.1%) of the respondents disagreed that stigma associated to cancer as well as perception that breast screening is not important can influence them for clinical breast examination and mammogram respectively. Respondents (n=272, 70.8%) were neutral on whether cost of a mammogram/breast scan influences them for clinical breast examination and mammogram/ breast scan use respectively (Table 4.6).

Table 4.6: Variables that influenced decision for clinical breast examination and mammogram

Variable(n=384)	Strongly disagree, Freq (%)	Disagree, Freq (%)	Neutral, Freq (%)	Agree, Freq (%)	Strongly agree, Freq (%)
Family history of breast cancer	45(11.7)	205(53.4)	68(17.7)	55(14.3)	11(2.9)
Consequence of presenting with advanced cancer	19(4.9)	55(14.3)	55(14.3)	**227(59.1)**	28(7.3)
Serious concern that a mammogram will be painful	39(10.2)	193(50.3)	132(34.4)	17(4.4)	3(0.8)
Concern about the embarrassment of having a mammogram	36(9.4)	192(50.0)	83(21.6)	67(17.4)	6(1.6)
Cultural practices	34(8.9)	70(18.2)	42(10.9)	207(53.9)	31(8.1)
Stigma associated to cancer	74(19.3)	237(61.7)	35(9.1)	14(3.6)	24(6.3)
Cost of a mammogram/breast scan	11(2.9)	48(12.5)	272(70.8)	48(12.)	5(1.3)
Distance to screening facilities	27(7.0)	179(46.6)	81(21.1)	82(21.4)	15(3.9)
Perception that breast screening is not important	68(17.7)	223(58.1)	40(10.4)	40(10.4)	13(3.4)

4.4 Health education regarding breast cancer screening

Table 4.7 summarizes the health education on breast cancer screening. Almost all of the respondents (n=375, 97.7%) indicated that they never had any educational sessions about breast health and screening by nurses/doctors at the Hospital within the last two years. Similarly, large percentage (n=377, 98.2%) never had guiding to perform breast self-examination.

The respondents who said they were never provided with brochures (n=347, 90.4%) and never given advise about the breast cancer screening 355(92.4%). (n=237, 61.7%) of the respondents were neutral on the regular follow up by healthcare providers using breast examination cards, considerable percentage (n=1026.0%) disagree that there was no regular follow up.

Table 4.7: Health education towards breast cancer screening (n=384)

Variables	Freq	%
Frequency of educational sessions about breast health and screening by nurses/doctors at the Hospital within the last two years		
Once every 3 months	9	2.3
Never	375	97.7
Frequency of guiding to perform breast self-examination at the health service within this year		
Once a year	7	1.8
Never	377	98.2
How often brochures were provided		
Rarely	37	9.6
Never	347	90.4
How often were you advised		
Rarely	29	7.6
Never	355	92.4
Regular follow up of mothers by nurses at the health facilities using breast examination cards		
Disagree	100	26.0
Neutral	237	61.7
Agree	47	12.2

4.5 Variables associated with practice of Breast Cancer Screening

4.5.1 Association between socio-demographic characteristics and breast cancer screening

Bivariate analysis of the association between socio-demographic characteristics and breast cancer screening utilization is shown in Table 4.8.There was significantly increased proportion of breast cancer screening among respondents aged 30-39 years (n=91,41.9%) [OR=2.73; 95%CI=1.65 - 4.51; P>0.001] and 40 years and above (n=17, 44.7%) [OR=3.06; 95%CI=1.42 - 6.59; P=0.004] than to those aged 20-29 years (20.9%).

The proportion of breast cancer screening was significantly more among respondents with primary school (n=14, 48.3%) [OR=2.44; 95%CI=1.11 - 5.37; P=0.027], secondary school 41(41.8%) [OR=1.88; 95%CI=1.14 - 3.11; P=0.014] and college attended (n=23(45.1%) [OR=2.15; 95%CI=1.14 - 4.03; P=0.018] compeered to those who attended university (n=57, 27.7%).

There was a significant association between marital status of respondents and breast cancer screening where single/widowed had more breast cancer screening (n=20, 54.1%) [OR=2.37; 95%CI=1.20 - 4.70; P=0.013] compared to married women (n=115, 33.1%).

Table 4.8: Association between demographic characteristics and breast cancer screening practice

Variables	Yes, (n=136)		No, (n=248)		OR	95% CI		p value*
	N	%	n	%		Lower	Upper	
Age in years								
20-29	27	20.9	102	79.1				
30-39	91	41.9	126	58.1	2.73	1.65	4.51	< 0.001
40 and above	17	44.7	21	55.3	3.06	1.42	6.59	0.004
Level of education								
Primary	14	48.3	15	51.7	2.44	1.11	5.37	0.027
Secondary	41	41.8	57	58.2	1.88	1.14	3.11	0.014
College	23	45.1	28	54.9	2.15	1.14	4.03	0.018
University	57	27.7	149	72.3	Ref			
Marital status								
Married	115	33.1	232	66.9	Ref			
Single/widowed	20	54.1	17	45.9	2.37	1.20	4.70	0.013
Income status								
Low income status	12	44.4	15	55.6	Ref			
Middle income status	123	34.8	230	65.2	0.67	0.30	1.47	0.318
High income status	0	0.0	4	100.0	Ref			

*Significant at p<0.05 bolded; OR =Odds ratio; CI= Confidence Interval

4.5.2: Association between awareness on breast cancer screening and breast cancer screening

Analysis of the relationship between awareness on breast cancer screening and breast cancer screening utilization is summarized in Table 4.9. Respondents who ever heard of breast cancer screening had significantly increased proportion of breast cancer screening 86(57.7%) [OR=5.18; 95%CI=3.30 - 8.15; P>0.001] compared to respondents who never heard about it (n=49, 20.9%). Likewise, the proportion of breast cancer screening was significantly more among respondents who ever heard of breast self-examination 68(61.8%) [OR=5.00; 95%CI=3.12 - 8.03; P>0.001] than those who indicated otherwise (n=67, 24.5%). Similarly, respondents who ever heard of mammogram had significantly

increased proportion of breast cancer screening (n=57, 62.0%) [OR=4.47; 95%CI=2.73 - 7.33; P>0.001] compared to respondents who never heard about it (n=78, 26.7%).

Moreover, there was significantly increased proportion of breast cancer screening among respondent who had moderate level of screening awareness (n=47, 49.0%) [OR=2.73; 95%CI=1.65 - 4.51; P>0.001] and high level of screening awareness (n=39, 73.6%) [OR=3.06; 95%CI=1.42 - 6.59; P=0.004] than to those who had low level of screening awareness (n=49, 20.9%).

Table 4.9: Association between awareness on breast cancer screening and practice breast cancer screening

Variables	Yes, (N=136)		No, (N=248)		OR	95% CI		p value*
	n	%	n	%		Lower	Upper	
Ever heard of breast cancer screening								
Yes	86	57.7	63	42.3	5.18	3.30	8.15	<0.001
No	49	20.9	186	79.1	Ref			
Ever heard of breast self-examination								
Yes	68	61.8	42	38.2	5.00	3.12	8.03	<0.001
No	67	24.5	207	75.5	Ref			
Ever heard of mammogram								
Yes	57	62.0	35	38.0	4.47	2.73	7.33	<0.001
No	78	26.7	214	73.3	Ref			
Level of awareness on the breast cancer screening								
Low (> 50%)	49	20.9	186	79.1	Ref			
Moderate (50-69%)	47	49.0	49	51.0	3.64	2.19	6.06	<0.001
High (70% and above)	39	73.6	14	26.4	10.57	5.32	21.02	<0.001

Significant at p<0.05 bolded; OR =Odds ratio; CI= Confidence Interval

4.5.4 Association between institutional characteristics of breast cancer screening and practice breast cancer screening

Analysis of the relationship between institutional characteristics of breast cancer screening and utilization breast cancer screening is summarized in Table 4.12. Respondents who were provided with brochures rarely had significantly more proportion

of breast cancer screening 21(56.8%) [OR=2.68; 95%CI=1.35 - 5.34; P=0.004] than to those who never provided with brochure 114(32.9%). Utilization of breast cancer screening was significantly more among respondents who used to get advice rarely about breast cancer screening 20(69.0%) [OR=4.64; 95%CI=2.05 - 10.50; P<0.001] compared to those who never gotten any advice 115(32.4%). Respondents who agreed that there was regular follow up of mothers by nurses at the health facilities using breast examination cards had significantly more to have breast cancer screening (n=25,53.2%) [OR=2.11; 95%CI=1.04 - 4.27; P=0.038] than those who disagreed with the statement (n=35, 35.0%).

Table 4.10: Association between institutional characteristics of breast cancer screening and practice breast cancer screening (n=384)

Variables	Yes, (n=136)		No, (n=248)		OR	95% CI		p value*
	n	%	n	%		Lower	Upper	
Frequency of educational sessions about breast health and screening by nurses/doctors at the Hospital within the last two years								
Once every 3 months	4	44.4%	5	55.6%	1.49	0.39	5.64	0.555
Never	131	34.9%	244	65.1%	Ref			
Frequency of guiding to perform breast self-examination at the health service within this year nurses/doctors								
Once a year	4	57.1%	3	42.9%	2.50	0.55	11.36	0.219
Never	131	34.7%	246	65.3%	Ref			
How often brochures were provided								
Rarely	21	56.8%	16	43.2%	2.68	1.35	5.34	**0.004**
Never	114	32.9%	233	67.1%	Ref			
How often were you advised								
Rarely	20	69.0%	9	31.0%	4.64	2.05	10.50	**<0.001**
Never	115	32.4%	240	67.6%	Ref			
Regular follow up of mothers by nurses at the health facilities using breast examination cards								
Disagree	35	35.0%	65	65.0%	Ref			
Neutral	75	31.6%	162	68.4%	0.86	0.53	1.41	0.549
Agree	25	53.2%	22	46.8%	2.11	1.04	4.27	**0.038**

Significant at p<0.05 bolded; OR =Odds ratio; CI= Confidence Interval

4.6 Multivariable analysis of factors associated with breast cancer screening practice

Multiple regression analysis was performed in order to identify factors independently associated with breast cancer screening practice among women attending university

Hospital Kigali. Ten (10) factors that associated with breast cancer screening at P<0.05 during bivariate analysis were subjected all together in a multiple regression analysis (Table 4.13; Full model). Upon fitting these factors using binary logistic regression and by specifying *'backward LR'* method with removal at P<0.05, five (5) factors remained in the final analysis or reduced model (Table 4.13).

Respondents aged 30-39 years were about 3.5 times [AOR=3.47; 95%CI=1.71 - 7.03; P=0.001] while those 40 years and above were about 4 times [AOR=4.18; 95%CI=1.65 - 10.57; P=0.003] more likely to be screened for breast cancer than those aged 20-29 years. Single/widowed women were about 5 fold more likely to practice breast cancer screening [AOR=5.37; 95%CI=2.18 - 13.26; P<0.001] compared to their married counterparts.

Respondents with moderate level of breast cancer screening awareness were 4 times [AOR=3.95; 95%CI=2.16 - 7.20; P>0.001] and those with high level of screening awareness were 17 times [AOR=17.23; 95%CI=7.62 - 38.99; P<0.001] more likely to undergone breast cancer screening than those who had low level of screening awareness. Respondents who disagreed with the statement that presenting with advanced cancer can influence for clinical breast examination and mammogram/ breast scan use were about 4 times more likely to use breast cancer screening compared to those who agreed with the statement; [AOR=4.29; 95%CI=2.21 - 8.33; P<0.001].Respondents who agreed that there was regular follow up of mothers by nurses at the health facilities using breast examination cards were 3 times more likely to have breast cancer screening [AOR=3.05; 95%CI=1.31 - 7.10; P=0.010] than those who disagreed with the statement (35.0%).

Table 4.11: Multivariate analysis of factors associated with breast cancer screening practice

Variables(n=384)	AOR	95% CI ᵠ		p value*
		Lower	Upper	
Full model				
Age in years				
20-29	Ref			
30-39	3.25	1.51	6.99	0.003
40 and above	2.61	0.93	7.36	0.070
Level of education				
Primary	2.84	1.06	7.58	0.037
Secondary	0.75	0.38	1.49	0.412
College	2.10	0.85	5.18	0.108
University	Ref			
Marital status				
Married	Ref			
Single/widowed	4.06	1.52	10.86	0.005
Level of awareness on the breast cancer screening				
Low (> 50%)	Ref			
Moderate (50-69%)	3.53	1.83	6.82	<0.001
High (70% and above)	39.80	12.27	129.07	<0.001
Level of awareness on the risk factors				
Low (25-49%)	Ref			
Moderate (50-74%)	2.43	0.82	7.21	0.110
High (75% and above)	0.32	0.06	1.63	0.168
Consequence of presenting with advanced cancer				
Disagree	5.98	2.75	13.01	<0.001
Neutral	4.34	1.83	10.30	0.001
Agree	Ref			
Stigma associated to cancer				
Disagree	Ref			
Neutral	1.13	0.45	2.83	0.803
Agree	0.70	0.25	1.94	0.493
How often brochures were provided				
Rarely	0.11	0.02	0.60	0.011
Never	Ref			
How often were you advised				
Rarely	10.76	2.12	54.70	0.004
Never	Ref			
Regular follow up of mothers by nurses at the health facilities using breast examination cards				
Disagree	Ref			
Neutral	2.75	1.33	5.70	0.006
Agree	2.32	0.91	5.89	0.077

Significant at p<0.05 bolded; AOR =Adjusted odds ratio; CI= Confidence Interval

Table 4.12 Multivariate analysis of factors associated with breast cancer screening practice.

Variables(n=384)	AOR	95%CI		P
Reduced model		**Lower**	**Upper**	**value***
Age in years				
20-29	Ref			
30-39	3.47	1.71	7.03	0.001
40 and above	4.18	1.65	10.57	0.003
Marital status				
Married	Ref			
Single/widowed	5.37	2.18	13.26	0.000
Level of awareness on the breast cancer screening				
Low (> 50%)	Ref			
Moderate (50-69%)	3.95	2.16	7.20	<0.001
High (70% and above)	17.23	7.62	38.99	<0.001
Consequence of presenting with advanced cancer				
Disagree	4.29	2.21	8.33	<0.001
Neutral	4.29	2.08	8.87	<0.001
Agree	Ref			
Regular follow up of mothers by nurses at the health facilities using breast examination cards				
Disagree	Ref			
Neutral	2.79	0.96	5.37	0.060
Agree	3.05	1.31	7.10	0.010

* **Significant at p<0.05 bolded; AOR =Adjusted odds ratio; CI= Confidence Interval**

4.7 Key informants interview

The three participants of the key informant interview were selected based on years of experience at the hospital gynecology clinics and those above 5 years were considered for the study: two nurses and one gynecology doctor that have worked in the hospital for more than five years at gynecology clinics were selected and requested voluntarily to participate. The interviews focused on the objectives of this study; they were asked to draw on their own understanding and experience, and to reflect on the understandings and experiences of others in their department. Thus, these interviews provide a "clear view" of the practice of breast cancer screening at CHUK, Hospital, Rwanda. Three themes emerged from initially "piling" things that went together into codes; then

subsequent organization of codes into themes based on topics that were repeated across interviews; and then later collapsing of seven initial themes into three major themes that were relevant for the objectives of the study.

4.7.1 Operational breast screening services

When asked if the health facility had operational breast clinic and services offered in it. Key informants displayed common understanding that there was no specific breast clinic but gynecology clinics served for the purpose and that screening was done when needed not routinely. This clearly revealed that there is no specific clinic for breast exam all are dealt with other gynecological problems at same clinic and thus there should be specific days for breast exam only in order to promote awareness. Key informant response to breast health protocol mentioned one common protocol followed as physical exam. All mentioned and agreed to the concept that it's done during physical exam of the client when consulting clinic.

One key informant said

> *"Most common breast health protocol is through clinical exam for those consulting and health education to some who come for other problems other than breast exam*".

After mentioning the operational breast protocol used in the facility, the key informants were asked if the hospital had a working mammogram and all of them agreed that there was a working mammogram but two among them added that: 'breast scan was not available at the facility'. Key informant said

> *"I have not seen breast scan but Mammogram is available in the facility and its working but there is some underutilization by women and thus making breast cancer screening low"*

It's clear that mammogram is offered in the facility but women seem not to utilize this service. May be reasons to this should be investigated.

4.7.2 Aspects of breast screening and time allocated

On which aspects of breast cancer and screening the clinics covered, majority of the key informants said it dealt with Diagnostic issues especially cases referred from nearby health centers. It's evident that the major aspect reported by the key informants in clinic is for diagnostic purposes and few women come for regular checkups probably those referred to the facility. One participant said

> 'Breast screening is done when a woman reports a problem mostly". Another one said
>
> 'It's for diagnostic purposes when a woman comes or referred with a problem"

All the three key informants agreed when asked how much time is allocated for breast health education relative to other health issues in a month within the clinics one wasn't about time but said

> *"Sometimes it's mentioned to women when they come for clinics", the other said.*
>
> *"Think there is no specific head to toe examination it's mentioned no specific time is allocated they all pointed out that no specific time was allocated.*

4.8 Awareness and follow-up for screening

All the key informants reported that "*no brochures* but follow up *yes* for those women with issues any specific cards for BSE"Of the three one added that:

> *"Breast exam information is found at notice board for gynecology department"***.**

Having known whether health education and awareness was being practiced adequately, key informants were then asked what factors are likely to influence the ability of women of reproductive age to undertake breast examination and screening for cancer. Majority talked of low level of awareness. One participant mentioned that:

> *"Health brochures are only pinned in the wall at door entrance of the gynecology clinic and usually after consultation they are given a date to come back for follow up if there is a problem found only like lump on breast no cards for BSE". Another said that:*

> *"Little information on breast cancer screening, age of women some think they are too young to get it, knowledge on the disease" and Knowledge deficit on the disease, money some are poor and can't afford mammogram"*

Key informants seemed to point out level of awareness as the most factor affecting ability of women to undertake breast cancer screening. Without knowledge on breast cancer screening and prevention it's very difficult for women to just go for screening of their breast. Also lack of awareness by health providers to women hinders them from knowing that it is essential to screen for breast.

4.9 Summary of the Independent and dependant Variables

The main variables that influenced the utilization of breast cancer screening in the facility through multiple regression analysis in reduced model showed five main independent variables that proved presence of statistical relationship. They were as follows: Age 30-39 years (0.003<0.05), level of education-primary (0.037<0.05), level of awareness both moderate and high (0.000<0.005) respectively, consequence of presenting with advanced cancer both those who disagreed and neutral (0.000<0.05) and finally is the regular follow up of mothers by nurses at the health facilities using breast examination cards (0.010<0.05)

CHAPTER FIVE

DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS.

5.1 Discussion

Breast cancer, which is preventable and treatable, is one among the leading causes of death among women in Rwanda. Despite this upsetting statistics, this study indicates low awareness of breast cancer screening, risk factors and the practice of self-breast exam was considerably low among women attending CHUK Hospital, Rwanda. This appears to be a problem of developing and underdeveloped worlds as studies done in South Africa by (Apffelstaedt et al., 2014) and in Nigeria by (Arulogun & Maxwell, 2012) and in Kenya by (Opwora et al., 2011) which showed a related pattern of lack of awareness on breast cancer screening

5.1.1 Level of awareness on breast cancer screening among women.

A public that is well informed not only carries out BSE, but also consults medical experts about any breast changes and the appropriate health actions to take in order to avoid the complicated effects of late breast cancer.This concurs with current study that showed majority of the respondents (n=235, 61.2%) knew nothing about breast cancer thus had low level of awareness on breast cancer screening.

Among (n=274, 71.4%) of respondents never heard of self-breast examination and (n=292(76%) knew nothing about mammogram. This reflected very low level of awareness among the respondents and could be because they didn't get the importance of screening. It's in line with a study by (Gimeno Garcia et al., 2014) that a much informed public tend to screen more for breast cancer screening

About breast cancer causes/risk awareness majority of women (n=119, 31%) when asked believed that cancer was untreatable disease this was due to the fact that most cancers are known to be untreatable, also highest percentage (n=298, 77.6%) of women

were not aware of the age one is likely to develop cancer. This showed that most women are not aware on the causes and risks of breast cancer and that health education was very low on breast cancer causes and risks. The study proved 85.2% of women had low level of awareness on the breast cancer risks/causes and that health education on breast cancer risks/causes seemed to be low this agrees with the American Cancer Society that Breast cancer knowledge refers to a woman's knowledge of breast cancer risk, breast cancer screening and its treatment.

Awareness on breast cancer risks/causes is a predisposing variable that determines women's breast cancer screening compliance. (Lee-Lin et al., 2012) reported breast cancer knowledge is important because women who have an appropriate amount of breast cancer knowledge are more aware of their risk for breast cancer and are more likely to comply with breast cancer screening.

5.1.2 Proportion of women who practiced breast cancer screening to those who didn't

This study sought to find out Rwandan women who practiced breast cancer screening and only (n=136, 35.2%) screened their breast while (n=248, 64.8%) women never had their breast examined. It further proved that majority of women (n=323, 84.1%) never practiced self-breast exam, (n=284, 74.5%) were never examined by doctor/nurse and a large percentage (n=350, 91.1%) never did mammogram.

Main reason for not doing mammogram was that nothing was wrong with them(n=278,79.4%).This agrees with a study by (Ferlay et al., 2015) that despite the reported awareness and BSE being recommended for over thirty years, the literature indicates that fewer than thirty-six percent of all women complete this procedure as recommended.

Regular mammography has been shown to reduce mortality from breast cancer in women aged 40 and older (Noroozi & Tahmasebi, 2011) but still majority of Rwandan women don't have their breast screened this could be attributed to factors such as low

income, breast cancer knowledge and for instance in Rwanda; the availability of mammogram in hospitals and it's evident that few hospitals offer these services thus limiting the utilization.

The factors influencing decision to breast screen practices(clinical breast exam, self-breast exam and mammogram) that showed marked significance were: Respondent who disagreed with statement that consequence of presenting with advanced cancer influence screening of breast (n=39,52.7%) Similarly, significance more among respondent who agreed that stigma associated to cancer can influence to decision of clinical breast examination and mammogram/ breast scan use was noted (n=19,50.0%)compared to those who disagreed with the statement (31.8%).This results are in line with a study done in Kenya by (Opwora et al., 2011) that showed that most factors that influenced breast cancer screening included being afraid to know the extent of breast cancer and instilled fear of being screened for it and that stigma influenced the decision of breast screening among women.

On Health education regarding breast scan/institutional characteristics significance was noted among respondents who were provided with brochures rarely (P=0.004].Respondents who used to get advice rarely on breast cancer screening (P=0.001]and those respondents who agreed that there was regular follow up of mothers by nurses at the health facilities using breast examination cards (P=0.038].This shows that health provider didn't maximize ways to give awareness on breast cancer and it's in line with a study by (Noroozi & Tahmasebi, 2011) which cited breast cancer knowledge as the best predictor of breast self-examination and that breast cancer knowledge has a positive relationship with breast cancer screening, it showed that as a woman's breast cancer knowledge is increased, her breast cancer screening practices will increase as well.

This study intended to find out factors influencing practice of breast cancer screening by using bivariate analysis of the association between socio-demographic characteristics, level of awareness, and breast cancer screening practice. Factors that proved significant

were: Respondents aged 30-39 years (n=91 41.9%) a significant association between marital status of respondents and breast cancer screening where single/widowed had more breast cancer screening (n=20, 54.1%).

Respondents who ever heard of breast cancer screening (P=0.001],respondents who ever heard of breast self-examination (P=0.001],respondents who ever heard of mammogram (P=0.001).This backed a study done by(Ban & Godellas, 2014) that reported that majority of respondents were not aware of breast cancer screening and proved the importance of women who having an appropriate amount of breast cancer awareness are more aware of their risk for breast cancer and are more likely to comply with breast cancer screening.

A lack of breast cancer awareness and its associated risks has been the most common reason given by women for not practising breast cancer screening (Vahabi, 2011). (Ferlay et al 2015) further states that Low awareness about causation and vulnerability of the respondents to breast cancer imply that the respondents are unaware of the implications of breast changes, the necessity of early breast screening and where to obtain the screening services and it supports the current study.

It was also realized that practice of breast cancer screening among respondent had significance with consequence of presenting with advanced cancer influencing the decision of clinical breast examination and mammogram/ breast scan use (n=39, 52.7%).Similarly, respondent who agreed that stigma associated to cancer could influence the decision of clinical breast examination and mammogram/ breast scan use were screened for breast cancer more (P=0.028]. This results are in line with a study done in Kenya by (Opwora et al., 2011) that showed that most factors that influenced breast cancer screening included being afraid to know the extent of breast cancer and instilled fear of being screened for it.

Stigma influenced the decision of breast screening among women. Among the institutional characteristics that showed significance to breast cancer screening and

utilization were: Brochures were provided rarely(p=0.004),Advise was rarely given(0.000) and regular follow up by nurses on using breast cards(p=0,038).This proved low level of awareness among respondents on breast cancer screening yet it's very importance for them to practice screening more often.

Its agrees with a study by(Ashing-Giwa et al., 2004) that information on breast cancer is important because women who have an appropriate amount of breast cancer awareness are more aware of their risk for breast cancer and are more likely to comply with breast cancer screening and healthcare providers play a big role in educating women.

5.1.3 Factors associated with breast cancer screening among

Variables that came out strongly to influence practice of breast cancer screening independently in this study after Multivariate analysis were: age of respondent's 30-39years (p>0.001) marital status particularly single/widowed (p=0.001), level of awareness both moderate (p=0.001) and high level of awareness (p=0.001) respectively.

Respondents who disagreed that presenting with advanced cancer could influence the clinical breast examination and mammogram/ breast scan use (p<0.001) and finally Respondents who agreed that there was regular follow up of mothers by nurses at the health facilities (p<0.010).This findings backs a study done on the breast cancer prevention awareness and breast examination attitudes among Hong Kong women who work in a medical environment that showed breaches in utilization of breast cancer screening and that factors like level of awareness, and age influenced breast cancer screening.

5.2 Study limitations

5.2.1 Recall bias

Some respondents could not remember how they got information on breast cancer screening

5.3 Conclusion

- It's quite evident that, there was low level of awareness among the respondents in this study. Those with high and moderate level of awareness were more likely to practice breast cancer screening.
- Most participants didn't practice breast cancer screening and hence huge gap on breast screening practices.
- This study clearly points out that: age, marital status, level of awareness, consequence of presenting with advanced cancer and regular follow up of women highly influenced breast cancer screening practice hence need for more awareness must be done to addresRs these issues through more training to health care providers on importance of awareness and advertising through media. It is essential that another study be done on breast cancer screening practices, prevention and attitudes.

5.3 Recommendations

The commitment to prevent and treat breast cancer deserves attention and support. Unnecessary suffering and death will only be prevented when all women and girls are provided access to information, services and tools to prevent breast cancer. Based on the conclusion of this study, the following recommendations are suggested:

1. Strategies to increase awareness on importance breast cancer screening, risk fa

2. Aggressive awareness campaigns and education programs to enlighten the public about breast cancer screening practice should be broad to encompass risk factors and modes of prevention of the disease
3. Breast cancer screening should be incorporated into the reproductive health and other regular checkups.

REFERENCES

Abdullah, N. N., Aziz, N. A., Rampal, R., & Al-Sadat, N. (2011). Mammography screening uptake among hospital personnel in kuala lumpur tertiary hospital. *Asian Pacific Journal of Cancer Prevention*, *12*(10), 2643–2647.

Cancer facts and figures, American Cancer Society ___ (1999).

American Cancer Society. (2016). Cancer Facts & Figures 2016. *Cancer Facts & Figures 2016*.

Anderson, B. O., Shyyan, R., Eniu, A., Smith, R. A., Yip, C. H., Bese, N. S., Chow, L. W. C., Masood, S., Ramsey, S. D., & Carlson, R. W. (2006). Breast cancer in limited-resource countries: An overview of the breast health global initiative 2005 guidelines. In *Breast Journal*, *12*(Suppl. 1).

Apffelstaedt, J. P., Dalmayer, L., & Baatjes, K. (2014). Mammographic screening for breast cancer in a resource-restricted environment. *South African Medical Journal*.

Arulogun, O. S., & Maxwell, O. O. (2012). Perception and utilization of cervical cancer screening services among female nurses in University College Hospital, Ibadan, Nigeria. *Pan African Medical Journal*, *11*, 69.

Ashing-Giwa, K. T., Padilla, G., Tejero, J., Kraemer, J., Wright, K., Coscarelli, A., Clayton, S., Williams, I., & Hills, D. (2004). Understanding the breast cancer experience of women: a qualitative study of African American, Asian American, Latina and Caucasian cancer survivors. *Psychooncology*, *13*(6), 408–428.

Babitsch, B., Gohl, D., & von Lengerke, T. (2012). Re-revisiting Andersen's Behavioral Model of Health Services Use: a systematic review of studies from 1998–2011. *GMS Psycho-Social-Medicine*, *9*, 1–15. Retrieved from http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3488807/%5Cnhttp://www.pubmedcentral.nih.gov/articleren

der.fcgi?artid=3488807&tool=pmcentrez&rendertype=abstract

Ban, K. A., & Godellas, C. V. (2014). Epidemiology of Breast Cancer. In *Surgical Oncology Clinics of North America*, *23*(3), 409–422)

Bener, A., Honein, G., Carter, A. O., Da'ar, Z., Miller, C., & Dunn, E. V. (2002). The determinants of breast cancer screening behavior: a focus group study of women in the United Arab Emirates. *Oncology Nursing Forum*, *29*(9), E91-8. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/12370705

Bizimana, J.-P., Twarabamenye, E., & Kienberger, S. (2015). Assessing the social vulnerability to malaria in Rwanda. *Malaria Journal*, *14*(1), 2. Retrieved from http://www.scopus.com/inward/record.url?eid=2-s2.0-84924094246&partnerID=tZOtx3y1

Bleyer, A., & Welch, H. G. (2012). Effect of three decades of screening mammography on breast-cancer incidence. *The New England Journal of Medicine*, *367*(21), 1998–2005. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/23171096

Boene, H., González, R., Valá, A., Rupérez, M., Velasco, C., Machevo, S., Sacoor, C., Sevene, E., Macete, E., Menéndez, C., & Munguambe, K. (2014). Perceptions of malaria in pregnancy and acceptability of preventive interventions among Mozambican pregnant women: Implications for effectiveness of malaria control in pregnancy. *PLoS ONE*, *9*(2).

Bollen, K. a, Glanville, J. L., & Stecklov, G. (2007). Socio-economic status, permanent income, and fertility: a latent-variable approach. *Population Studies*, *61*(1), 15–34.

Brandt, K. R., Scott, C. G., Ma, L., Mahmoudzadeh, A. P., Jensen, M. R., Whaley, D. H., Wu, F. F., Malkov, S., Hruska, C. B., Norman, A. D., Heine, J., Shepherd, J., Pankratz, V. S., Kerlikowske, K., & Vachon, C. M. (2016). Comparison of Clinical and Automated Breast Density Measurements: Implications for Risk Prediction and

Supplemental Screening. *Radiology*.

Brouwers, M. C., De Vito, C., Bahirathan, L., Carol, A., Carroll, J. C., Cotterchio, M., Dobbins, M., Lent, B., Levitt, C., Lewis, N., McGregor, S. E., Paszat, L., Rand, C., & Wathen, N. (2011). Effective interventions to facilitate the uptake of breast, cervical and colorectal cancer screening: an implementation guideline. *Implementation Science : IS*, *6*, 112. Retrieved from http://www.pubmedcentral.nih .gov/articlerender.fcgi?artid=3222606&tool=pmcentrez&rendertype=abstract

Carmichael, A R., & Bates, T. (2004). Obesity and breast cancer: a review of the literature. *Breast (Edinburgh, Scotland)*, *13*(2), 85–92.

Conway-Phillips, R., & Millon-Underwood, S. (2009). Breast cancer screening behaviors of African American women: a comprehensive review, analysis, and critique of nursing research. *The ABNF Journal*, *20*, 97–101.

Desantis, C., Ma, J., Bryan, L., & Jemal, A. (2014). Breast cancer statistics, 2013. *CA: A Cancer Journal for Clinicians*, *64*(1), 52–62. https://doi.org/10.3322/caac.21203

DeSantis, C., Siegel, R., Bandi, P., & Jemal, A. (2011). Breast cancer statistics, 2011. *CA: A Cancer Journal for Clinicians*, *61*(6), 409–418.

Ferlay, J., Shin, H. R., Bray, F., Forman, D., Mathers, C., & Parkin, D. M. (2010). Estimates of worldwide burden of cancer in 2008: GLOBOCAN 2008. *International Journal of Cancer*, *127*(12), 2893–2917.

Ferlay, J., Soerjomataram, I., Dikshit, R., Eser, S., Mathers, C., Rebelo, M., Parkin, D. M., Forman, D., & Bray, F. (2015). Cancer incidence and mortality worldwide: Sources, methods and major patterns in GLOBOCAN 2012. *International Journal of Cancer*, *136*(5), E359–E386.

Garbers, S., Jessop, D. J., Foti, H., Uribelarrea, M., & Chiasson, M. A. (2003). Barriers

to Breast Cancer Screening for Low-income Mexican and Dominican Women in New York City. *Journal of Urban Health*, *80*(1), 81–91.

Gimeno Garcia, A. Z., Hernandez Alvarez Buylla, N., Nicolas-Perez, D., & Quintero, E. (2014). Public Awareness of Colorectal Cancer Screening: Knowledge, Attitudes, and Interventions for Increasing Screening Uptake. *ISRN Oncology*, *2014*, 425787. Retrieved from http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3963118&tool=pmcentrez&rendertype=abstract

Gøtzsche, P. C., & Jørgensen, K. J. (2013). Screening for breast cancer with mammography. *The Cochrane Database of Systematic Reviews*, *6*, CD001877. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/23737396

Hajian-Tilaki, K., & Auladi, S. (2014). Health belief model and practice of breast self-examination and breast cancer screening in Iranian women. *Breast Cancer*.

Hossain, M. S., Ferdous, S., & Karim-Kos, H. E. (2014). Breast cancer in South Asia: A Bangladeshi perspective. In *Cancer Epidemiology*.

Kim, H., & Lee, M. (2015). Factors Associated with Health Services Utilization between the years 2010 and 2012 in Korea: A Panel Study Using Andersen's Behavioral Model. *Osong Public Health and Research Perspectives*. Retrievedfrom http://www.sciencedirect.com/science/article/pii/S2210909915300813

Lee-Lin, F., Menon, U., Nail, L., & Lutz, K. F. (2012a). Findings from Focus Groups Indicating what Chinese American Immigrant Women Think about Breast Cancer and Breast Cancer Screening. *JOGNN - Journal of Obstetric, Gynecologic, and Neonatal Nursing*, *41*(5), 627–637.

Lee-Lin, F., Menon, U., Nail, L., & Lutz, K. F. (2012b). Findings from Focus Groups Indicating what Chinese American Immigrant Women Think about Breast Cancer and Breast Cancer Screening. *JOGNN - Journal of Obstetric, Gynecologic, and*

Neonatal Nursing.

Marsh, G. M., Morfeld, P., Collins, J. J., & Symons, J. M. (2014). Issues of methods and interpretation in the National Cancer Institute formaldehyde cohort study. In *Journal of Occupational Medicine and Toxicology*. https://doi.org/10.1186/1745-6673-9-22

Mittra, I. (2011). Breast cancer screening in developing countries. *Preventive Medicine*, *53*(3), 121–122.

Mody, G. N., Nduaguba, A., Ntirenganya, F., & Riviello, R. (2013). Characteristics and presentation of patients with breast cancer in Rwanda. *American Journal of Surgery*, *205*(4), 409–413.

Mupepi, S. C., Sampselle, C. M., & Johnson, T. R. (2011). Knowledge, attitudes, and demographic factors influencing cervical cancer screening behavior of Zimbabwean women. *J Womens Health (Larchmt)*, *20*, 943–952.

National Cancer Institute, (1999).

Noroozi, A., & Tahmasebi, R. (2011). Factors influencing breast cancer screening behavior among Iranian women. *Asian Pacific Journal of Cancer Prevention : APJCP*, *12*(5), 1239–1244. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/21875274

Ntirenganya, F., Petroze, R. T., Kamara, T. B., Groen, R. S., Kushner, A. L., Kyamanywa, P., Calland, J. F., & Kingham, T. P. (2014). Prevalence of breast masses and barriers to care: results from a population-based survey in Rwanda and Sierra Leone. *Journal of Surgical Oncology*, *110*, 903–906.

Oeffinger, K. C., Fontham, E. T. H., Etzioni, R., Herzig, A., Michaelson, J. S., Shih, Y.-C. T., Walter, L. C., Church, T. R., Flowers, C. R., LaMonte, S. J., Wolf, A. M. D.,

DeSantis, C., Lortet-Tieulent, J., Andrews, K., Manassaram-Baptiste, D., Saslow, D., Smith, R. A., Brawley, O. W., & Wender, R. (2015). Breast Cancer Screening for Women at Average Risk. *Jama*, *314*(15), 1599.

Ogundiran, T., Tuupanen, S., Aaltonen, L. A., Akarolo-Anthony, S., & Adebamowo, C. (2012). delGA (rs67491583) variant and colorectal cancer risk in an indigenous African population. *African Journal of Medicine and Medical Sciences*, *41*(3), 271–275. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/23457874

Opwora, A. S., Laving, A. M. R., Nyabola, L. O., & Olenja, J. M. (2011). Who is to blame? Perspectives of caregivers on barriers to accessing healthcare for the under-fives in Butere District, Western Kenya. *BMC Public Health*, *11*, 272. Retrieved from http://eutils.ncbi.nlm.nih.gov/entrez/eutils/elink.fcgi?dbfrom=pubmed &id=21539746&retmode=ref&cmd=prlinks%5Cnpapers2://publication/doi/10.1186/1471-2458-11-272

Pace, L. E., & Keating, N. L. (2014). A systematic assessment of benefits and risks to guide breast cancer screening decisions. In *JAMA*.

Pace, L. E., Mpunga, T., Hategekimana, V., Dusengimana, J.-M. V., Habineza, H., Bigirimana, J. B., Mutumbira, C., Mpanumusingo, E., Ngiruwera, J. P., Tapela, N., Amoroso, C., Shulman, L. N., & Keating, N. L. (2015). Delays in Breast Cancer Presentation and Diagnosis at Two Rural Cancer Referral Centers in Rwanda. *The Oncologist*, *20*(7), 780–788. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/26032138

Parkin, D. M., Nambooze, S., Wabwire-Mangen, F., & Wabinga, H. R. (2010). Changing cancer incidence in Kampala, Uganda, 1991-2006. *International Journal of Cancer*, *126*(5), 1187–1195.

Cancer screening behaviors of low-income women: The impact of race, (1997).

Patel, A., Schofield, G. M., Kolt, G. S., & Keogh, J. W. L. (2013). Perceived barriers, benefits, and motives for physical activity: Two primary-care physical activity prescription programs. *Journal of Aging and Physical Activity*, *21*(1), 85–99.

Peek, M. E., & Han, J. H. (2004). Disparities in Screening Mammography. In *Journal of general internal medicine*, 19(2), 184–194

Sarma, E. A. (2015). Barriers to screening mammography. *Health Psychology Review*.

Schwartsmann, G. (2001). Breast cancer in South America: challenges to improve early detection and medical management of a public health problem. *Journal of Clinical Oncology : Official Journal of the American Society of Clinical Oncology*, *19*(18 Suppl), 118S-124S. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/11560986

Shrivastava, S. R., Shrivastava, P. S., & Ramasamy, J. (2013). Self Breast Examination: A Tool for Early Diagnosis of Breast Cancer. *American Journal of Public Health Research*, *1*(6), 135–139

Siegel, R., Naishadham, D., & Jemal, A. (2013). Cancer Statistics, 2013. *CA Cancer J Clin*, *63*, 11–30. https://doi.org/10.3322/caac.21166

Tarver, T. (2012). Cancer Facts & Figures 2012. American Cancer Society (ACS). *Journal of Consumer Health on the Internet*, *16*(December), 366–367.

Thomas, D. B., Gao, D. L., Ray, R. M., Wang, W. W., Allison, C. J., Chen, F. L., Porter, P., Hu, Y. W., Zhao, G. L., Pan, L. D., Li, W., Wu, C., Coriaty, Z., Evans, I., Lin, M. G., Stalsberg, H., & Self, S. G. (2002). Randomized trial of breast self-examination in Shanghai: final results. *J Natl Cancer Inst*, *94*(19), 1445–1457. Retrieved from http://jnci.oxfordjournals.org/content/94/19/1445.full.pdf

Trochim, W. M. K. (2006). Research Methods Knowledge Base. In *Web center for*

social research methods, 32(2), ix, 363). Retrieved from http://www.socialresearchmethods.net/kb/index.php

Vahabi, M. (2011). Knowledge of Breast cancer and screening practices among Iranian immigrant women in Toronto. *Journal of Community Health*, *36*(2), 265–273.

White, A., Thompson, T. D., White, M. C., Sabatino, S. A., de Moor, J., Doria-Rose, P. V., Geiger, A. M., & Richardson, L. C. (2017). Cancer screening test use – United States, 2015. *Morbidity and Mortality Weekly Report*.

Wilf-Miron, R., Peled, R., Yaari, E., Vainer, A., Porath, A., & Kokia, E. (2011). The association between socio-demographic characteristics and adherence to breast and colorectal cancer screening: Analysis of large sub populations. *BMC Cancer*, *11*(1), 376. Retrieved from http://www.biomedcentral.com/1471-2407/11/376

Wiysonge, C. S., Uthman, O. A., Ndumbe, P. M., & Hussey, G. D. (2013). A bibliometric analysis of childhood immunization research productivity in Africa since the onset of the Expanded Program on Immunization in 1974. *BMC Medicine*, *11*(1), 66. Retrieved from http://www.pubmedcentral.nih.gov/articlerender. fcgi?artid =3599719&tool=pmcentrez&rendertype=abstract

Youlden, D. R., Cramb, S. M., Dunn, N. A. M., Muller, J. M., Pyke, C. M., & Baade, P. D. (2012). The descriptive epidemiology of female breast cancer: An international comparison of screening, incidence, survival and mortality. In *Cancer Epidemiology 36*, (I3), 237–248.

APPENDICES

Appendix I: Questionnaire

Part A: Demographic and Social-Economic characteristics

Numbers	Questions	Response	
1	What is your age?	1. 20-29yrs 2. 30-39yrs 3. 40-49yrs **4.** >50yrs	
2	What is your level of education?	1. Primary 2. Secondary 3. College 4. university	
3	What is your marital status?	1. Married 2. Single/Widowed	
4	What is your income status?	1. Low income 2. Middle income **3.** High income	

Part B:Objective # 1: Level of awareness on breast cancer and screening				
Level of awareness on breast cancer screening			**Yes**	**No**
5	Have you ever heard of breast cancer screening?			
6	Have you ever heard of breast self-examination?			
7	Have ever heard of mammogram?			
8	Level of awareness on the breast cancer screening	Low	Moderate	High
9	Source of information about breast cancer and screening	1.School		
		2.Radio		
		3.Healthcare		
		Provider		
		4.other sources		

Awareness on the risk factors/causes of breast cancer					
10	**What is cancer**	An abnormal growth of cells which are malignant			
		Untreatable disease			
		A virus.			
		Don't know			
11	**Likely age to develop breast cancer in years**	**20** **30**			
		40			
		50 and above			
		Agree	**Neutral**	**disagree**	
13	**Nothing causes breast cancer; it just happens**				
14	**Heredity causes breast cancer**				
15	**Bad nutrition causes breast cancer**				
16	**Changes in breast size are a symptom of breast cancer**				
17	**A lump or thickening of the breast is a symptom of breast cancer**				
Part B :Breast cancer screening practices			**Yes**	**No**	
18	Ever practiced breast self-exam				
19	Breast examined by doctor/nurse				
20	Ever been done mammogram				
21	Frequency of self-breast examination	Once a month			
		Once a year			
		Once every two years			
		Only when having a problem			
23	How often breast are examined by Doctor/Nurse	Every year			
		Every two years			
		Only when having a problem			

24	Frequency of mammogram (n=34)	Only when having a problem	
		Every year	
		Others	
25	Reasons for never had mammogram	Nothing wrong with me	
		Never heard breast cancer in our family	
		Afraid of finding a problem	
26	Willingness to do mammography if not done	Within 30 days	
		Within 60 days	
		Not willing	

Factors that influence Utilization of breast cancer screening

		DEGREE OF INFLUENCE			
		STRONGLY DISAGREE	**DISAGREE**	**AGREE**	**STRONGLY AGREE**
27	Family history of breast cancer				
28	Consequence of presenting with advanced cancer				
29	Serious concern that a mammogram will be painful				
30	Concern about the embarrassment of having a mammogram				
31	Cultural practices				
32	Stigma associated to cancer				
33	Cost of a mammogram/breast scan				

34	Distance to screening facilities				
35	Perception that breast screening is not important				
Health Education on breast cancer screening					
36	Frequency of educational sessions about breast health and screening by nurses/doctors at the Hospital within the last two years			Once every three months	
				Never	
37	Frequency of guiding to perform breast self-examination at the health service within this year			Once a year	
				Never	
38	How often brochures were provided			Rarely	Never
39	How often were you advised				
40	Regular follow up of mothers by nurses at the health facilities using breast examination cards			Disagree	
				Neutral	
				Agree	

Appendix II: Questionnaire (Kinyarwanda)

Igicecyambere: Umwirondoro impavuziturutsekumi-berehorusange, imibaniren'ubukungu

Numero	**ikibazo**	**Igisubizo**	
1	Ufite imyaka ingahe?	1) 20-29yrs 2) 30-39yrs 3) 40-49yrs 4) >50yrs	
2	Wize amashuri angahe?	1) Abanza 2) Ayisumbuye 3) Makuru 4) Kaminuza 5) Ntayo	
3	Uri?	1) Ingaragu 2) Urabutse 3) Watandukanyen' uwomwashakany e 4) Umupfakazi	
4	Uhagaze mu kigeranyo cyu'ubukungu ukunkije ibyowinjiza?	1) Uri hasi 2) Uri hagati **3)** Uri hejuru	
5	Wigize wisuzumisha kanseriy'ibere?	1) Yego **2)** Oya	
6	Nibari gisubizo cyawe ari yego kuikibazocya 5, nihehe wakuye amakuru yokwisuzumisha 'kanseriy'ibere"?	1) Radiyo 2) Televiziyo 3) Ibinyamakuru 4) Interinete 5) Umwarimu 6) Umukozi mu byu'ubuzima **7)** Ahandi	

Ukoreshejeururwegorwimibareirihasihamwekugirangougaragazeibimenyetsougenderaho kugirausuzumeibere; 1 =Simbyemerantagato, 2 = Simbyemera, 3 = Ndifashe, 4 = Ndabyemera, 5 = Ndabyemeracyane.

Numero	Impervo					
		Simbyemerantagato	**Simbyemera**	**Ndifashe**	**Ndabyemera**	**Ndabyemeracyane**
7	Kanseriy'ibere mu marrying					
8	Ingarukazokwinzakanseriimazeigihe					
9	Gutinyakoguca mu cyumabyakubabaza					
10	Birambagamirakwisuzumaibere					
11	Umucyo					
12	Akatokuburwayibw'kanseri					
13	Igiciro cya mammografi					
14	Urugendo rugera ahobasuzuma kanseriy'iberenikure					
15	Kwisuzuma kanseriy'ibere mbere yuko urwara singombwa					

Igicecyakabiri: **igipimocyogusobanukirwa no kumenyaibyizabyokwisuzumishan'umubarew'ababashakwisuzumisha**

Numero	ikabazo	igisubizo	kode
16	Mwigizemubwirwauburyobwo'kwisuzumaibere?	1) Yego 2) Oya	

17	Mwigezemwisuzuma ibere?	1) Yego 2) Oya	
18	Ni kangahemwisuzumye ibere?	1)Ntanarimwe 2)Rimwe mu kwezi 3)Rimwe mu mwaka 4)Rimwe mu myaka ibiri 5)Kereka gusa iyomfite ikibazo 6)Ibindi	
19	Mwarimwabonanenamugangacyangwamuformokaziakasuzumaamabereyawe?	1) Yego 2) Oya	
20	Ni kangahemwahuye no mugangacyangwamuformokaziakasuzumaamabereyawe)?	1) Burimwaka 2) Burimyakaibiri 3) Kerekagusaiyomfiteikibazo 4) Ibindi	
21	Uwigizewumvaikizaminikitwamammografi (niradiografi y' gusuzumaamabere.)	1) Yego 2) Oya	
22	Uwigizeukorerwaradiografiy'amabere?	1) Yego 2) Oya	
23	Nibaari 'yego' niryariuherukagukorerwaradiografiy'amabere?	1) 2010 2) 2011 3) 2012 4) 2013 5) 2014 6) 2015	
24	Ni inshurozingaheukorerwamammografi?	1) Keretsegusaiyomfiteikibazo 2) Rimwe mu mwaka 3) Rimwe mu	

		myakaibiri 4) Ibindi	
25	Nibautagizeukorerwamammografi (radiografiy'gusuzumaamebere, niiyihempamvu?	1) Ndacyarimutokubikorerwa 2) Na kibazomfite 3) Ntakanseriy'iberetugira mu muryangowacu 4) Ntinyakobasangamfiteikibazo 5) Birababaza	
26	Niba utajya kwisuzuma uburwayi bwiibere cyangwa utisuzumisha kurimuganga,kumuforomokazicyangwabagukoreyemammografi,uratekezakougombakubikora	1) Muminsimirongotatuikurikira 2) Mumeziatandatu 3) Ntabwombizi	

27	Kanseriniiki?	Uturemagingotutasanzwe	
		Indwaraitavurwa	
		Agakoko	
		Ntabwombizi	
28	Kanseriy'ibereikundakurwarwan'abagore	Ba fiteimyaka 20	
		Ba fiteimyaka 30	
		Ba fiteimyaka 40	
		Ba fiteimyaka 50	
		Ntabwombizi	

Koshanibayego ,oyacyangwentabwombizi

		Yego	**Oya**	**Ntabwombizi**
29	Kuryanabibiterakanseriy'ibere			
3	Ihindukakw'inganoy'ibereniikimenyetsocyakanseriy'ibere			

0				
31	Akabyimba mu ibereniikimenyetsocyakanseriy'ibere			
32	Kuva mu imokoniikimenyetsocyakanseriy'ibere			
33	Uruhurwi'ibereiyoruhinduyeibara, bivuzekoarwayecanceriy'ibere?			
34	Kuryanabiiterakanseriy'ibere			

Igicecyagatatu:

Imitererey'ibikorwaremezon'ibigobifashakwisuzumishakanseriy'ibere

Koshaakazukaberanyenigisubizocyawe (√)

35	Ni kangahewasobanuriweibyerekeyekanseriy'ibere, ukanasuzumwan'umuforomokazicyangwaumuganga mu myakaibiriishize?	Rimwe mu mwaka	
		Rimwe mu meziatandatu	
		Rimwe mu meziatatu	
		Ntanarimwe	
36	Ni kangaheumuforomocyangwaumuganga baba barakwerekereyeukowakwisuzumaibere?	Rimwe mu mwaka	
		Rimwe mu meziatandatu	
		Rimwe mu meziatatu	
		Ntanarimwe Never	
37	Kangahewabawarabonyeibyowakwifashishakumenyauburyobwogusuzuma (ibitabo, ibyapacangwa video) kanseriy'ibere?	Ikurikanyecyane	
		ikurikanye	
		Rimwen'rimwe	
		Ntanarimwe	

38	Ni kangahewabawaragiriweinaman'umugangacangwaumuforomoyogukoreshaikizaminicyokureba mu ibere (mammography) mumyakaibiriishize?	Ikurikanyecyane				
		Ikurikanye				
		Rimwen'rimwe				
		Ntanarimwe				
		Simbyemerantagato	**Simbyemera**	**Ndifashe**	**Ndabyemera**	**Ndabyemeracyane**
39	Gukwikiranywabihorahokumubyeyihakoreshejweamakarita mu gusuzumaiberebishoboragutumabibonekamberekouwomubyeyiyagirakanseriy'ibere.					
40	Amatangazokumaradiobishoboragufasha mu gusuzumamberekanseriy'ibere					

Appendix III: Key informant interview schedule

1. What specific aspects of breast cancer and screening if any are covered at the clinics?
2. About how much time is allocated for breast health education relative to other health issues in a month within the clinics? Give a reason(s) for your response.
3. Does the health facility have follow up visitation cards visitation cards for women on BSE and clinical examination?
4. In your opinion, what factors are likely to influence the ability of women of reproductive age to undertake breast examination and screening for cancer?

Appendix IV: Informed consent (Kinyarwanda)

Ukora ubushakashatsi

MurahoMadamu,

Nitwa, KorirAgnesChebet, ndiumunyeshurimuriKaminuzayaJomoKenyataishamirya Kigalimugashamik'UbuzimaRusange,Ndimogukoraubushakashatsibujyanyen'ikoreshwa ryaserivisiyogusuzumakanseriy'iberemubitarobikurubyaKaminuzaIKigali.Amakuruazav amoazafashaurwegorw'ubuzimagukoraigenamigambin'iteganyabikorwabinozemu rwegorwokugabanyaubutindebwokubonaindwarayaKanseriy'iberehakirikare.

Ndabasabakwemerakugirauruharemuriububushakashatsimusubizaibibazobikurikira, birafataigihegito, kandi ntangarukan'imwemuzagira.Amakuru yose mutangaazakoreshwa muburyobw'ibanga.Amazinayanyuntazagaragaraahantunahamwekandiamakurumutanga ntawundiazahabwakeretseabashinzweamasomoigihebyabangombwa. Mufiteuburenganzirabwokwemeracyangwaguhakanagusubizaibibazoby'ububushakashat sicyangwakugirabimwemuribyomudasubiza. Murakoze kwemera gufatanyanatwe.

Ubazwa

Njewe……..maze kumva neza integon'akamaro k'ububuushakashatsi, nagize umwanya wo kubaza ibibazo byose bijyanye k'ububuushakashatsi nkabanyuzwe n'ibisobanuro mpawe. Nzi neza ko nshobora kwanga kugirauruhare muri ububushakashatsi ntacyontkaje. Mazekumvaneza ububushakashatsi nemeye ubwanjye kugirauruharemuriububushaka bwitwa "gokoreshauburyobwogusuzumakanseriy'ibere mu bitarobikurubyaKaminuzai Kigali".

Izinary'Umubyeyi……

Umukonocyangwaigikumwe …….

Itariki:

Appendix V: Informed consent

Researcher

Good morning /afternoon Madam,

I am Korir Agnes Chebet, a student in Public health from Jomo Kenyatta University of Agriculture and Technology/ Kigali Campus. I am conducting a study on utilization of breast cancer screening among women attending Kigali University teaching Hospital by collecting the information which will assist the health sector to design appropriate interventions so as to improve early breast cancer diagnosis. I request you to participate in the study by answering the questions in this questionnaire. The interview will take few minutes and there are no risks to participation. All the information obtained from you will be treated with utmost confidentiality during and after the study. Your names will not be included on the form and the information you give will not be shared with other people except academic staff if need be. You are free to accept or deny answering these questions at any stage during questioning.

Thank you for your kind participation.

Respondent

I ……. having been adequately informed about the purpose, procedures, potential risks and benefits of this study. I have had the opportunity to ask questions and any questions I have asked have been answered to my satisfaction. I know that I can refuse to participate in this study without any loss or benefit to which I would have otherwise been entitled. Having gone through the consent form thoroughly I hereby give my personal consent to participate in the research project titled "Factors influencing breast cancer screening among women attending Centre Hospitalier Universitaire de Kigali (CHUK)".

Name of respondent……

Signature and Date or Right thumb print……

Appendix VI: Awareness of cancer and its risk/causes

The overall awareness score among the participants was assessed using the seven (7) statements whose responses and scores were structured as follows:

- What is cancer (An abnormal growth of cells which are malignant =1; Untreatable disease = 1; A virus = 0; and Do not know = 0)
- Likely age to develop breast cancer in years (20s =1; 30s = 2; 40s= 3; 50s =4 and Do not know = 0)
- Nothing causes breast cancer; it just happens (Yes =0; No = 1; Do not know= 0)
- Heredity causes breast cancer (Yes =1; No = 0; Do not know= 0)
- Bad Nutrition causes breast cancer (Yes =0; No = 1; Do not know= 0)
- Changes in breast size are a symptom of breast cancer (Yes =1; No = 0; Do not know= 0)
- A lump or thickening of the breast is a symptom of breast cancer (Yes =1; No = 0; Do not know= 0)

The overall score was generated by aggregating the scores. The maximum attainable score was 10 and the minimum score was 0. The aggregate was converted into percentages and the level of awareness was classified as follows: Low (> 50%), Moderate (50-69%) and High (70% and above).

Appendix VII: Approval of Research Supervisors

JOMO KENYATTA UNIVERSITY
OF
AGRICULTURE AND TECHNOLOGY
DIRECTOR, BOARD OF POSTGRADUATE STUDIES

P.O. BOX 62000
NAIROBI – 00200
KENYA
Email: director@bpgs.jkuat.ac.ke

TEL: 254-067-52711/52181-4
FAX: 254-067-52164/52030

REF: JKU/2/11/TM310-C010-2904/2015 **16TH OCTOBER, 2017**

KORIR AGNES CHEBET
C/o SoPH
JKUAT

Dear Ms. Chebet,

RE: APPROVAL OF RESEARCH PROPOSAL AND OF SUPERVISORS

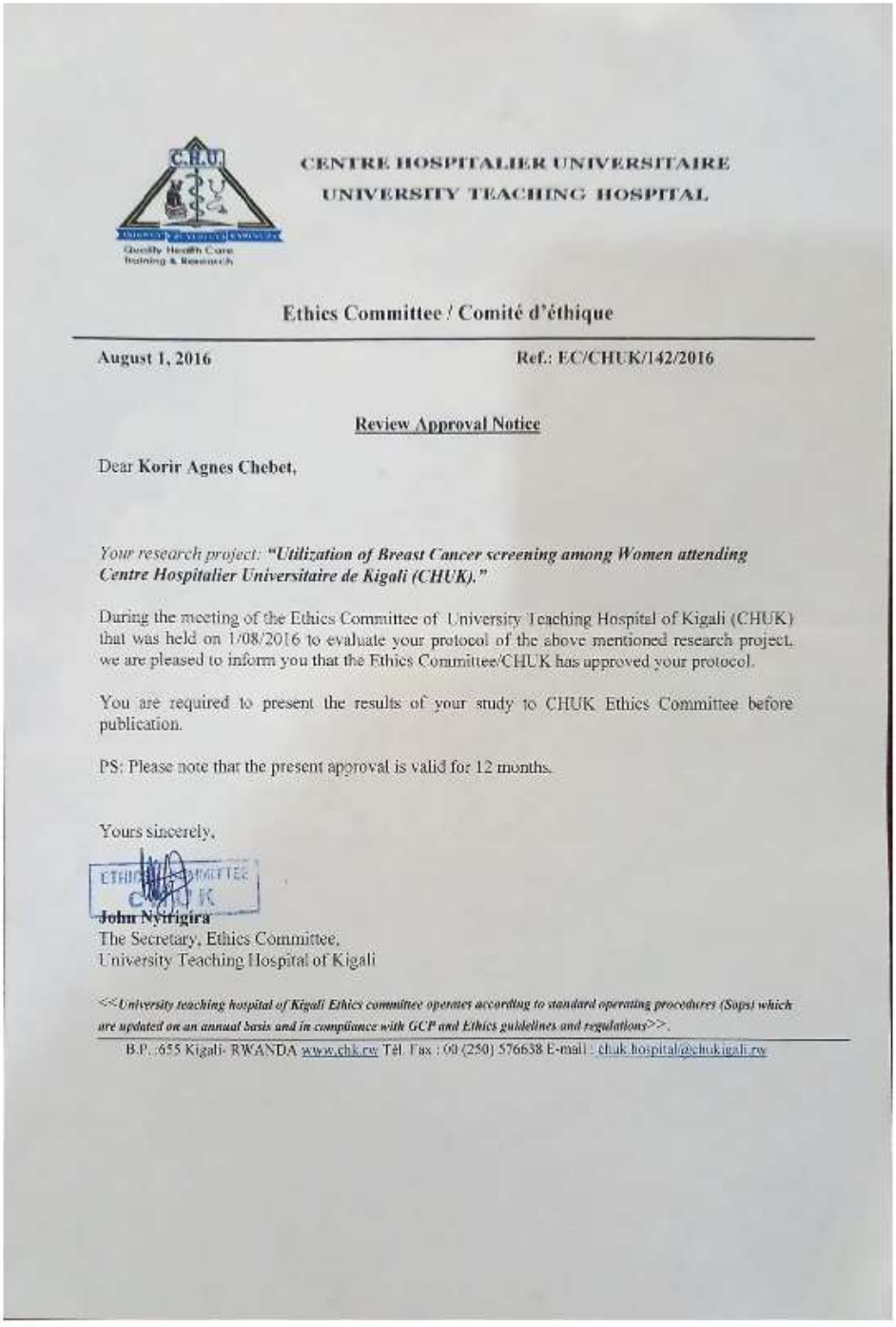
Kindly note that your MSc. research proposal entitled: **"UTILIZATION OF BREAST CANCERSCREENING AMONG WOMEN ATTENDING CENTER HOSPITAL KIGALI, NYARUGENGE DISTRICT, RWANDA"** has been approved. The following are your approved supervisors:-

1. Dr. Magu Dennis
2. Ms. Nwankwo Mercy

Yours sincerely

PROF. MATHEW KINYANJUI
DIRECTOR, BOARD OF POSTGRADUATE STUDIES
Copy to: Dean, SoPH
/cn

Appendix VIII: Ethical Approval



CENTRE HOSPITALIER UNIVERSITAIRE
UNIVERSITY TEACHING HOSPITAL

Quality Health Care
Training & Research

Ethics Committee / Comité d'éthique

August 1, 2016 **Ref.: EC/CHUK/142/2016**

Review Approval Notice

Dear **Korir Agnes Chebet,**

Your research project: ***"Utilization of Breast Cancer screening among Women attending Centre Hospitalier Universitaire de Kigali (CHUK)."***

During the meeting of the Ethics Committee of University Teaching Hospital of Kigali (CHUK) that was held on 1/08/2016 to evaluate your protocol of the above mentioned research project, we are pleased to inform you that the Ethics Committee/CHUK has approved your protocol.

You are required to present the results of your study to CHUK Ethics Committee before publication.

PS: Please note that the present approval is valid for 12 months.

Yours sincerely,

ETHICS COMMITTEE
CHUK

John Nyirigira
The Secretary, Ethics Committee,
University Teaching Hospital of Kigali

<<University teaching hospital of Kigali Ethics committee operates according to standard operating procedures (Sops) which are updated on an annual basis and in compliance with GCP and Ethics guidelines and regulations>>.

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