EFFECT OF A COMMUNITY BASED HEALTH EDUCATION INTERVENTION ON BREAST AND CERVICAL CANCER AWARENESS AND SCREENING AMONG WOMEN OF REPRODUCTIVE AGE IN KITUI COUNTY, KENYA

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Effect of a Community Based Health Education Intervention on Breast and Cervical Cancer Awareness and Screening among Women of Reproductive Age in Kitui County, Kenya

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DECLARATION

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

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DEDICATION

I dedicate this work to my dear husband Dr. Clement Muinde Mbatha and our children; Martha Mwikali Muinde and Charles Muendo Muinde. Thank you for believing in me.

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ABBREVIATIONS AND ACRONYMS

ACS	American Cancer Society
ANC	Antenatal Care
ASAL	Arid and Semi-arid Lands
B-CAM	Breast Cancer awareness Measure
CBHC	Community Based Health Care
CBHI	Community Based Health Education Intervention
C-CAM	Cervical Cancer awareness Measure
CDC	Centre for Disease Control
CHS	Community Health Strategy
CHVs	Community Health Volunteers
CHWs	Community Health Workers
DiD	Difference in Difference Statistic
ERC	Ethics Review Committee
HPV	Human Papilloma Virus
IARC	International Agency of Research on Cancer
KDHS	Kenya Demographic Health Survey
KNBS	Kenya National Bureau of Statistics
KNH	Kenyatta National Hospital

MCH	Maternal and Child Health
MCHW	Maternal and Community Health Workers
MDGs	Millenium Development Goals
MOH	Ministry of Health
NCDs	Non- Communicable Diseases
NCI	National Cancer Institute
OR	Odds Ratio
PHO	Public Health Officer
TB	Tuberculosis
UCL	University College of London
UN	United Nations
UON	University of Nairobi
WHO	World Health Organization

OPERATIONAL DEFINITIONS OF TERMS

Awareness of breast cancer This was determined based on three dimensions; awareness of at least two danger signs for breast cancer, awareness on age related risk of breast cancer, and awareness on one or more approaches for screening of breast cancer.

Awareness of cervical cancer This was determined based on three dimensions; awareness of at least two danger signs indicative of cervical cancer, awareness of age-related risk of cervical cancer, and awareness of at least two risk factors associated with development of cervical cancer.

Community-Based Health Education Intervention (CBHI) This is a curriculum that was developed by the researcher to be used by Community Health Volunteers (CHVs) during the study to train women of reproductive age on elements of cervical and breast cancer. The focus of the curriculum was on risk factors, signs and symptoms, danger signs, and approaches to the screening of cervical and breast cancer. The curriculum was informed by findings from a training module in the United Kingdom and gaps that were identified during the baseline study.

Early detection This is the identification of a disease in its early stages before the signs and symptoms manifest.

Effect This is a change that is a result of an action. The action in this study is the CBHI intervention.

Risk factor	This refers to anything that is associated with the likelihood of getting a disease. Different diseases have different risk factors associated with them. These could include factors that cannot be changed like race or gender of a person or those that can be changed such as behavioural factors like a person's diet, physical activity and smoking.
Screening	Application of a procedure or a test to identify a disease in its early stages or identify its risk factors before the disease manifests in the body.

ABSTRACT

Cancer is one of the major non-communicable diseases (NCDs), and together with cardiovascular diseases, diabetes and chronic respiratory diseases they cause over 60% of total global mortality every year. In Sub-Saharan Africa, the incidence and mortality attributable to cancer has been on an increasing trend. The National Cancer Control Strategy 2017-2022 indicates that breast and cervical cancer contributes 23.3 % and 20% respectively of cancer deaths in Kenya. Early screening and detection is the only effective way of managing these cancers. Engaging Community Health workers in health service delivery especially in resource-poor countries is effective. This study sought to determine the effect of a Community Based Health Education Intervention on breast and cervical cancer awareness and screening among women of reproductive age in Kitui County, Kenya. The study adopted a quasi-experimental design with a pre and post intervention survey. Two sub-counties (Kitui East-Intervention and Mwingi West-Control) were purposively sampled for inclusion in the study to ensure there is a buffer zone to minimize contamination. Respondents for participation were randomly selected for inclusion from the two study areas. The sample size constituted of 491 respondents at baseline and 496 at end line. An interviewer administered questionnaire was employed to collect data. SPSS version 22 was used to analyse data. Awareness and screening for both breast and cervical cancer were the main outcomes of the study. Data was analyzed by use of descriptive statistics. Z-scores and DiD were calculated to establish change in proportions between baseline and endline. A binary logistic regression model that provided for both crude and adjusted ODDS ratios (OR) was used to test the hypothesis. At endline, respondents in the intervention site were 3.8 times more likely to know the danger signs of breast cancer (*Adj.* OR=3.895, P<0.001, 95%CI: 2.538-5.979). The results were also similar for cervical cancer with respondents in the intervention site being 4.9 times more likely to be aware of the danger signs of cervical cancer at endline compared to baseline (*Adj.* OR=4.991, P<0.001, 95%CI: 3.554-7.008). The intervention increased breast cancer screening by 4.458 (Adj. OR=4.458, P<0.05, 95%CI: 3.204-6.202). Subsequently, at end line, respondents in Kitui East were ten (10) times more likely to screen for cervical cancer (Adj. OR=10.307, P<0.05, 95%CI: 6.284-16.904). This study concludes that the intervention increased awareness and promoted screening for both breast and cervical cancers. However, there is still a big proportion of women of reproductive age who are not aware of both breast and cervical cancers and are therefore exposed to the risk of developing these cancers. Key recommendation from the study is that the Ministry of Health (MoH) and County governments need to review existing policies to incorporate an expanded role of the community health volunteers as a critical service provider since they are effective in delivering health messages contributing to improved maternal health service uptake.

CHAPTER ONE

INTRODUCTION

1.1 Background

Every year, many women die prematurely due to different types of cancer that affect them including ovarian, cervical, and breast cancer. In developed countries, there has been improved investment, research, and programming which has improved prevention and treatment of these cancers (Adunlin *et al*., 2019). The investments in high-income countries have allowed for innovative, cost-effective, and efficient methods for early detection of the cancers such as the Pap Smear, mammography and such tests that have significantly contributed to prevention and enrolment of patients for early treatment before the cancers have metastasized.

In 2020, the World Health Organization indicated that cancer was the leading cause of morbidity and mortality in the world. The report estimated that about 18.1 million new cases of cancer were reported globally in 2018. Estimate models of the progression of cancer by the WHO indicate that cancer deaths are projected to rise by 45% by the year 2030. The report suggested that the rise in the burden of the disease might be five times greater in middle to low-income countries compared to the developed countries. The projection also indicated a rising economic burden of the disease with the cost of cancer prevention and treatment estimated at US$ 1.6 trillion as of 2018; this would threaten the budget of individuals at all income levels and would cause immeasurable suffering and financial distress to individuals who have developed the cancers and their families (WHO, 2020).

The vast majority of women who succumb to these types of cancers come from middle to low-income countries. These deaths are mainly attributed to relatively poor access to treatment and screening services in these countries. Further, the countries' responses to these types of cancers have also been hampered by insufficient financial resources, other competing healthcare priorities, a limited number of human resources, and weak healthcare systems (Ayanore *et al*., 2020).

In many developing countries, Non-Communicable Diseases (NCDs) like cervical and breast cancer have posed a real threat to their economies by escalating social and economic inequality. Governments in these nations acknowledge that they have a responsibility to effectively respond to the challenges posed by NCDs through a multisectoral approach at the national and community level to identify effective interventions for control, prevention, and treatment of NCDs (Ralaidovy *et al*., 2018). Further, the efforts of the developing countries are significantly complementing the efforts of developed nations to find an effective response to NCDs.

These efforts affirm the globally recognized understanding that health is not a privilege but a right that needs to be enjoyed by everyone so as to attain the highest standards of mental and physical health. In the global arena, the WHO has played a vital role in reaffirming its commitment as a specialized agency taking leadership in NCDs response by coordinating the global monitoring and evaluation actions against NCDs in relation to efforts by other global partners like the United Nations agencies, development banks, and other international organizations addressing NCDs response (Nishtar *et al*., 2018).

International and national efforts to promote prevention and control of cervical and breast cancer are focused on preventive screenings which contribute to early detection of the cancers. However, these efforts have not been felt at the community level in rural and marginalized areas in developing countries. As such, these regions experience low level utilization of the preventive screenings and therefore suffer from lower survival rates, late-stage identification of cervical and breast cancer, higher incidence, and mortality of the diseases (Attipoe-Dorcoo *et al*., 2021).

According to Meghea and Williams (2015), in order to increase the rate of screening among these underserved marginalized communities in the developing world, community-based screening, education, and referral mechanisms have been found to have a significant positive effect on the utilization of preventive services. There is sufficient empirical evidence indicating that such interventions at the community level that integrate community health workers to create awareness and cascade

knowledge on cervical and breast cancer have had a positive impact in increasing uptake of screening services in marginalized and underserved communities. Further, the interventions have been associated with improved health outcomes (Meghea, 2015).

WHO estimates that about 33 in 100,000 women in Kenya are diagnosed with cervical cancer every year and about 22 of those die from the disease every year. It is the leading cause of morbidity and mortality among women. In Kenya, uptake of screening services is still low despite effective methods such as screening being in existence in many health facilities. Nyangasi *et al*., (2018) explored the behavioral, biological, and socio-demographic factors that influence the uptake of screening for cervical cancer.

The study established that about 67.9% of the women enrolled were aware of the existence of cervical cancer preventive measures. Results from the study indicated that there were higher rates of screening among women with higher levels of education, those in the highest income quantile, and those residing in urban areas. The levels were significantly low among those with no formal education and those who were poor. Further, the uptake of screening was also significantly high among self-employed women, those who identified as binge drinkers, those who indicated that they had insufficient physical exercise, and those with relatively high consumption of sugar (Nyangasi *et al*., 2018).

The rising prevalence of cervical cancer is causing a worrying trend to public health. Poor levels of education, low awareness, low screening coverage, and weaker health systems have led to low survival rates and poor health outcomes for many marginalized and economically disadvantaged communities in the country. Risk factors that are associated with the economic and social transition as well as a growing and an aging population are gradually driving the prevalence of the disease in the country (Adams *et al*., 2014).

Kenya, being a signatory to global commitments for cancer prevention and control, has made significant efforts in the last decade to focus more attention on the disease. These commitments include the WHO guideline on HPV vaccination, the Global

action plan for the prevention and control of NCDs, and the Global Task Force on Expanded Access to Cancer Care and Control in Developing Countries. The commitments have ensured that women and girls can access cervical cancer immunization at very affordable prices. However, the government efforts have not translated to an increase in the coverage of screening and vaccination (MOH, 2017).

A lack of a comprehensive national cancer registry in Kenya has significantly affected the accuracy of statistics about the disease. Majority of deaths in the country are however attributed to cervical cancer despite it being the second common type of cancer in the country. The Kenya Demographic Health Survey (KDHS) estimated the national coverage of screening at 10% and 14% for breast and cervical cancer respectively among women aged 15 to 49 years (KNBS and Macro 2014). The government, in its commitment to address cancer developed a national cancer prevention strategic plan and launched a pilot vaccination campaign for HPV among women of reproductive age (Wamburu *et al*., 2016). These studies and reports indicate that there is a relatively high awareness and vaccine acceptability but factors such as cost, shortage of supplies, untrained and inadequate staff, poor access to facilities and long waiting time have contributed to low coverage of screening and vaccination (Randall, & Ghebre, 2016).

In Kenya, Cancer is one of the main causes of mortality and morbidity as with other Sub-Saharan countries in the region. The Kenya National Cancer Control Strategy 2017-2022 estimated that about 37,000 new infections occurred in the year 2012. During the same period, a total of 28,500 deaths occurred as a result of cancer (MOH, 2017). Current statistics according to the National Cancer Institute indicate an incidence of 47,887 and mortality of 32,987 in 2018.

Breast and cervical cancer screening in the country remains low, a fact that could be attributed to low knowledge on these cancers, limited and scarce access to sexual reproductive medical services (KNBS & Macro, 2014). The low uptake therefore calls for innovative measures to enhance knowledge on these cancers and therefore promote screening leading to early detection of these cancers.

The role that Community Health workers (CHWs) are playing in health service delivery especially in resource poor countries has been found to be effective (Chowdhury *et al*., 2014). According to a World Health Report published in 2006, the human resource deficits in the health industry can be remedied by the role that CHWs play in providing additional manpower. They have become a critical pillar in health service delivery, and they provide a variety of auxiliary services including patient home care, counseling, outreach, and serving the marginalized and disadvantaged populations. Studies done to assess the impact of CHWs in promoting equitable access to care and treatment have demonstrated a positive influence on health outcomes (WHO & G.H.W.A, 2013). The Ministry of Health (MoH) in Kenya underscores the indispensability of Community health volunteers (CHVs) as critical pillars in the primary healthcare delivery at the facility and community level (MoH, 2014).

Kitui County is one of the counties that form part of the former Eastern Province whose levels of screening for both breast and cervical cancer were established to be low and comparable to the national level (KNBS & Macro 2014). A community Based Health Education Intervention (CBHI) was developed by the researcher aimed at addressing the low levels of knowledge and screening uptake for both breast and cervical cancer among women of reproductive age in Kitui County. The CBHI was informed by a validated United Kingdom breast and cervical cancer awareness modules (Cancer Research UK, 2010) and (UCL Health Behaviour Research, 2008). This focused on; early detection of warning signs and symptoms, risk factors and regular screening for self as well as facility-based screening.

The study therefore sought to establish the effect of the CBHI on breast and cervical cancer awareness and screening among women of reproductive age in Kitui County; Kenya.

1.2 Statement of the problem

Screening uptake for breast and cervical cancer remains a public health concern in the country especially in the former Eastern province where Kitui County is located. The Kenya Demographic Health Survey 2014 indicates that screening uptake for

breast and cervical cancer remains low at 10% and 14% respectively. In the former Eastern Province, at least 10.9% have ever had a breast exam by a Health Care provider while 12.8% have ever had a cervical cancer exam (KNBS & Macro, 2014).

Screening uptake is critical for early detection of cancers before they proceed to stages that are untreatable. Early detection is a key primary prevention strategy that allows for diagnosis of the cancers before they proceed to stage 3 and 4. Cancers beyond stage 3 have poor prognosis leading to early deaths among women of reproductive age.

Breast and cervical cancer are of public health concern due to persistent low screening uptake. Screening and early detection of these cancers increases chances of survival and improves quality of life. Though the ministry of health has put in place the Kenya National Cancer Control Strategy 2017-2022 to address cancer in the country, screening uptake continues to be of public health concern with devastating effects due to low uptake.

1.3 Justification of the Study

Screening for breast and cervical cancer remains a key pillar in early detection and management of these cancers. Low screening uptake predisposes women to the risk of these cancers since they are detected at stages that are difficulty to treat often leading to death. It is therefore paramount to have effective strategies that promote screening of breast and cervical cancer leading to early detection of these cancers and therefore good prognosis with improved quality of life among women of reproductive age.

The findings of this study will inform the existing policies in the county such as the Kitui County Integrated Development plan on the role that community-based interventions led by Community Health Volunteers (CHVs) play in promoting screening and early detection of breast and cervical cancer. This will inform revision of this policy through expansion of the mandate of CHVs to handle prevention issues with regard to cancer in addition to their daily roles to improve maternal health outcomes within the county.

The findings will further inform the national policy documents such as the Kenya National Cancer Control Strategy on the role that community structures play in promotion of cancer screening. This will inform review of the mode of engagement and motivation for the CHVs for improved performance leading to better health outcomes.

Further adoption of the study recommendations through policy review at both the national and county levels will also improve the quality of life for cancer patients as it will inform community led interventions in management of patients living with cancer. This will enhance access to supportive and rehabilitative care for these patients leading to improved health outcomes and longevity of life.

The findings will also add to the existing body of knowledge on breast and cervical cancer awareness, screening and prevention.

1.4 Hypothesis

Null hypothesis:

1. The Community Based Health Education Intervention does not have an effect on level of awareness on breast cancer among women of reproductive age in Kitui County.
2. The Community Based Health Education Intervention does not have an effect on level of awareness on cervical cancer among women of reproductive age in Kitui County.
3. There will be no change in breast cancer screening uptake as a result of the CBHI among women of reproductive age in Kitui County.
4. There will be no change in cervical cancer screening uptake as a result of the CBHI among women of reproductive age in Kitui County.

1.5 Research Questions

1. What is the level of awareness on breast and cervical cancer among women of reproductive age in Kitui County; Kenya?

2. What is the effect of the Community Based Health Education Intervention (CBHI) on breast and cervical cancer awareness among women of reproductive age in Kitui County; Kenya?
3. What are the changes in breast and cervical cancer screening uptake as a result of the Community Based Health Education Intervention (CBHI) among women of reproductive age in Kitui County; Kenya?

1.6 Main Objective

The main objective of this study was to determine the effect of a Community-Based Health Education Intervention on Breast and Cervical cancer awareness and screening among women of reproductive age in Kitui County.

1.7 Specific Objectives

The specific objectives of the study are:

1. To determine the level of awareness on breast and cervical cancer among women of reproductive age in Kitui County; Kenya.
2. To determine the effect of the Community Based Health Education Intervention (CBHI) on breast and cervical cancer awareness among women of reproductive age in Kitui County; Kenya.
3. To assess changes in breast and cervical cancer screening uptake as a result of the Community Based Health Education Intervention (CBHI) among women of reproductive age in Kitui County; Kenya.

CHAPTER TWO

LITERATURE REVIEW

2.1 Breast and Cervical Cancer Awareness and Screening

2.1.1 A global overview

In the United States, nonmelanoma skin cancer aside, breast cancer is one of the major cancers affecting women. It is responsible for majority of cancer deaths among women of all races and Hispanic ethnicity (American Cancer Society, 2018). Further, the American Cancer Society indicates that every year, in the United States, almost 200,000 women are diagnosed with breast cancer, and at least 40,000 women die from the same cancer. Cervical cancer was also a leading cause of death among women in the United States.

However, in the past 40 years, the mortality rate associated with cervical cancer has reduced in this region. This reduction is due to regular cervical cancer screening and regular pap tests that women receive during regular routine visits to the physician. Significantly, these pap tests assist in detecting cervical pre-cancer before it turns in to cancer, which when detected early gets treated. Preventive measures such as breast cancer screening using a mammogram and Pap tests for examining cervical cancer reduces cancer death rates in women (WHO, 2015). Ideally, breast and cervical cancer screening assist in identifying cancer or precancerous abnormalities that can be treated earlier, thus prevent cancer from spreading or causing deaths (CDC, 2014).

A study by the American Cancer Society (ACS) established that the most vital strategy for reducing mortality related to breast and cervical cancer was to encourage early detection initiatives and investment in contemporary cancer treatments. The research found that when the disease is detected at an early stage before it spreads, it makes it easier to treat it successfully with available therapeutic measures. Subsequently, the society recommended that regular screening for women and girls is one of the most reliable and effective ways for early detection of cancer (Milner & McNally, 2020). As a key deliverable from the study, the ACS developed guidelines

for screening women with an average risk of these diseases and those with a high-risk factor for developing the diseases. The findings of the study revealed that the size of cancer and its degree of spread are the main indicators that predict the prognosis for patients who have developed the disease (Han *et al*., 2018).

A study by Smith *et al*., (2017), provided a summary of emerging issues related to the rates of cancer screening and guidelines for their detection and trends that are inherent in the data collected about cancers in America. The current guidelines according to the study proposed that women who were aged between 40 to 54 years, should be provided with an opportunity to begin annual screening of breast cancer. Regular screening by use of mammography was recommended for women above 45 years to detect breast cancer.

For cervical cancer, the guidelines recommended a Pap test to begin for women above the age of 21; liquid-based or conventional Pap tests are recommended after every 3 years for women who are aged 21-29 years. Further, for women aged between 30-65 years the guidelines recommended a combination of HPV DNA test and Pap test after every 5 years. In addition, the guidelines advised that women who have had a total hysterectomy should stop cervical cancer screening (Smith *et al*., 2017).

Europe has also experienced a high burden of breast and cervical cancer. A study by Gianino *et al.*, (2018), sought to establish the association between social and economic variables with the participation trends of screening for these diseases. The study conducted in 17 European countries showed that screening for the diseases was significantly associated with a decrease in cancer mortality. The study established that there was no significant association that existed between the rate of utilization and uptake of screening and educational level, type of employment, income, and preventive expenditure. Further, the study indicated that cancer screening programmes, in the long run, could reduce social-economic inequalities among the younger population who take advantage of preventive services. However, the study recommended that additional gains in control and prevention of breast and cervical

cancer could be enhanced with effective and well-resourced community organizations and efficient recruitment strategies.

Vahabi *et al*., (2015) conducted a study in Ontario, Canada, to compare the uptake of mammography screening among native women and immigrants in Ontario and to establish factors associated with low mammography screening. The study indicated that more efforts should be incorporated, to increase immigrant women's access to primary care patient enrolment models and screening. The study also concluded that cancer interventions that address language, acculturation, limitations, and deficit knowledge on screening barriers should be accorded more support. Additionally, health professionals need to be educated and be at the forefront in offering screening guidelines at all times (Vahabi *et al*., 2015).

Another study was undertaken in Indonesia, using survey data to establish determinants of breast and cervical cancer screening awareness and participation. It further sought to establish the awareness and participation of women in breast self-examination. It was confirmed that among Indonesian women, socioeconomic disparities influenced cancer screening awareness and participation. The study concluded that the results might support to inform targeted health promotion interventions and enhance cancer screening in areas with inadequate resources (Gianino *et al*., 2018).

Most developed countries have access to contemporary screening approaches for breast cancer unlike many low- and middle-income countries. In the US, on average, 70% of women undergo mammography varied by level of education, skin color, insurance, and birth (Da Costa Vieira, *et al*., 2017). Such early interventions have ensured that there is an early discovery of breast cancer which allows for timely treatment before the disease progresses further.

Unlike in the USA, Sub-Saharan nations in Africa with a lack of contemporary screening approaches still lag in early detection and have seen the incidence of breast cancer rise at an alarming trend. Irvin and Kaplan, (2014), argued that the trend can be altered if contemporary screening approaches for breast cancer are adopted to mitigate the premature mortality associated with the disease. Other studies have

provided collaborating empirical evidence that indicates effective and timely breast cancer screening can significantly reduce related morbidity and mortality associated with breast cancer (Arrospide *et al*., 2015).

WHO (2017), advised that the control of several modifiable risk factors such as regular exercising, maintaining a healthy weight, and reduction in consumption of alcohol have a significant impact in decreasing the incidence of breast cancer among women in the reproductive age. However, Elobaid *et al*. (2014) argue that these strategies cannot exclusively eliminate or lessen the morbidity of breast cancer; they propose that investment in and development of guidelines for early detection of breast cancer outcomes are the cornerstone to control of breast cancer.

Cervical cancer is usually described as the malignant neoplasm of the cervix uteri. Infection with a sexually transmitted disease, mostly Human papilloma virus (HPV), is a common risk factor associated with acquisition of the cancer. WHO (2015) established that out of about 100 different types of HPV, there are 13 types that are mainly associated with cervical cancer. Among the 13 viruses of the type of HPV, two types (16 and 18) are attributable to almost 70% of cases of cervical cancer and other precancerous cervical lacerations. Chan *et al*. (2019), associated nearly all interventions related to cervical cancer to the detrimental effects of HPV.

Adunlin *et al*. (2019) indicates that many developing countries are experiencing a surge in the mortality and morbidity of cervical cancer. The study estimated that among women in the reproductive age in the Sub-Saharan region of Africa, cervical cancer accounted for nearly 22.2% of all cancers and is responsible for most deaths among this cohort of women. The WHO estimates that by 2030, cervical cancer will be responsible for the deaths of more than 443,000 women with nearly 90% of them from the Sub-Saharan Africa (Abiodun *et al*., 2014).

Stockton (2016) established that cervical cancer was a major cause of death among women in the reproductive age despite the disease being the most preventable type of cancer. The paper estimated that the disease was responsible for about 700 deaths among women per day: one woman after every two minutes. Further, the study indicated that the challenge with prevention of cervical cancer rests with the fact that

approximately 95% of women in economically developing nations are never screened for the disease and therefore the observed high mortality rate ascribed to the disease. In addition, the study also found that other than HPV, other risk factors associated with the development of the disease included early sexual debut, multiple sexual partners, and a sedentary lifestyle. Management of these risk factors would be critical in prevention and control of cervical cancer.

2.1.2 Breast and cervical cancer awareness and screening in Africa

In Sub-Saharan Africa, the incidence and mortality rates from breast and cervical cancer are on the rise. According to CDC (2014), breast cancer is the most common cancer among women. In 2010 and 2012, over 1.6 and 1.67 million cases of breast and cervical cancer, respectively, were reported globally (Ifediora *et al*., 2019).

A recent study conducted to establish Africa's breast cancer incidence rate reported an increase in the incidence of breast cancer. In the study, the observed crude incidence rate was 24.5 per 100,000 person-years. Generally, the literature indicates that early detection is the only solution to control breast cancer. Elobaid *et al*. (2014), affirmed that breast cancer screening reduces morbidity and mortality thereby improving survival rate among women.

Globally, the second most common cancer among women is cervical cancer. It is estimated that there are 528,000 new cases and 266,000 death cases annually (Kessler *et al*., 2016). Additionally, from this figure, 85% of the new cases and 87% of death cases occur among women living in low and middle-income countries. Furthermore, the burden of cervical cancer incidence and mortality rate is reported to be on the rise in developing countries, but it is a different case in industrialized countries. In the last 50 years, cervical cancer incidence cases in industrialized countries have reduced by over 70%. In developing nations, the cervical cancer incidence rate is expected to rise from 444,546 to 588,922 from 2012 to 2025 (Abiodun *et al*., 2014; United Nations, 2019).

Cervical cancer is regarded as a social disease as its incidence is related to social and economic factors. Moreover, it highly affects the poor and less educated individuals

in whom the risk factors are most prevalent (Abiodun et al., 2014). However, research has established that comprehensive approaches, such as prevention, early diagnosis, effective screening, and treatment programs could help reduce the high cervical cancer mortality rate (Adunlin *et al*., 2019).

A systematic review by Bahnassy, Abdellateif, and Zekri, (2020), revealed that the shortest survival rates and poorest outcome in the world were among patients with African ancestry. The review attributed this reality to sociocultural, socioeconomic, racial, and biological factors operating singularly or in combination.

Data from the International Agency of Research on Cancer (IARC) estimated that in 2018 there were about 811,200 new cases of cancer representing about 4.5% of the total cases in the world and 534,000 deaths attributed to different forms of cancer representing about 7.3% of all the global deaths. Among the estimated cases, the types of cancer with the greatest burden were breast cancer (27.7%) and cervical cancer (19.6%) of all the total cases. The study acknowledged that cancer outcomes are disproportionate in all those diagnosed with the disease as there are factors that affect their behavior and impact the patient's response to treatment and eventually their survival rate (Bahnassy *et al*., 2020).

The WHO (2021) approximates that about 70% of cancer deaths occur in middle- and low-income countries; many of which are in sub-Saharan Africa. About a third of the deaths attributable to different types of cancers are related to dietary and behavioral risks such as low vegetable and fruit intake, high BMI, low levels of physical activity, alcohol, and tobacco use. It further estimated that about 22% of all cancer deaths are due to tobacco use. In addition to these factors, others contributing to high mortality and morbidity are inaccessible treatment and diagnosis and late-stage presentation.

Moodley *et al*. (2020) conducted a study in South Africa and Uganda to map the awareness of the risk factors associated with cervical and breast cancers. The study concluded that the two diseases were the leading causes of the burden of cancer in the two countries. In South Africa, the study found that women in urban areas compared to those in rural areas had a significantly higher awareness of the

symptoms and risk factors associated with the two diseases. In Uganda, the results revealed that marital status or women who lived with partners exhibited a higher awareness of the symptoms and risk factors associated with the two diseases.

The study also found that the knowledge of symptoms and risk factors for both cancers was relatively low when the women were tested on the ability to recall. Despite the two countries having implemented vaccination drives for Human Papilloma Virus (HPV), the study found that a significant majority of the women did not recognize that HPV was a risk factor for cervical cancer. However, in both countries, the study indicated that a significant majority of the women recognized that having multiple sexual partners was a risk factor for cervical cancer (Moodley *et al*., 2020).

The adoption of systematic and nationwide screening programs in the developed countries has led to reduction in cervical cancer incidence and mortality rates. Ideally, effective screening programs have been easier to implement in developed nations than the developing ones because they require infrastructure, quality assurance, human resources, monitoring, evaluation, and financial resources (Assoumou *et al*., 2015). Therefore, women in developed countries have quicker access to modern screening services than their counterparts in developing countries. Further, women in the developed countries tend to have more knowledge of these two cancers.

The reality for many women in Africa is the danger that cervical and breast cancers present, as the deaths that they cause are no more than deaths resulting in complications before, during and after pregnancy. The epidemiological trends of the diseases indicate that despite availability of effective treatment and screening services, a growing body of knowledge about the diseases and a refocus of public health policies to target Non-Communicable Diseases (NCDs), the burden of cervical and breast cancers is still on the rise (Charles *et al*., 2015.

In Nigeria, Ifediora, (2019) established that along with other NCDs, the impact of cervical and breast cancers is worsening and disproportionately affecting low- and middle-income countries in sub-Saharan Africa. The study indicated that to rollout

preventive approaches for the diseases government funding was necessary; however, many of the low- and middle-income countries in sub-Saharan Africa cannot afford to sponsor universal screening, vaccination, treatment, and diagnostic programmes. This factor coupled with other socioeconomic and sociocultural factors have been the main contributors to poor outcomes in these countries. The study argues that there is an urgent need for governments of these countries, the international community, and donors to establish affordable, cost-effective, sustainable, effective, and socially acceptable approaches to reduce mortality and morbidity attributed to these two types of cancer.

In Nigeria approximately 40.43 million women belong to the reproductive age and are therefore at risk of developing cervical cancer. In 2017, out of a total 14,089 women diagnosed with the cervical cancer, about 8,240 were estimated to have succumbed to the disease (Morounke *et al*., 2017). The study projected that by the year 2025, the deaths would increase by 63% among women aged <65 years and 50% among women aged >65 years.

Global Cancer Incidence report published in 2018 presented a comparative analysis that painted a grim picture on the incidence and mortality of cervical cancers among 100,000 women per year. It was 6.4 and 1.9 in North America respectively and, in western Europe 6.8 and 2.1 respectively. These statistics are relatively low compared to the numbers in Africa where the incidence and mortality were 48.4% and 57.3% respectively. These statistics have however not enhanced functional preventive programs for cervical cancer with only nine out of the fifty-five countries in the continent indicating that they have implemented such programmes (Morounke *et al*., 2017).

In Ghana, the most common type of cancer among women is cervical cancer. Dunyo, Effah, and Udofia, (2018) indicated that although many facilities in the country have screening approaches to detect the disease, coverage of screening in the country stands at 2.8%. Consequently, many women present late for treatment after the cancer has spread and this complicates the treatment of the disease. The study focused on understanding histological, clinical, and socio-demographic factors that

are associated with late presentation of cervical cancer for women who are attending Gynecological Oncology care.

Dunyo *et al*., (2018) found that about 65.97% of the cases diagnosed were in later and progressive stages of the disease. It further established that the level of education and the age at menarche were not significant predictors of late presentation, but the history of screening was a significant predictor. Women with no history of previously undergoing screening were four times more likely to present late compared to those who had been screened at least once before. The study recommended that there was need to promote and intensify efforts for early screening for cervical cancer.

A study by Assoumou *et al*., (2015) was undertaken to assess the knowledge and awareness about cervical cancer, Pap smear testing, its usage, and HPV among women in Libreville, Gabon. It was established that the Gabonese women had low level of knowledge on the aforementioned areas. Therefore, the study concluded that there is critical need to undertake sensitization and inform the Gabonese women about cervical cancer, its risk factors, and preventive measures such as taking a Pap smear test to prevent or control cancer.

A different study on cervical cancer indicated that Africa has limited cervical cancer screening services. In addition, most of the centers offering cancer screening services are stationed in Secondary and Tertiary Health care facilities in the urban areas. Further, there are knowledge gaps among the patients and the health care workers leading to delays in referrals, therefore, management of patients with cervical cancer. The study recommended that there is need for political goodwill from the government. The government must recognize cervical cancer as a health concern and allocate enough resources for research, prevention, and its treatment. The study also recommended the need for cervical cancer screening awareness among high-risk women and more preventive measures to reduce the incidence and mortality rate of cervical cancer (Ferlay *et al*., 2018).

2.1.3 Breast and cervical cancer awareness and screening in Kenya

Many studies have been undertaken countrywide to determine knowledge on breast and/or cervical cancer as well as the screening uptake for the two cancers. Majority of the studies established that many women in the rural setup have inadequate knowledge of the two cancers, and their screening uptake was relatively low. Different reasons for low levels of screening have been cited by various studies.

A study conducted by Ng'ang'a *et al*. (2018) sought to establish awareness of cervical cancer screening among women. The study also sought to determine patterns of health behaviour among screened and unscreened women as well as associated cervical cancer screening predictors. The study results showed that a high level of awareness of cervical cancer was not commensurate to cervical cancer screening. This study was consistent with others that showed a gap between sensitization of cancer screening and actual cervical cancer screening among the women. Further, the study confirmed that the well-to-do women, most educated, urban dwellers, and the older women were more likely to visit health centers for cervical cancer screening (Ng'ang'a *et al*., 2018).

Consequently, a study conducted in Mama Lucy Kibaki Hospital focused on the factors affecting cervical cancer screening uptake. The study revealed that despite the respondents having cervical cancer knowledge, they were still reluctant to undertake cervical cancer screening. In addition, the study established other reasons that hindered screening among women. These included: fear of the screening procedure, the results as well as lack of information. The study recommended that to promote cervical cancer screening among women, more efforts directed towards comprehensive sensitization programs should be put in place (Mbaka *et al*., 2018).

A different study conducted in a rural community at the Coastal region sought to establish their knowledge, perceptions, and preventive practices towards breast cancer. The study established that the women in this region had heard about breast cancer but were not conversant with its risk factors. The study further established factors that hindered the respondents' knowledge on breast cancer and some of its risk factors. These limiting factors ranged from variation in identification of the signs

of breast cancer, lack of decision making among women, few screening services for breast cancer, preference for traditional healers, lack of trust in the health care system to inadequate healthcare services access (Sayed *et al*., 2018).

Another study undertaken in Isiolo and Tharaka Nithi counties sought to determine cervical cancer knowledge, perception, screening uptake, and prevention measures among women aged 18 years and above. The findings of the research indicated that a high proportion of the respondents had heard about cervical cancer, although very few had been screened. In addition, few respondents could identify the risk factors of cervical cancer and most of them named only two risk factors. Further, only few respondents indicated HPV as one of the risk factors associated with cervical cancer (Gatumo *et al*., 2018).

Wambalaba *et al*. (2019) in a study that targeted ten counties in Kenya sought to establish the availability and capacity of cancer diagnostics and treatment. The study found that most women sought medical assistance when their cancer had already reached an advanced stage. This is due to the fact that most of the women in these counties have little knowledge of the signs and symptoms of cancer. Subsequently, the health care centers have inadequate diagnostic and screening services, and the referral system is poorly established.

In addition, there are limited specialists in the country with the majority residing in Nairobi resulting in long waiting period for their appointments leading to their cancers progressing to stages that are difficult to treat. Some also cited lack of resources to visit Nairobi for health care services. The study further indicated that health care facilities only offered limited services such as preventive vaccines, Pap smear tests and breast self-examination, which is not adequate for cancer prevention and treatment. The study therefore recommended decentralization of cancer services as well as sensitization in clinics and community level hospitals (Wambalaba *et al*., 2019).

Literature indicates that most Sub-Saharan Africa countries lack adequate infrastructure necessary for early screening, diagnosis, and treatment for cancers. Kenya is no exception with most counties having inadequate capacity both technical

and infrastructural to treat, diagnose or screen for cervical and breast cancer. Due to this, most cancers are detected during stage 3 when the disease has progressed and therefore difficulty to treat and manage leading to poor prognosis. Often, most patients are referred to other facilities outside their counties mostly in Nairobi where there are long queues for patients to get the necessary treatment (Wambalaba *et al*., 2019).

To address this challenge, it is essential for stakeholders in the health industry to design strategic frameworks that are tailored at the community level and are also community led in order to target women from the communities to empower them with information on these cancers. The impact of such approaches would be to make screening easily accessible at the community and promote early detection and prevention of cervical and breast cancer.

2.2 Effectiveness of CBHI on Improving Maternal Health

2.2.1 Global perspective

A meta-analysis conducted to determine the contribution of community-level interventions reported that Community Based Health Care (CBHC) services are effective in providing the necessary care services for Maternal and Child Health. In this review, about 43 studies published before May 2013 were reviewed. The study indicated that home visitation by CHWs promoted antenatal care, coverage of tetanus immunization, referral and early commencement of breastfeeding. This resulted in a significant reduction in perinatal, neonatal, and maternal morbidity and mortality (Lassi *et al*., 2014).

The World Health Organization also conducted a systematic review to assess the global experience of CHWs in providing health services geared towards promoting Millenium Development Goals (MDGs) number 4 and 5. It was established that CHWs offer a variety of services to the community such as safe delivery, breastfeeding counseling, simple childhood illnesses management, and treatment and rehabilitation of people with mental health issues. This study which reviewed over 30 Country Intervention studies, indicated that CHW’s services have assisted in

reducing maternal and child morbidity and death rate globally. The study also confirmed that CHWs form a critical link between the communities and health and social services (WHO, 2017).

Another study conducted in Bangladesh sought to establish whether there was a positive correlation between community-level interventions and the utilization of maternal health. The study confirmed that community-level interventions improved antenatal care utilization. The study concluded that there was need for continuous home visitation to promote the utilization of maternal health care in rural Bangladesh communities (Han *et al*., 2018).

Further, a survey conducted by Perry and Zulliger (2014) examined the evidence on effectiveness of CHWs in providing MCH services. The study established that promotion of exclusive breastfeeding was highly effective when undertaken by CHWs through Community based interventions. The study further revealed that CHWs act as an essential link in the health systems and are the key drivers in promoting healthy behaviors in settings that are economically strained.

Mohan *et al*. (2019) established that small media, client reminders, group education, and one-on-one education are imperative interventions that have increased the demand and uptake for cervical and breast screening. The study described group education as knowledge awareness sessions conducted by health professionals or trained community health workers who use a standardized curriculum, role modeling, interactive focus group discussions, and other methods. The intervention's objective was to convey information on the benefits, indications for, and ways of conquering the inhibitors to cervical and breast screening.

The goal of the intervention was to encourage, inform and motivate women of reproductive age to utilize recommended preventive measures such as screening. The one-on-one education interventions target individuals and are under the direction of health professionals, healthcare workers, lay health advisors, community health workers and volunteers. Often this intervention is delivered digitally through contacting participants or in-person in community, medical, household, and worksites settings (Mohan *et al*., 2019).

Client reminder interventions were observed by Sano, Goto, and Hamashima (2017) to be implemented through written forms (email, postcard, letters) and automated telephone messages that remind girls and women when they are due for cervical and breast cancer screening. The study concluded that measures such as follow-up, telephone reminders, automated texts and technological assistance in scheduling appointments enhance the client reminder interventions.

The reminders can be tailored to a specific person or untailored to target the general population based on their unique medical characteristics, the outcome of interest, and the assessment of medical needs and coverage of the targeted community. Further, the effectiveness of client reminders can also be buttressed by the integration of small media such as newsletters and brochures which provide messages to motivate and inform the public on the need, benefits, and medical merits for uptake of screening for cervical and breast cancer (Sano *et al*., 2017).

2.2.2 Community Based Health Interventions in Improving Maternal Health in Africa

Communities have a positive perception about community-based structures because they identify with them and are more receptive to such mechanisms. Several studies have been conducted in the region to find out the role that is played by interventions that are community based. In Nigeria, one study sought to measure the impact that community-based service delivery had on maternal healthcare. The study indicated that in the regions where such interventions were implemented the utilization of ANC services increased by over 10% (Charles *et al*., 2015).

The same study also found that delivery in hospitals using skilled birth attendants was two-fold in the intervention sites compared to control sites of the study. Another study in the same country that sought to establish the role of primary healthcare workers in monitoring growth of children observed that their awareness about growth monitoring was high.

Abiodun *et al*. (2014) conducted another study in Nigeria to determine the role of health education programmes on the knowledge, perception and uptake of cervical

and breast cancer screening in rural areas. The study established that health education programmes implemented in rural areas in Nigeria significantly increased the awareness of cervical and breast cancer among the people in the intervention sites. It was indicated that the low uptake in screening services was attributed to low levels of awareness about the facilities that offer screening services and the knowledge about the importance of the services as a preventive measure. It was concluded that dissemination of information on cancer in form of video was an efficient and cost-effective methodology of enhancing awareness, improving knowledge on and positively changing the perception of women in rural areas about cervical cancer screening. It further improved screening for cancer of the cervix.

To assess how effective CHWs are in enhancing utilization of nutritional supplements, a study was conducted in Sierra Leone. It sought to establish how a CHW programme focused on provision of Vitamin A had accomplished a consistent and equitable coverage of Vitamin A uptake in the country. Ayanore *et al*. (2020) found that the programme had a positive impact in enhancing the coverage and consistent uptake of Vitamin A to improve nutritional needs of the children in the country. It further indicated that UHC could be achieved by utilizing CHWs to target hard to reach areas.

In Uganda, another study sought to establish the effectiveness of involving CHWs in maternal and newborn healthcare. The findings showed that CHWs were perceived as an important pillar in ensuring positive outcomes for maternal and new-born healthcare at the community level. Their importance was enhanced by the fact that they leverage their social networks to identify the clients who need their services; pregnant women, women in labor, newly delivered women, their spouses and the wider community and expose them to health education activities (Okuga *et al*., 2015).

2.2.3 Community Based Health Interventions in Improving Maternal Health in Kenya

The importance of community-based interventions in promotion of primary prevention and maternal health care cannot be underestimated in Kenya. Kisia *et al*.,

(2015), conducted a study to establish factors that promoted the utilization of CHWs in enhancing access to treatment for malaria among children from poor households. The study revealed that there was a relatively high utilization of CHWs and subsequently a better level of access to treatment across these households. Further, it was indicated that the engagement of CHWs had increased timely access to effective treatment through linkage with healthcare facilities.

Adam *et al*. (2014), also conducted another study to find out the impact of CHWs in promoting MCH education among women. The study established that the mean score among women who reported to have been exposed to health messages by CHWs was significantly higher than the score of women who had not been exposed to such messages. It was therefore concluded that health promotion messages by CHWs were signficant in increasing knowledge on maternal and newborn care among women in communities; it was also attributed to promoting and encouraging skilled deliveries by the mothers under the care of skilled attendants.

Wangalwa *et al*. (2016) conducted a systematic review of studies that evaluated the impact of community based strategies in promoting MCH services. One of the studies reviewed sought to evaluate the impact that the community health strategy had on community based newborn and maternal health service delivery in Busia. The results from the study revealed that the programme had increased the ANC attendance among pregnant women, it encouraged skilled delivery, it increased the number of mothers who received preventive and interminttent treatment for malaria, promoted HIV testing among pregnant mothers at ANC , during labour and delivery and promoted breastfeeding for the first six months for those offering postnatal care to the newborns. The study was criticized in that it did not indicate how it controlled for confounding factors and the results were limited to the observation of the reseachers.

Olayo *et al*. (2014), study was also included in the systematic review. The study evaluated the effectiveness of Community Health Strategy (CHS) in delivery and provision of healthcare services in western Kenya. It indicated that there was an increase in desired results on indicators such as antenatal care, skilled delivery, water

treatment, use of latrines, use of insectisicide treated nets in intervention sites compared to non-intervention sites.

Another study by Swanson *et al.* (2018) that evaluated the effect of a community based cervical cancer screening programme in Western Kenya established that nearly a third of eligible women in Ngodhe were screened for cervical cancer. This was mainly because the programme was community driven.

In Kenya, the body of knowledge assessing the effectiveness of community based health interventions is limited; especially those focusing on uptake of breast and cervical cancer screening. In a study by the WHO, it was established that community based services appropriately addressed the needs of the populations compared to clinic-based services. The services are also less expensive and promote self-reliance and local participation. The study argued that CHW services were desired because they were more accessible and acceptable in their communities. In addition , leveraging on their inputs would enhance the level of coverage of services, promote equity thereby increasing utilization of services by residents from poor households.

Further, the report indicated that there is an apparent scarcity of data showing how cost-effective the CHWs service delivery programs are; which concurs with the earlier findings of the study indicating existence of limited studies interrogating the impact of CHWs on increasing coverage and promoting equity in service delivery when compared to other models of health service delivery. The report argued that the economic analysis of the impact of CHWs is made difficult because of qualitative aspects of the programmes such as duty, reciprocity, altruism, volunteerism and community norms. The effectiveness analysis thus cannot accurately estimate the cost of these aspects of CHWs programmes. Further, another existing challenge is the fact that such economic analysis ignores critical social benefits such as communiy mobilization (WHO, 2017).

2.3 Study conceptual framework

Several theories continue to inform behaviour change and particularly the health belief model. The theory fundamentally ascribes behaviour change to the perception

of the individual or society about the severity of the health issue of interest. Further, the theory identifies factors such as perceived susceptibility, perceived severity, perceived benefits, exposure to factors that prompt action, perceived barriers to action and self-efficacy as major promoters or inhibitors of behavioural change towards a certain health issue (Skinner, Tiro, & Champion, 2015).

Studies have indicated that improving knowledge levels among populations usually contribute to behaviour change that manifest in improved uptake of services. Further, community-based health education programmes have been found to be more effective compared to the other methods of information dissemination.

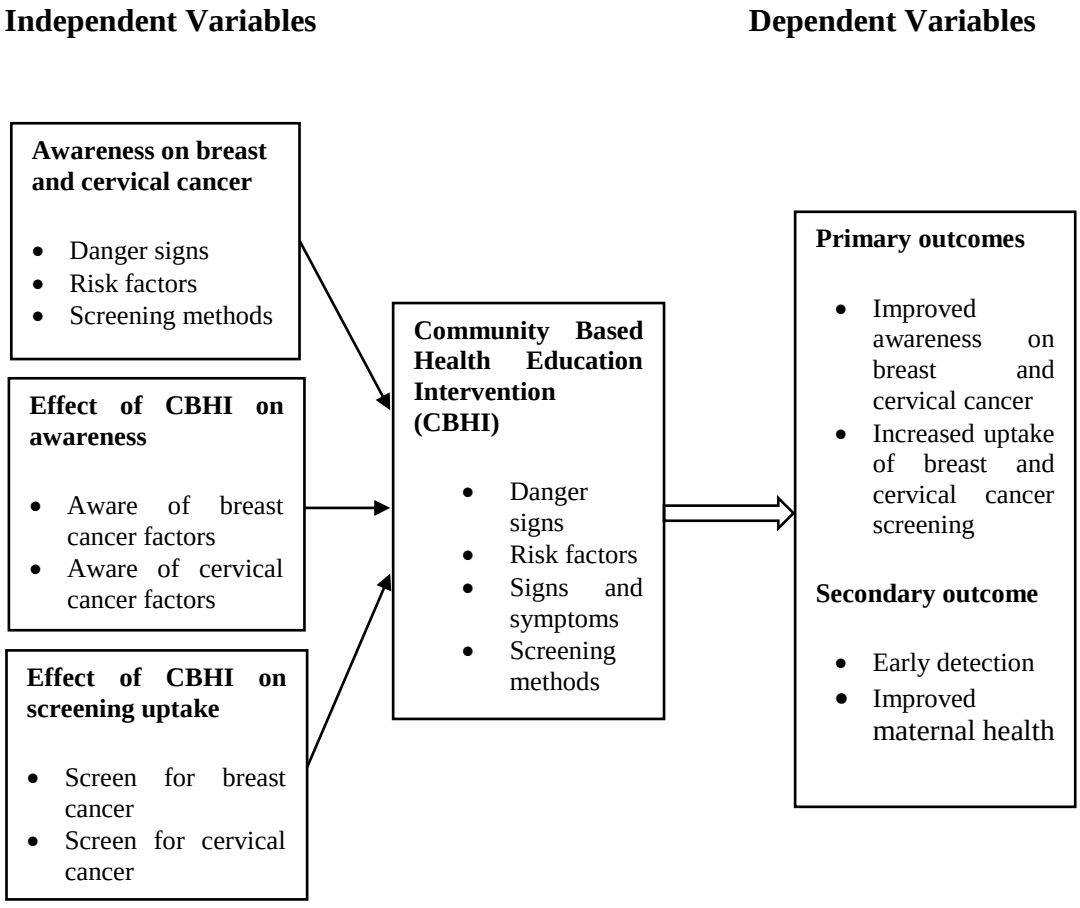

Figure 2.1: Conceptual Framework

The study conceptual framework was developed as informed by cause effect relationship by (Burns *et al.,* 2018).

CHAPTER THREE

MATERIALS AND METHODS

3.1 Study area and Study setting

The study was conducted in Kitui East and Mwingi West Sub-counties in Kitui County. These were purposively sampled to allow for a buffer zone between them to minimize contamination.

The study was done in selected households in Kitui East and Mwingi West. Kitui East was the intervention site while Mwingi West was the control site.

Kitui East has a total population of 10,187 women of reproductive age while Mwingi West has a total of 10,639 (Kenya National Bureau of Statistics, 2018). Both sub-counties have similarities in that both are located within the Kitui County that is Arid and Semi-Arid (ASAL) characterized by a hot dry weather with unreliable rainfall. Most people in the county are poor as they rely on subsistence farming for their upkeep. This predisposes them to food insecurity (County Government of Kitui, 2018). Both Kitui East and Mwingi West are among the sub-counties that are underserved in terms of distance to health care facilities and therefore residents have to walk for more than 10km in order to access care. The facilities are also understaffed which affects the variety of services provided, number of hours over which services are available, waiting time and the quality of services provided (County Government of Kitui, 2018). This therefore hinders access to quality health care for the majority of residents in the two sub-counties.

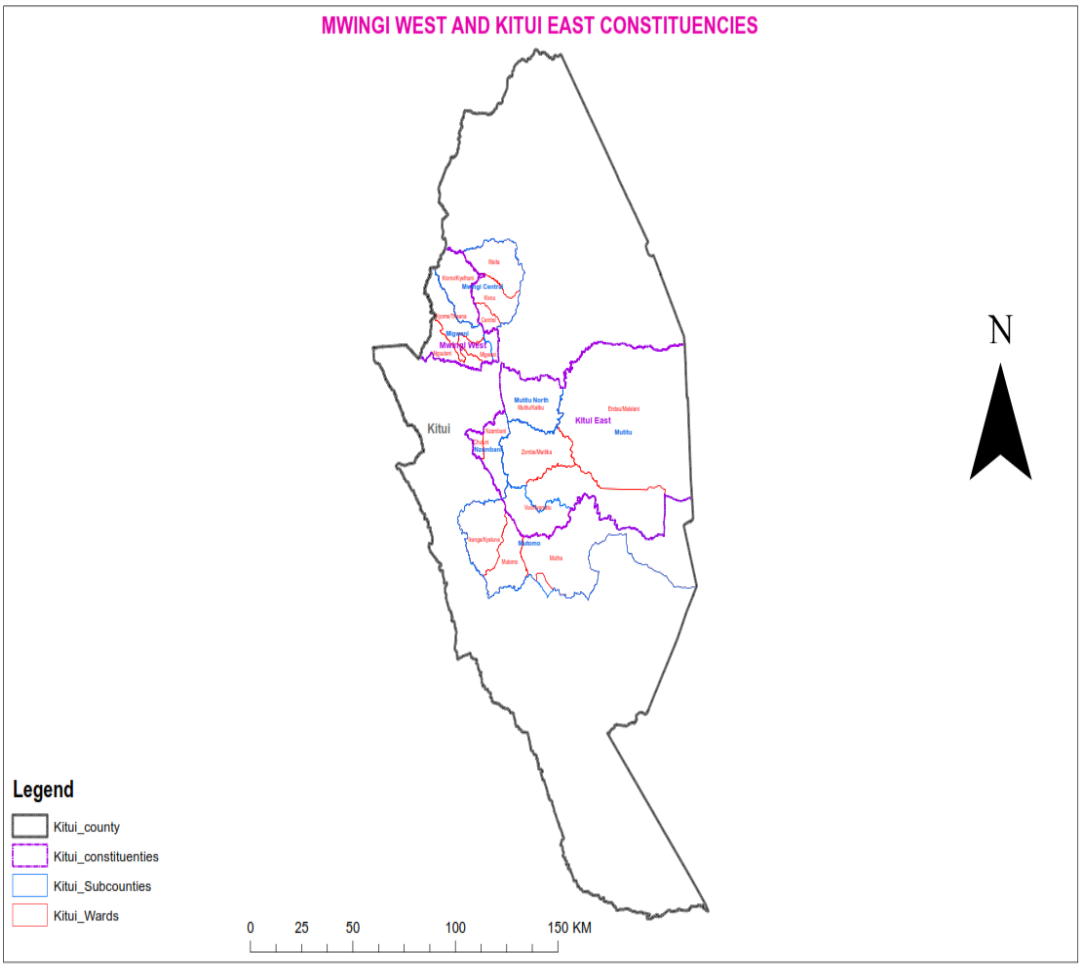

Figure 3.1: Kitui County Map showing Kitui East and Mwingi West Sub-Counties; Source: Kenya National Bureau of Statistics

3.2 Study Design

The study adopted a quasi-experimental design with two arms i.e., control arm (women of reproductive who did not receive any training on breast and cervical cancer) and intervention arm (women of reproductive age who received training on breast and cervical cancer). The Quasi experiment was designed to have one pre intervention and one post intervention survey in both the intervention and control sites. The intervention (Training) was administered for a period of two months. A baseline survey was conducted prior to the intervention followed by an end line survey eight months after the intervention in order to assess for changes in the identified variables. This therefore informed whether the intervention has had an effect or not.

Quasi experimental designs are strong with external validity implying that the findings can be generalized to the broader population. Further, there is no loss to follow up as respondents for baseline do not have to be the same for endline since it is a community intervention.

3.3 The Community Based Health Education Intervention

The Intervention was a Community Based Health Education curriculum designed to raise awareness and promote early screening for both cervical and breast cancer in the intervention site. It was designed to be used by Community Health Volunteers to reach out to the communities. It provided basic messages on both breast and cervical cancer as well as screening approaches employed in both.

Development of the intervention was informed by a validated United Kingdom breast and cervical cancer awareness modules (Cancer Research UK, 2010) and (UCL Health Behaviour Research, 2008). Gaps identified during the baseline survey further enriched the curriculum.

The intervention was designed to be used by Community health volunteers to create awareness among women of reproductive age in the intervention site. The curriculum had a detailed outline of coverage as well as demonstration sessions for some of the procedures. It was expected that administration of the intervention would lead to an increase in knowledge and screening for both breast and cervical cancer.

The following were the key elements of the intervention:

3.3.1 Development of a breast and cervical cancer awareness training curriculum

A curriculum was developed aimed at enhancing knowledge on both cancers and provide information on the importance of early screening. It provided messages on:

1) Dangers signs or the early warning signs of both cancers
2) Risk factors associated with development of both cancers
3) Signs and symptoms of both cancers

4) Screening approaches employed for both cancers
5) Importance of early breast and cervical cancer screening

3.3.2 Validation of the training messages and materials

As much as the intervention was informed by a validated tool, the training curriculum was independently piloted to ensure validity and reliability. The curriculum was piloted among women of reproductive age in Machakos County before it was implemented in the intervention site. This allowed for adjustment in order to ensure that the intended messages were delivered to the target group.

3.3.3 Recruiting and training of Community Health volunteers

Kitui East has a total of 31 Community units. Community Health Volunteers (CHVs) were assigned to specific community units. CHVs were recruited to support the training and selected on the basis of the number of community units in the Sub-County. The CHVs were trained on the curriculum with specific emphasis on knowledge and screening for both breast and cervical cancer.

3.3.4 Assignment of CHVs to Community Units

The CHVs were assigned to train community members in their areas of jurisdiction (Community Units) in Kitui East, the intervention site. There are approximately 10,187 women of reproductive age in this sub-county. There is a total number of 31 community units in Kitui East. Each Community unit had approximately 500 households. A total of 62 CHVs were engaged with two CHVs being in charge of a community unit.

A typical class consisted of 40 members. Training per class was undertaken for a period of one week. On the basis of the number of classes derived from women in the community units, the entire training was undertaken for a period of two months.

3.3.5 Mobilization for training

The village administrators supported in mobilization of women of reproductive age to be trained. Chiefs' barazas was the main mode used to inform community members about the training with an emphasis on the reproductive health benefits that residents would gain by attending the training.

3.3.6 Supervision on trainings

Follow up was made to ensure that the CHVs carried out the trainings as expected. A total number of 15 Public Health Officers (PHO) were selected to support in supervision. Each PHO provided oversight for two community units. Overall supervision was provided by the Principal Investigator.

3.4 Study population

The target population constituted women of reproductive age in Kenya. The broad objective of this study was to determine the effect of a Community Based Health Education Intervention on Breast and cervical cancer awareness and screening among women of reproductive age in Kitui County. Therefore, the respondents in this study were limited to women of reproductive age (18-49 years) in Kitui County.

3.4.1 Inclusion Criteria

The criteria used for inclusion of participants into the study entailed: women of reproductive age, aged between 18-49 years, willing to give an informed consent and belonging to the sub-counties of Kitui East and Mwingi West.

3.4.2 Exclusion Criteria

The exclusion criteria for participants in the study included: Women outside the age bracket of 18-49 years, those not willing to give an informed consent and those residing in other sub-counties outside Kitui East and Mwingi West.

3.5 Sampling Techniques

3.5.1 Sample Size Determination

The primary outcome measure was uptake of cervical cancer screening among women of reproductive age. Uptake was considered as participants screened for cervical cancer in either arm of the study. According to the 2014 Kenya Demographic Survey (KDHS), 13% of women reported to have ever had cervical cancer screening in the former Eastern Province. Therefore, we assumed a 13% screening uptake of cervical cancer in Kitui County. It was anticipated that control arm would have 13% screening uptake and that the respondents would increase screening uptake by 10% in the intervention arm.

The study adopted a quasi-experimental study design with comparison of two proportions from intervention group (women who were sensitized on cervical and breast cancer) and the control group (women who were not sensitized on cervical and breast cancer).

The aim was to estimate a sample size needed to achieve 80% power at a two-sided 5% level of significance for detecting a 10% absolute difference in screening uptake between the intervention and the control groups. A screening uptake of 13% in the control group, and 23% in the intervention group were therefore assumed. The standard sample size equation below as proposed by Casagrande *et al*., 2004 for comparison of two proportions was utilized:

$$\frac{\left\{u\sqrt{\pi_1(1-\pi_1)+\pi_0(1-\pi_0)}+v\sqrt{2\bar{\pi}(1-\bar{\pi})}\right\}^2}{(\pi_0-\pi_1)^2}$$

where,

π_0= proportion for control group (13%)

π_1 = proportion of intervention group (23%)

u = one-sided percentage point of normal distribution corresponding to 80% power i.e. (100% - the power) = 0.84

v= percentage point of the normal distribution corresponding to the two-sided significance level of 5% = 1.96

$$\bar{\pi} = \frac{\pi_0 + \pi_1}{2}$$

Substituting these figures into the equation above yielded a sample size of 234 participants per group. Adjusting for 10% non-response yielded approximately 257 sample size per group. Therefore, the study, required a sample size of 514 participants in total.

3.5.2 Sampling process

Purposive and simple random sampling were employed in this study. Purposive sampling was employed to identify the intervention and control sites while simple random sampling was used to identify the study participants.

The predicted total population of women in Kitui County by 2018 is 579,230. Total number of women in Kitui East and Mwingi West (Intervention and control site respectively) was 10,187 and 10,639 respectively (Kenya National Bureau of Statistics, 2018). At baseline, a sampling frame of 5320 and 6415 households with a woman of reproductive age was established in intervention and control sites respectively. Five hundred and fourteen (514) households were randomly identified from both sampling frames. In the end term survey, a sampling frame of 6124 and 5397 households with women of reproductive age was established.

The sampling frame was obtained from the Community Unit lists provided by the sub-county administrators. A random selection of 514 households was made in both intervention and control sites. The simple random selection was undertaken using the SPSS software. In cases where a household had more than one woman in this age group volunteer sampling was used whereby respondents were requested to volunteer themselves.

3.6 Data Collection

Data was collected using a researcher administered questionnaire (Appendix II). The Questionnaire constituted 2 parts namely; One the Breast Cancer Awareness Measure (B-CAM) and the Cervical Cancer Awareness Measure borrowed from the measures developed by Cancer Research UK, King's College London and University, and two questions to determine if the respondent had recently sought the services of cancer screening**.**

Awareness was determined through administration of a questionnaire with questions aligned to the basic facts of cancer. This was determined prior the intervention and after the intervention for both the intervention and control groups.

Screening uptake was also determined with a questionnaire with questions on the health seeking behaviour. This was determined at baseline before the intervention and after the intervention for both the intervention and control groups.

Research assistants supported in data collection. For one to qualify as a research assistant, they had to have at least high school education and further be conversant with the study area. These research assistants were trained on data collection skills and basic health research ethics. The training was both theoretical and practical, where the research assistants did 'mock' interviews filling in sample questionnaires. At least ten (10) research assistants were recruited to support in data collection.

3.7 Data Management and Analysis

All the questionnaires were assigned unique identifiers provided for each participant to ensure confidentiality. This ensured that the information provided by the study participant could not be linked to them. The information obtained was kept in secure cabinets by the researcher to ensure no unauthorized access to the document occurred.

The primary outcomes were: i) uptake of breast and cervical cancer screening among women of reproductive age and; ii) knowledge on breast and cervical cancer among women of reproductive age. Uptake was considered as participants screened for breast and cervical cancer in either arm of the study.

The explanatory variables included patients' Age, parity, education, marital status, occupation and Household income. Socio-demographic characteristics of the study participants were summarized using descriptive statistics. SPSS software version 22 was used to analyze data. Effect of the CBHI on knowledge and screening uptake was estimated using three statistical analyses as follows; Z score tests to determine if proportions of respondents being screened for both breast and cervical cancer were statistically significant before and after the intervention. Difference-in-Differences (DiD) model also known as the 'double difference' method was used to estimate the net change in knowledge over time between intervention and control groups as proposed by (White & Sabarwal, 2014); (Memon *et al*., 2015).

Binary logistic regression analysis was used to estimate the probability of an early cancer detection outcome as a result of the CBHI. That is the probability that a woman of reproductive age would have knowledge on both breast and cervical cancer and the woman would undertake screening for both breast and cervical cancer. These probabilities were estimated in the intervention group to compare probabilities before (at baseline) and after the intervention (end line survey). In control group, binary logistic regression analysis was used to establish if there was any significant difference in the probabilities of the two CBHI outcomes at baseline and end term surveys.

Binary logistic regression was used to test the four hypotheses in this study. This is preferred compared to other hypothesis testing methods because it is the most relevant method to control for extraneous factors (sociodemographic characteristics) that would have influenced the study outcomes other than the CBHI.

Objective no. 1 and 2 on assessment of knowledge on breast and cervical cancer among women of reproductive age was measured using questions that elicited responses with regard to the early warning signs, age at risk of developing either breast and cervical cancer and knowledge of at least two breast and cervical cancer screening methods.

Respondents were also asked questions with regard to their previous experience with either of the cancers.

Objective no 3 on determining breast and cervical cancer screening uptake were measured using questions on whether the respondents had ever been screened before for either of the cancers.

3.8 Ethical Considerations

The Principal Investigator upheld the principles of research ethics in the course of the work. This Proposal was subjected to the KNH-UON Ethics Review committee (ERC) for ethical approval. An informed consent form was attached as part of the questionnaire. Informed consent was obtained from the participants. They were taken through the consent form that contained explanations on their participation in the study and what was expected of them. It further clarified that the participant could leave the study any time they felt uncomfortable. The participant was then guided to sign the consent form. Details of the consent form are found in Appendix II-Informed Consent. This ensured that participation was on a voluntary basis. Further, Permission to undertake the study was sought from the County Department of Health, Kitui.

The participant was then asked questions on their knowledge of breast and cervical cancer. Thereafter they were taken through the curriculum and then their knowledge

and awareness were determined. The study was not invasive in any way, as it did not entail drawing of body samples and the risks involved were minimal.

3.9 Study limitations and delimitations

This study had some limitations. The design adopted did not provide for random allocation of respondents into either the control or the intervention group and therefore this affected the internal validity in terms of reasons for the outcomes of the study. However, since there was a pre and posttest survey after the intervention as well as a comparison control group, this attempted to eliminate rival explanations and establish a causal association.

Secondly, it was also not possible to account for possibility of other programs that could have influenced the outcomes of interest (other than CBHI) in the intervention site. However, there was an attempt to reduce the effect of confounding factors through, treating socio-demographic factors of both intervention and control sties as potential confounders and having them controlled in the binary logistic regression model used in hypothesis testing.

CHAPTER FOUR

RESULTS

4.1 Introduction:

A total of 514 respondents were targeted for both baseline and endline. At baseline, the response rate was 95% while at endline the response rate was higher at 96%. There was no loss to follow up as with quasi experimental studies, the endline respondents do not have to be same as for baseline study. This also explains the higher response rate at end line.

4.1.1 Socio-demographic Information

Table 4.1 indicates that all the respondents were aged between 18 and 49 years. Majority of the respondents were aged between 31-35 years at baseline for both intervention and control at 36.9% (91) and 34.6% (85) respectively. Most respondents had attained secondary school level of education for both intervention and control at baseline at 35.4% (87) and 56.5% (138) respectively. A similar trend was observed for endline respondents with intervention and control at 50.4% (125) and 41.2% (102) respectively.

Table 4.1: Socio-demographic characteristics of the respondents at endline and Baseline

Variable	Categories	Baseline Survey				End term Survey (8 months)			
Age		**Control**		**Intervention**		**Control**		**Intervention**	
		F	%	F	%	F	%	F	%
	18-20 years	7	3.0	0	0	12	4.9	13	5.1
	21-25 years	38	15.7	19	7.7	46	18.8	39	15.6
	26-30 years	82	33.3	64	26.2	71	28.9	68	27.4
	31-35 years	85	34.6	91	36.9	84	34.1	80	32.3
	36-40 years	30	12.4	69	28.0	33	13.3	49	19.6
	41-45 years	2	1.0	3	1.2	0	0	0	0
	Total	245	100	246	100	247	100	249	100
Parity		F	%	F	%	F	%	F	%
	1 Child	14	5.7	7	3.0	18	7.4	8	3.2
	2 children	13	5.5	9	3.7	8	3.2	11	4.6
	3 children	35	14.4	37	14.9	41	16.5	39	15.6
	4 children	75	30.8	64	26.0	54	22.0	74	29.8
	5 children	54	22.1	57	23.0	60	24.4	60	24.2
	6 children	43	17.4	38	15.6	50	20.2	40	15.9
	7 and above	10	4.0	34	13.9	15	6.2	16	6.6
	Total	245	100	246	100	247	100	249	100
Education		F	%	F	%	F	%	F	%
	No education	6	2.5	20	8.2	3	1.2	16	6.6
Level	Primary	49	19.9	84	34.2	68	27.7	59	23.5
	Secondary	138	56.5	87	35.4	102	41.2	125	50.4
	College/ University	52	21.1	55	22.3	74	29.9	49	19.6
	Total	245	100	246	100	247	100	249	100
Occupation		F	%	F	%	F	%	F	%
	Not working	6	2.5	4	1.7	9	3.7	18	7.1
	Peasant	138	56.5	123	49.8	135	54.8	136	54.5
	Farmer								
	Business	70	28.4	62	25.2	62	24.9	60	24.2
	Employment	31	12.7	57	23.3	41	16.5	35	14.2
	Total	245	100	246	100	247	100	249	100
Marital		F	%	F	%	F	%	F	%
	Single	19	7.7	11	4.5	21	8.4	20	8.1
Status	Married	210	85.6	181	73.5	199	80.7	189	75.8
	Widowed	10	4.2	40	16.1	16	6.4	29	11.7
	Separated/ Divorced	6	2.5	15	5.9	11	4.4	11	4.4
	Total	245	100	246	100	247	100	249	100

4.1.2 Level of Income

Table 4.2 provides an analysis on the level of income which revealed that the mean monthly household income was relatively low among the control group (*M* = 4267.62, *SD* = 4692.08) compared to the intervention group (*M* = 5875.00, *SD* = 4274.67). The intervention group minimum income was 1,000 Kenyan Shillings while the maximum was 22,000 Kenyan shillings.

At end line, the distribution of mean monthly household income was found to be higher in the intervention group (*M* = 5374.08, *SD* = 5235.687) than in the control groups (*M* = 4343.21, *SD* = 4665.227). The minimum income reported for the control group was KSh. 500 with the intervention reporting a minimum of zero income.

Table 4.2: Total monthly household income

Total monthly household income (Baseline)		
Control	N	245
	Mean	4267.41
	Median	2500.00
	Mode	2000
	Std. Deviation	4691.081
	Minimum	500
	Maximum	25000
Intervention	N	246
	Mean	5875.00
	Median	4000.00
	Mode	2500
	Std. Deviation	4274.669
	Minimum	1000
	Maximum	22000
Total monthly household income (End line)		
Control	N	247
	Mean	4343.21
	Median	2500.00
	Mode	2000
	Std. Deviation	4665.227
	Minimum	500
	Maximum	24000
Intervention	N	249
	Mean	5374.08
	Median	3500.00
	Mode	3000
	Std. Deviation	5235.687
	Minimum	0
	Maximum	26000

4.2 Awareness on breast and cervical cancer among women of reproductive age

4.2.1 Awareness on Breast Cancer

Three domains were considered to determine the level of awareness on breast cancer among women of reproductive age namely: Awareness on danger signs of breast cancer, awareness of age at risk of developing breast cancer and awareness on at least one breast cancer screening method.

4.2.1.1 Awareness Domain 1: Aware of danger signs of breast cancer

Table 4.3 indicates that the proportion of respondents who knew at least two danger signs of breast cancer was nearly equal in proportion for both control and intervention groups at 59.5% (146) and 59.2% (146), respectively.

Table 4.3: Aware of at least 2 Danger Signs of Breast Cancer

Site	**Baseline Survey** Woman Know at least 2 danger signs of Breast cancer	
	Frequency	%
Intervention site	146/246	**59.2**
Control Site	146/245	**59.5**

Further analysis using a binary logistic regression model that provided for both crude and adjusted Odds Ratios (ORs) was undertaken. Adjustment was made for socio-demographic characteristics as potential confounders.

The binary logistic regression analysis revealed that at baseline, there was no significant difference in the odds of respondents who knew at least two danger signs of breast cancer between intervention and control groups (Crude OR=0.988, P>0.05, 95%CI of OR: 0.746-1.308).

Table 4.4 indicates that after adjusting for sociodemographic characteristics (Age, Number of children, Level of education, Primary Occupation, Marital status

and total monthly household income) as potential confounders, that there was no significant difference in the odds of respondents who knew at least two danger signs of breast cancer between intervention and control (*Adj*. OR=1.008, P>0.05, 95%CI of OR: 0.699-1.455).

Table 4.4: Odds of Awareness of at least 2 Danger Signs of Breast Cancer at Baseline

Study Phase		**Sig.**	**OR**	**95%C.I**	
Baseline	Woman Knows at least 2 danger signs of Breast cancer	.965	1.008	.699	1.455
	Age of respondent	.000	2.503	1.830	3.424
	Number of children of respondent	.000	.593	.474	.743
	Level of education of respondent	.000	.414	.312	.550
	Primary Occupation of respondent	.178	1.245	.905	1.714
	Marital status	.000	1.826	1.339	2.490
	Total monthly household income	.000	1.000	1.000	1.000
	Constant	.001	.184		

Table 4.5 provides a comparison between intervention and control.

Table 4.5: Odds of Awareness of Danger Signs of Breast Cancer at Baseline Survey in Intervention Vs Control

Baseline Survey	**Crude vs *Adj.***	**Sig.**	**OR**	**95% CI**
Intervention Vs Control	Crude OR	0.932	0.988	0.746-1.308
(Kitui East *Vs* Mwingi	Adjusted OR	0.965	1.008	0.699-1.455

4.2.1.2 Awareness Domain 2: Aware of age at risk of developing breast cancer

Table 4.6 indicates that more respondents in the control group (128, 52.5%) were aware of the age at risk of developing breast cancer compared to 118 (47.8%) in the intervention group.

Table 4.6: Aware of Age at Risk of Developing Breast Cancer

Site	**Baseline survey** Woman Knows the age at risk of developing Breast cancer	
	Frequency	%
Intervention site	118/246	47.8
Control site	128/245	52.5

The binary logistic regression analysis revealed that at baseline, there was no significant difference in the odds of respondents who knew the age at risk of developing breast cancer between intervention and control (Crude OR=0. 828, P>0.05, 95%CI of OR: 0.628-1.092).

Table 4.7 indicates that after adjusting for sociodemographic characteristics as potential confounders, there was no significant difference in the odds of respondents who knew the age at risk of developing breast cancer between intervention and control (*Adj.* OR=0.782, P>0.05, 95%CI of OR: 0.565-1.084).

Table 4.7: Odds of Awareness of Age at Risk of Developing Breast Cancer at Baseline survey in Intervention Vs Control

Baseline Survey	**Crude vs *Adj.***	**Sig.**	**OR**	**95% CI**
Intervention Vs Control (Kitui East *Vs* Mwingi	Crude OR	0.181	0.828	0.628-1.092
	Adjusted OR	0.140	0.782	0.565-1.084

4.2.1.3 Awareness Domain 3: Mother knows one breast cancer screening method

Table 4.8 indicates that majority of the respondents in both the control group at 154 (62.9%) and the intervention group at 154 (62.6%) were aware of at least one breast cancer screening method.

Table 4.8: Aware of One Breast Cancer Screening method

Site	**Baseline survey**	
	Woman knows one Breast cancer screening method	
	Frequency	%
Intervention site	154/246	62.6
Control site	154/245	62.9

A binary logistic regression analysis at baseline indicated no significant difference in the odds of respondents who knew at least one breast cancer screening method between intervention and control groups (Crude OR=0.987, P>0.05, 95%CI of OR: 0.742-1.313).

Table 4.9 indicates that after adjusting for socio-demographic characteristics as potential confounders, there was no significant difference in the odds of respondents who knew at least one breast cancer screening method between intervention and control groups (*Adj.* OR=0.982, P>0.05, 95%CI of OR: 0.686-1.406).

Table 4.9: Odds of Awareness of at least one Breast cancer screening method at Baseline survey in Intervention Vs Control

Baseline Survey	**Crude vs *Adj.***	**Sig.**	**OR**	**95% CI**
Intervention Vs Control	Crude OR	0.927	0.987	0.742-1.313
(Kitui East *Vs* Mwingi	Adjusted OR	0.921	0.982	0.686-1.406

4.2.2 Awareness on cervical cancer

To determine the level of awareness on cervical cancer among women of reproductive age, three domains were considered namely: Awareness on danger signs of cervical cancer, awareness on age at risk of developing cervical cancer and awareness on at least two risk factors associated with development of cervical cancer.

4.2.2.1 Awareness Domain 1: Aware of at least 2 danger signs of cervical cancer

Table 4.10 indicates that the proportion of those who knew at least two danger signs of cervical cancer were 21.9% (54) in the control group and 25.7% (63) in the intervention group.

Table 4.10: Awareness on at least 2 danger signs of cervical cancer

Site	**Baseline Survey** Aware of at least 2 danger signs of cervical cancer	
	Frequency	%
Intervention site	63/246	25.7
Control site	54/245	21.9

A binary logistic regression analysis indicated no significant difference in the odds of respondents who knew at least two danger signs of cervical cancer between intervention and control (Crude OR=1.237, P>0.05, 95%CI of OR: 0.894-1.712)

Table 4.11 indicates that after adjusting for sociodemographic characteristics as potential confounders, there was no significant difference in the odds of respondents who knew at least two danger signs of cervical cancer between intervention and control (*Adj.* OR=1.120, P>0.05, 95%CI: 0.795-1.578).

Table 4.11: Odds of awareness on at least two danger signs of cervical cancer at Baseline survey in Intervention Vs Control

Baseline Survey	Crude vs *Adj.*	Sig.	OR	95% CI
Intervention Vs Control	Crude OR	0.200	1.237	0.894-1.712
(Kitui East *Vs* Mwingi	Adjusted OR	0.518	1.120	0.795-1.578

4.2.2.2 Awareness Domain 2: Aware of age most likely to develop cervical cancer

Table 4.12 shows that the proportion of respondents who had knowledge on age most likely to develop cervical cancer was found to be higher at 141 (57.2%) among the intervention group compared to the control group at 188 (46.8%) at baseline.

Table 4.12: Aware of Age most likely to develop cervical cancer

Site	Baseline survey Aware of Age most likely to develop cervical cancer Frequency	%
Intervention site	141/246	57.2
Control site	188/245	46.8

A binary logistic regression analysis at baseline indicated that there was no significant difference in the odds of respondents who knew the age most likely to develop cervical cancer between intervention and control [(Crude OR=1.520, P>0.05, 95%CI of OR: 1.151-2.007)

Table 4.13 indicates that after adjusting for sociodemographic characteristics (Age, Number of children, Level of education, Primary Occupation, Marital status and total monthly household income) as potential confounders, there was no significant difference in the odds of respondents who knew the age most likely to

develop cervical cancer between intervention and control (*Adj*. OR=1.285, P>0.05, 95%CI of OR: 0.901-1.834).

Table 4.13: Odds of Awareness of Age most likely to develop cervical cancer at baseline

Study Phase		Sig.	OR	95%C.I	
Baseline	Woman is aware of Age most likely to develop Cervical cancer	.167	1.285	.901	1.834
	Age of respondent	.000	2.527	1.847	3.458
	Number of children of respondent	.000	.595	.475	.745
	Level of education of respondent	.000	.412	.313	.544
	Primary Occupation of respondent	.252	1.205	.876	1.657
	Marital status	.000	1.803	1.321	2.461
	Total monthly household income	.000	1.000	1.000	1.000
	Constant	.001	.176		

Table 4.14 provides a comparison on age most likely to develop cervical cancer between intervention and control.

Table 4.14: Odds of awareness on age most likely to develop cervical cancer at Baseline survey in Intervention Vs Control

Baseline Survey	Crude vs *Adj.*	Sig.	OR	95% CI
Intervention Vs Control	Crude OR	0.003	1.520	1.151-2.007
(Kitui East *Vs* Mwingi West)	Adjusted OR	0.167	1.285	0.901-1.834

4.2.2.3 Awareness Domain 3: Aware of at least 2 risk factors associated with development of cervical cancer

Table 4.15 shows that the proportion of respondents who knew the risk factors associated with the development of cervical cancer was 64.4% (158) in the intervention group and 62.2% (152) in the control group.

Table 4.15: Odds of knowledge on age most likely to develop cervical cancer at Baseline survey in Intervention Vs Control

Site	**Baseline Survey**	
	Aware of at least 2 risk factors associated with cervical cancer	
	Frequency	%
Intervention site	158/246	64.4
Control site	152/245	62.2

A binary logistic regression analysis revealed that at baseline, there was no significant difference in the odds of respondents who knew of at least two risk factors associated with the development of cervical cancer between intervention and control (Crude OR=1.098, P>0.05, 95%CI of OR: 0.824-1.462)

Table 4.16 indicates that after adjusting for socio-demographic characteristics as potential confounders, there was no significant difference in the odds of respondents who knew of at least 2 risk factors associated with development of cervical cancer between intervention and control (*Adj*. OR=1.120, P>0.05, 95%CI of OR: 0.795-1.578).

Table 4.16: Odds of awareness of at least 2 risk factors associated with development of cervical cancer at Baseline survey in Intervention Vs Control

Baseline Survey	Crude vs *Adj.*	Sig.	OR	95% CI
Intervention Vs Control	Crude OR	0.523	1.098	0.824-1.462
(Kitui East *Vs* Mwingi West)	Adjusted OR	0.518	1.120	0.795-1.578

4.3 Effect of the Community Based Health Education Intervention (CBHI) on knowledge on breast and cervical cancer

4.3.1 Effect of the CBHI on level of awareness on Breast Cancer

To determine whether the CBHI had an effect on awareness of danger signs of breast cancer, a binary logistic regression model was used that provided for both crude and adjusted odds ratio. The adjusted odds ratio was done for Age, Number of children, and Level of education, Primary Occupation, Marital status and total monthly household income as potential confounders.

Null hypothesis:

The CBHI does not have an effect on the level of awareness on breast cancer among respondents in the intervention group; therefore, there is no significant difference in the odds of respondents who are aware of breast cancer in the intervention arm at endline survey compared to baseline survey.

To test this hypothesis, three domains of awareness were considered as indicated below:

4.3.1.1 Awareness Domain 1: Effect of the CBHI on awareness on danger signs of breast cancer

4.3.1.1.1 Proportions on awareness of danger signs of breast cancer

Table 4.17 shows the proportion of respondents who knew at least two danger signs of breast cancer was equal for both control and intervention groups at 59.5% (146) and 59.2% (146) respectively at baseline. During the end line evaluation, a higher proportion of the respondents in the intervention group at 87.5% (218) were aware of at least two danger signs of breast cancer than there were in the control group at 73.6% (182).

Table 4.17: Comparison on awareness of at least 2 Danger Signs of Breast Cancer between baseline and end term survey for both intervention and control

Survey	Intervention site		Control Site	
	Mothers Knows at least 2 danger signs of Breast cancer			
	Frequency	%	Frequency	%
Baseline	146/246	59.2	146/245	59.5
End-Term (8 months)	218/249	87.5	182/247	73.6

4.3.1.1.2 Change in awareness on danger signs of breast cancer in intervention and control sites

Table 4.18 shows the comparison made in proportions of respondents who were aware of the danger signs of breast cancer between end term and baseline survey for the control group which indicated a difference of 14.1% (73.6%-59.5%). A Z score test performed revealed a significant difference between the two proportions (Z score =4.2528, $P<0.05$).

In the intervention site, level of awareness on danger signs of breast cancer increased by 28.3% (difference in proportions 87.5% -59.2%). A Z score test performed to test

this difference established that the change in proportion was significant (Z score=9.1575, P<0.05).

This therefore implies that the CBHI significantly increased awareness levels on danger signs of breast cancer by 28.3%.

Table 4.18: Z score Tests testing change in proportions on awareness on danger signs of breast cancer

Study Site	Base line	End term	Z-Score test and P values (Baseline Vs. End term)
Intervention	186/246 (59.2%)	218/249 (87.5%)	Z score = 9.1575, P<0.05 (28.3% difference is significant)
Control	186/245 (59.5%)	182/247 (73.6%)	Z score =4.2528, P<0.05, (14.1% Difference is significant)

4.3.1.1.3 Net Change in awareness on danger signs of breast cancer in intervention and control sites

The net change/estimated effect of CBHI on awareness of danger signs of breast cancer in the intervention site compared to control site over 8 months' CBHI intervention period was calculated using the DiD model.

Difference in Difference (DiD) statistic established that in the 8 months intervention time, there was a 14.2% net increase in women who were aware of the danger signs of breast cancer in the intervention site. The DiD statistic was calculated as follows:

(87.5%-59.2%) -(73.6%-59.5%) = 14.2%

4.3.1.1.4 Observed Change in awareness on danger signs of breast cancer in the intervention arm

A binary logistic regression analysis conducted at end line after the Community Based Health Education Intervention was rolled out, indicated a significant difference in the odds of awareness on danger signs for breast cancer between the intervention and control. The intervention group respondents were 2.520 times more likely to know at least two danger signs of breast cancer than the control group respondents. (Crude OR=2.520, P<0.05, 95%CI of OR: 1.746-3.639)

Table 4.19 shows that after adjusting for sociodemographic characteristics (Age, Number of children, Level of education, Primary Occupation, Marital status and total monthly household income) as potential confounders, the odds of awareness of at least two danger signs for breast cancer in the intervention group compared to the control group increased to 3.8 (*Adj.* OR=3.895, P<0.05, 95%CI: 2.538-5.979).

Table 4.19: Odds of awareness on danger signs of breast cancer at endline

Study Phase		**Sig.**	**OR**	**95%C.I**	
Endline (18 months)	Woman Knows at least 2 danger signs of Breast cancer	.000	3.895	2.538	5.979
	Age of respondent	.000	1.819	1.315	2.517
	Number of children of respondent	.002	.676	.528	.865
	Level of education of respondent	.000	.606	.466	.789
	Primary Occupation of respondent	.000	.287	.196	.420
	Marital status	.081	1.297	.968	1.737
	Total monthly household income	.000	1.000	1.000	1.000
	Constant	.658	.821		

Table 4.20 shows a comparative summary of the odds of awareness on danger signs for breast cancer between baseline survey and end-term surveys in both intervention and control sites. The hypothesis test statistic is in bold.

Table 4.20: Comparison of the Odds of awareness on danger signs for breast cancer between baseline and end line

Surveys	Crude & Adj.	Sig	OR	95%CI
Baseline Survey	Crude	0.932	0.988	0.746-1.308
	Adjusted	0.965	1.008	0.699-1.455
End term Vs Baseline (Hypothesis test)	**Crude**	**<0.001***	**2.520**	**1.746-3.639**
	Adjusted	**<0.001***	**3.895**	**2.538-5.979**

*Table legend: * means test statistic is significant at P<0.05*

4.3.1.2 Awareness Domain 2: Effect of the CBHI on awareness of Age at Risk of Developing Breast Cancer

4.3.1.2.1 Proportions on awareness of Age at Risk of Developing Breast Cancer

Table 4.21 shows that with regard to awareness on the age that is at risk of developing breast cancer, a higher proportion of respondents in the control group at 52.5% (128) were aware of the age at risk of developing breast cancer compared to 47.8% (118) in the intervention group. Level of awareness on the age at risk of developing breast cancer increased in proportion at end line compared to baseline. At the end line, those who reported to know age at risk of developing breast cancer were 186 (74.8%) compared to 118 (47.9%) in the intervention group at the end and baseline, respectively.

Table 4.21: Comparison of awareness on age at Risk of Developing Breast Cancer between baseline and end term survey among intervention and control

Survey	Intervention site		Control Site	
	Mother Knows the age at risk of developing Breast cancer			
	Frequency	%	Frequency	%
Baseline	118/246	47.8	128/245	52.5
End-Term (8 months)	186/249	74.8	118/247	47.9

4.3.1.2.2 Change in awareness on age at risk of developing Breast Cancer in intervention and control sites

Table 4.22 shows a summary of the comparison made in proportions of respondents who were aware of the age at risk of developing breast cancer between end term and baseline survey for the control group that indicated a difference of -4.6% (47.9%-52.5%). A Z score test performed revealed no significant difference between the two proportions (Z score =-1.3029, P>0.05).

In the intervention site, awareness on age at risk of developing breast cancer increased by 27% (difference in proportions 74.8%-47.8%). A Z score test performed to test this difference established that the change in proportion was significant (Z score=7.9188, P<0.05).

This therefore implies that the CBHI significantly increased awareness on age at risk of developing breast cancer by 27% in the intervention site.

Table 4.22: Z score Tests testing change in proportions on awareness on age at risk of developing breast cancer

Study Site	Base line	End term	Z-Score test and P values (Baseline Vs. End term)
Intervention	118/246 (47.8%)	186/249 (74.8%)	Z score = 7.9188, P<0.05 (27% difference is significant)
Control	128/245 (52.5%)	118/247 (47.9%)	Z score =-1.3029, P>0.05, (-4.6% Difference is not significant)

4.3.1.2.3 Net Change in awareness of the age at risk of developing breast cancer in intervention and control sites

The net change/estimated effect of CBHI on level of awareness on age at risk of developing breast cancer in the intervention site compared to control site over 8 months' CBHI intervention period was calculated using the DiD model.

Difference in Difference (DiD) statistic established that in the 8 months intervention time, there was a 31.6% net increase in women who knew age at risk of developing breast cancer in the intervention site. The DiD statistic was calculated as follows:

(74.8%-47.8%) -(47.9%-52.5%) =31.6%

4.3.1.2.4 Observed Change in awareness on age at risk of developing breast cancer in the intervention arm

Binary logistic regression analysis conducted at end line indicated a significant difference in the odds of awareness on age at risk of developing breast cancer between the intervention and control. The intervention group respondents were 3.2 times more likely to know the age at risk of developing breast cancer than the control group respondents. (Crude OR=3.231, P<0.05, 95%CI of OR: 2.402-4.346)

After adjusting for sociodemographic characteristics (Age, Number of children, Level of education, Primary Occupation, Marital status and total monthly household income) as potential confounders, the odds of respondents in the intervention group who knew age at risk of developing breast cancer increased to 4.1 (*Adj*. OR=4.128, P<0.05, 95%CI: 2.940-5.797).

Table 4.23 shows a comparative summary of the odds of awareness on age at risk of developing breast cancer between baseline survey and end-term surveys in both intervention and control sites. The hypothesis test statistic is in bold.

Table 4.23: Comparison of the Odds of awareness on age at risk of developing breast cancer between baseline and end line

Surveys	Crude & Adj.	Sig	OR	95%CI
Baseline Survey	Crude	0.181	0.828	0.628-1.092
	Adjusted	0.140	0.782	0.565-1.084
End term Vs Baseline	Crude	<0.001*	3.231	2.402-4.346
(Hypothesis test)	Adjusted	<0.001*	4.128	2.940-5.797

*Table legend: * means test statistic is significant at P<0.05*

4.3.1.3 Awareness Domain 3: Effect of the CBHI on Mothers' level of awareness of at least one Breast cancer screening method

4.3.1.3.1 Proportions on awareness of at least one Breast cancer screening method

Table 4.24 indicates that at end line, almost all the respondents in the intervention group were aware of at least one breast cancer screening method at 94.4% (235). The control arm had 76.8% (190) of its respondents being aware of at least one breast cancer screening method. See Table 4.24.

Table 4.24: Comparison on awareness of at least one Breast Cancer Screening method between baseline and end line survey for both intervention and control

Survey	Intervention site		Control Site	
	Mother knows one Breast cancer screening method		Mother knows one Breast cancer screening method	
	Frequency	%	Frequency	%
Baseline	154/246	62.6	154/245	62.9
End-Term (8 months)	235/249	94.4	190/247	76.8

4.3.1.3.2 Change in awareness of at least one Breast Cancer Screening method in intervention and control sites

Table 4.25 provides a summary of the comparison made in proportions of respondents who were aware of at least one Breast Cancer Screening method between end term and baseline survey for the control group which indicated a difference of 13.9% (76.8%-62.9%). A Z score test performed revealed that there was a significant difference between the two proportions (Z score =4.2898, P<0.05).

In the intervention site, proportion of respondents who were aware of at least one breast cancer screening method increased by 31.8% (difference in proportions 94.4%-62.6%). A Z score test performed to test this difference established that the change in proportion was significant (Z score=11.0371, P<0.05).

This therefore implies that the CBHI significantly increased the level of awareness on at least one breast cancer screening method by 31.8% in the intervention site.

Table 4.25: Z score Tests testing change in proportions on awareness of at least one Breast Cancer Screening method

Study Site	Base line	End term	Z-Score test and P values (Baseline Vs. End term)
Intervention	154/246 (62.6%)	235/249 (94.4%)	Z score = 11.0371, P<0.05 (31.8% difference is significant)
Control	154/245 (62.9%)	190/247 (76.8%)	Z score =-1.3029, P>0.05, (13.9% Difference is significant)

4.3.1.3.3 Net Change in awareness of at least one Breast Cancer Screening method in intervention and control sites

Difference in Difference (DiD) statistic established that in the eight months intervention time, there was a 17.9% net increase in women who knew at least one

Breast Cancer Screening method in the intervention site. The DiD statistic was calculated as follows:

(94.4%-62.6%) -(76.8%-62.9%)=17.9%

4.3.1.3.4 Observed Change in level of awareness on at least one breast cancer screening method in the intervention arm

A binary logistic regression analysis at end line indicated a significant difference in the odds of awareness on at least one breast cancer screening method between the intervention and control. Therefore, the intervention group respondents were 5.0 times more likely to know at least one Breast cancer screening method than the control group respondents (Crude OR=5.073, P<0.05, 95%CI of OR: 3.139-8.196).

Table 4.26 indicates that after adjusting for sociodemographic characteristics (Age, Number of children, Level of education, Primary Occupation, Marital status and total monthly household income) as potential confounders, the odds of respondents in the intervention group who knew at least one Breast cancer screening method increased to 7.0 (*Adj.* OR=7.011, P<0.05, 95%CI: 4.138-11.880).

Table 4.26 Comparison of the Odds of awareness on at least one Breast cancer screening method between baseline and end line

Surveys	Crude & Adj.	Sig	OR	95%CI
Baseline Survey	Crude	0.927	0.987	0.742-1.313
	Adjusted	0.921	0.982	0.686-1.406
End term Vs Baseline	Crude	<0.001*	5.073	3.139-8.196
(Hypothesis test)	Adjusted	<0.001*	7.011	4.138-11.880

*Table legend: * means test statistic is significant at P<0.05*

Hypothesis Testing

Based on the results of the above three domains**,** the null hypothesis was rejected and the alternative hypothesis (In the intervention arm, there was a significant difference in the odds of respondents who were aware of breast cancer at end-term survey compared to baseline survey) was accepted.

4.3.2 Effect of the CBHI on level of awareness on Cervical Cancer among women of reproductive age

Null hypothesis:

The CBHI does not have an effect on the level of awareness on Cervical cancer among the intervention group; therefore, there is no significant difference in the odds of respondents who are aware of cervical cancer in the intervention arm at endline survey compared to baseline survey.

To test this hypothesis, three domains of awareness were considered as indicated below:

4.3.2.1 Awareness Domain 1: Effect of the CBHI on awareness of at least two danger signs of cervical cancer

4.3.2.1.1 Proportions on awareness of at least two danger signs of cervical cancer

Table 4.27 indicates that the proportions of respondents who were aware of at least two danger signs of cervical cancer was relatively low among the intervention and control groups at baseline at 25.7% (63) and 21.9% (54) respectively. At end line evaluation, there were more respondents who were aware of at least 2 danger signs of cervical cancer among the intervention at 59.2% (147) compared to the control group at 26.4% (65).

Table 4.27: Comparison on awareness of at least two danger signs of cervical cancer between baseline and end line survey for both intervention and control

Survey	Intervention site		Control Site	
	Aware of at least 2 danger signs of cervical cancer		Aware of at least 2 danger signs of cervical cancer	
	Frequency	%	Frequency	%
Baseline	63/246	25.7	54/245	21.9
End-Term (8 months)	147/249	59.2	65/247	26.4

4.3.2.1.2 Change in awareness of at least two danger signs of cervical cancer in intervention and control sites

Table 4.28 provides a comparison made in proportions of respondents who were aware of at least two danger signs of cervical cancer between end term and baseline survey for the control group which indicated a difference of 4.5% (26.4%-21.9%). A Z score test performed revealed that there was no significant difference between the two proportions (Z score =1.5208, P>0.05).

In the intervention site, proportion of respondents who were aware of at least two danger signs of cervical cancer increased by 33.5% (difference in proportions 59.2%-25.7%). A Z score test performed to test this difference established that the change in proportion was significant (Z score=9.638, P<0.05).

This, therefore, implies that the CBHI significantly increased the level of awareness on at least two danger signs of cervical cancer by 33.5% in the intervention site.

Table 4.28: Z score Tests testing change in proportions on awareness of at least two danger signs of cervical cancer

Study Site	Base line	End term	Z-Score test and P values (Baseline Vs. End term)
Intervention	63/246 (25.7%)	147/249 (59.2%)	Z score = 9.638, P<0.05 (33.5% difference is significant)
Control	54/245 (21.9%)	65/247 (26.4%)	Z score =1.5208, P>0.05, (4.5% Difference is not significant)

4.3.2.1.3 Net Change in awareness of at least two danger signs of cervical cancer in intervention and control sites

Difference in Difference (DiD) statistic established that in the eight months intervention time, there was a 29% net increase in women who were aware of at least two danger signs of cervical cancer in the intervention site. The DiD statistic was calculated as follows:

(59.2%-25.7%) -(26.4%-21.9%) = 29%

4.3.2.1.4 Observed Change in level of awareness of at least two danger signs of cervical cancer in the intervention arm

A binary logistic regression analysis at the end line indicated a significant difference in the odds of awareness on at least two danger signs for cervical cancer between the intervention and control. Therefore, the respondents in the intervention group were 4.0 times more likely to know at least two danger signs for cervical cancer than the control group respondents (Crude OR=4.036, P<0.05, 95%CI of OR: 3.002-5.427).

Table 4.29 indicates that after adjusting for potential confounders (Age, Number of children, Level of education, Primary Occupation, Marital status and total monthly household income), the odds of respondents in the intervention group

who knew at least two danger signs for cervical cancer increased to 5.0 (*Adj*. OR=4.991, P<0.05, 95%CI: 3.554-7.008).

Table 4.29: Comparison of the Odds of awareness on at least two danger signs for cervical cancer between baseline and end line

Surveys	Crude & Adj.	Sig	OR	95%CI
Baseline Survey	Crude	0.200	1.237	0.894-1.712
	Adjusted	0.518	1.120	0.795-1.578
End term Vs Baseline	Crude	<0.001*	4.036	3.002-5.427
(Hypothesis test)	Adjusted	<0.001*	4.991	3.554-7.008

*Table legend: * means test statistic is significant at P<0.05*

4.3.2.2 Awareness Domain 2: Effect of the CBHI on levels of awareness on Age most likely to develop cervical cancer

4.3.2.2.1 Proportions on awareness of age most likely to develop cervical cancer

Table 4.30 shows the proportion of respondents who were aware of the age most likely to develop cervical cancer was found to be higher at 57.2% (141) among the intervention group compared to the control group at 46.8% (188) at baseline. At endline, the proportion of respondents in the intervention group who aware of age at risk of developing cervical cancer was higher at 70.2% (175) among the intervention.

Table 4.30: Comparison on awareness of age most likely to develop cervical cancer between baseline and end line survey for both intervention and control

Survey	Intervention site		Control Site	
	Aware of Age most likely to develop cervical cancer		Aware of Age most likely to develop cervical cancer	
	Frequency	%	Frequency	%
Baseline	141/246	57.2	188/245	46.8
End-Term (8 months)	175/249	70.2	124/247	50.4

4.3.2.2.2 Change in awareness of the age most likely to develop cervical cancer in intervention and control sites

Table 4.31 shows a comparison made in proportions of respondents who were aware of the age most likely to develop cervical cancer between end term and baseline survey for the control group which indicated a difference of 3.6% (50.4%-46.8%). A Z score test performed revealed that there was no significant difference between the two proportions (Z score =1.0243, P>0.05).

In the intervention site, proportion of respondents who were aware of the age most likely to develop cervical cancer increased by 13% (difference in proportions 70.2%-57.2%). A Z score test performed to test this difference established that the change in proportion was significant (Z score=3.8524, P<0.05).

This therefore implies that the CBHI significantly increased levels of awareness on age most likely to develop cervical cancer by 13% in the intervention site.

Table 4.31: Z score Tests testing change in proportions on awareness of the age most likely to develop cervical cancer

Study Site	Base line	End term	Z-Score test and P values (Baseline Vs. End term)
Intervention	141/246 (57.2%)	175/249 (70.2%)	Z score = 3.8524, P<0.05 (13% difference is significant)
Control	188/245 (46.8%)	124/247 (50.4%)	Z score =1.0243, P>0.05, (3.6% Difference is not significant)

4.3.2.2.3 Net Change in awareness of the age most likely to develop cervical cancer in intervention and control sites

The net change/estimated effect of CBHI on level of awareness of the age most likely to develop cervical cancer in the intervention site compared to control site over 8 months' CBHI intervention period was calculated using the DiD model.

Difference in Difference (DiD) statistic established that in the 8 months intervention time, there was a 9.4% net increase in proportion of women who were aware of the age most likely to develop cervical cancer in the intervention site. The DiD statistic was calculated as follows:

(70.2%-57.2%) -(50.4%-46.8%) = 9.4%

4.3.2.2.4 Observed Change in awareness of the age most likely to develop cervical cancer in the intervention arm

A binary logistic regression analysis conducted at end line indicated that there was a significant difference in the odds of awareness on the age most likely to develop cervical cancer between intervention and control groups. Therefore, respondents in the intervention group were 2.0 times more likely to know the age most likely to develop cervical cancer than the control group respondents (Crude OR=2.318, P<0.05, 95%CI of OR: 1.738-3.091)

Table 4.32 indicates that after adjusting for socio-demographic characteristics (Age, Number of children, Level of education, Primary Occupation, Marital status and total monthly household income) as potential confounders, the odds of respondents in the intervention group who knew the age most likely to develop cervical cancer increased to 3.0 (*Adj.* OR=3.311, P<0.05, 95%CI: 2.324-4.717).

Results are summarized in table 4.32

Table 4.32: Odds of awareness on age most likely to develop cervical cancer at endline

Study Phase		Sig.	OR	95%C.I	
Endline (18 months)	Woman is aware of Age most likely to develop Cervical cancer	.000	3.311	2.324	4.717
	Age of respondent	.000	1.806	1.309	2.494
	Number of children of respondent	.007	.713	.558	.910
	Level of education of respondent	.004	.688	.533	.890
	Primary Occupation of respondent	.000	.253	.171	.374
	Marital status	.153	1.235	.925	1.650
	Total monthly household income	.000	1.000	1.000	1.000
	Constant	.904	1.054		

Table 4.33 shows a comparative summary of the odds of awareness of the age most likely to develop cervical cancer between baseline survey and end-term surveys in both intervention and control sites. The hypothesis test statistic is in bold.

Table 4.33: Comparison of the Odds of awareness on age most likely to develop cervical cancer between baseline and end line

Surveys	Crude & Adj.	Sig	OR	95%CI
Baseline Survey	Crude	0.003	1.520	1.151-2.007
	Adjusted	0.167	1.285	0.901-1.834
End term Vs Baseline	Crude	<0.001*	2.318	1.738-3.091
(Hypothesis test)	Adjusted	<0.001*	3.311	2.324-4.717

*Table legend: * means test statistic is significant at P<0.05*

4.3.2.3 Awareness Domain 3: Effect of the CBHI on awareness of at least two risk factors associated with development of cervical cancer

4.3.2.3.1 Proportions on awareness of at least two risk factors associated with development of cervical cancer

Table 4.34 indicates that the proportion of respondents who were aware of at least two risk factors associated with cervical cancer was found to be high among the intervention and control groups at 64.4% (158) and 62.2% (152) respectively at baseline. At endline, this proportion increased to 92.2% (230) respondents compared to baseline. The changes in proportions indicate a 30%-point increase attributed to the implementation of CBHI.

Table 4.34: Comparison on awareness of at least two risk factors associated with development of cervical cancer between baseline and end line survey for both intervention and control

Survey	Intervention site		Control Site	
	Aware of at least 2 risk factors associated with cervical cancer		Aware of at least 2 risk factors associated with cervical cancer	
	Frequency	%	Frequency	%
Baseline	158/246	64.4	152/245	62.2
End-Term (8 months)	230/249	92.2	160/247	64.7

4.3.2.3.2 Change in awareness of at least two risk factors associated with development of cervical cancer in intervention and control sites

Table 4.35 provides a comparison in proportions of respondents who were aware of at least two risk factors associated with development of cervical cancer between end term and baseline survey for the control group which indicated a difference of 2.5% (64.7%-62.2%). A Z score test performed revealed that there was no significant difference between the two proportions (Z score =0.738, P>0.05).

In the intervention site, proportion of respondents who were aware of at least two risk factors associated with development of cervical cancer increased by 27.8% (difference in proportions 92.2%-64.4%). A Z score test performed to test this difference established that the change in proportion was significant (Z score=9.6299, P<0.05).

Table 4.35: Z score Tests testing change in proportions on awareness of at least two risk factors associated with development of cervical cancer

Study Site	Base line	End term	Z-Score test and P values (Baseline Vs. End term)
Intervention	158/246 (64.4%)	230/249 (92.2%)	Z score = 9.6299, P<0.05 (27.8% difference is significant)
Control	152/245 (62.2%)	160/247 (64.7%)	Z score =0.738, P>0.05, (2.5% Difference is not significant)

4.3.2.3.3 Net Change in awareness of at least two risk factors associated with development of cervical cancer in intervention and control sites

Difference in Difference (DiD) statistic established that in the 8 months intervention time, there was a 25.3% net increase in proportion of women who were aware of at least two risk factors associated with development of cervical cancer in the intervention site. The DiD statistic was calculated as follows:

(92.2%-64.4%) -(64.7%-62.2%) = 25.3%

4.3.2.3.4 Observed Change in awareness on at least two risk factors associated with development of cervical cancer in the intervention arm

A binary logistic regression analysis at end line indicated that there was a significant difference in the odds of awareness of at least 2 risk factors associated with development of cervical cancer between the intervention and control. Therefore,

respondents in the intervention group were 6.0 times more likely to know at least 2 risk factors associated with development of cervical cancer than the control group respondents (Crude OR=6.430, P<0.05, 95%CI of OR: 4.249-9.732).

Table 4.36 indicates that after adjusting for socio-demographic characteristics as potential confounders, the odds of respondents in the intervention group who knew at least 2 risk factors associated with development of cervical cancer increased to 10.0 (*Adj*. OR=10.995, P<0.05, 95%CI: 6.831-17.700).

Table 4.36: Comparison of the Odds of awareness of at least 2 risk factors associated with development of cervical cancer between baseline and end line

Surveys	Crude & Adj.	Sig	OR	95%CI
Baseline Survey	Crude	0.523	1.098	0.824-1.462
	Adjusted	0.518	1.120	0.795-1.578
End term Vs Baseline	Crude	<0.001*	6.430	4.249-9.732
(Hypothesis test)	Adjusted	<0.001*	10.995	6.831-17.700

*Table legend: * means test statistic is significant at P<0.05*

Hypothesis Testing

Based on the results of the above three domains**,** the null hypothesis was rejected and the alternative hypothesis (In the intervention arm, there was a significant difference in the odds of respondents who were aware of cervical cancer at endline compared to baseline) was accepted.

4.4 To Determine the effect of CBHI on Breast and Cervical cancer screening uptake

4.4.1 Effect of the CBHI on Breast Cancer screening among Women of Reproductive Age

4.4.1.1 Proportions in breast cancer screening for both baseline and end line survey

The study further sought to determine how many participants had ever been screened for breast cancer before and after rolling out of the CBHI. Table 4.37 indicates a higher proportion of respondents in the control group at 31.8% (78) had ever been screened for breast cancer compared to the intervention group at only 29.5% (73) at baseline.

At endline, a higher proportion of respondents at 67.5% (168) in the intervention group had ever been screened for breast cancer compared to baseline.

Table 4.37: Comparison on Breast Cancer screening between baseline and end line survey for both intervention and control

Survey	Intervention site		Control Site	
	Have you ever sought breast cancer screening services?		Have you ever sought breast cancer screening services?	
	Frequency	%	Frequency	%
Baseline	73/246	29.5	78/245	31.8
End-Term (8 months)	168/249	67.5	90/247	36.5

Figure 4.1 indicates the general distribution of respondents on whether they had ever been screened for breast cancer for both control and intervention at baseline.

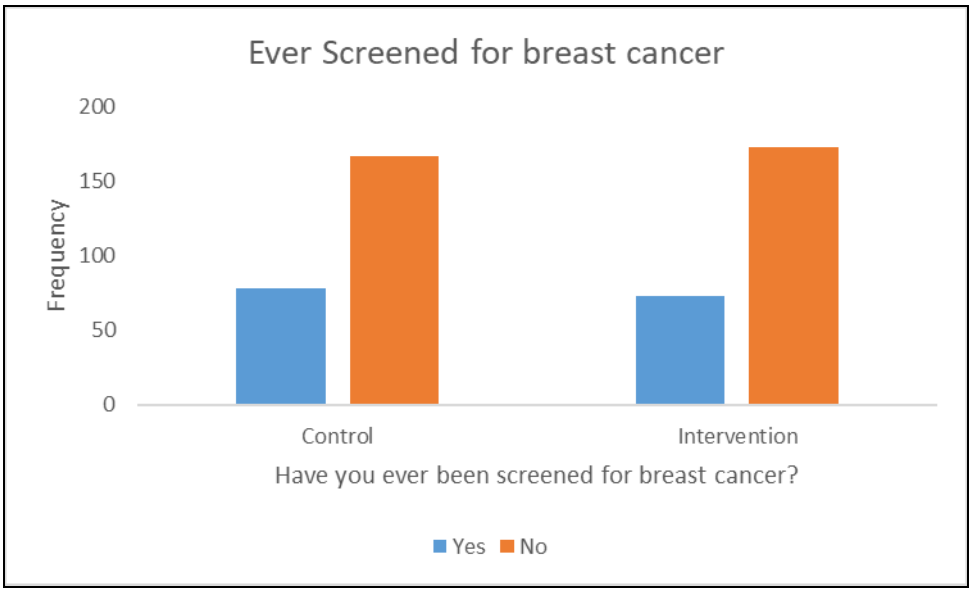

Figure 4.1: Ever Sought Breast Cancer Services among Control and Intervention Groups (Baseline)

Figure 4.2 shows the distribution of respondents at who had ever been screened for breast cancer at endline.

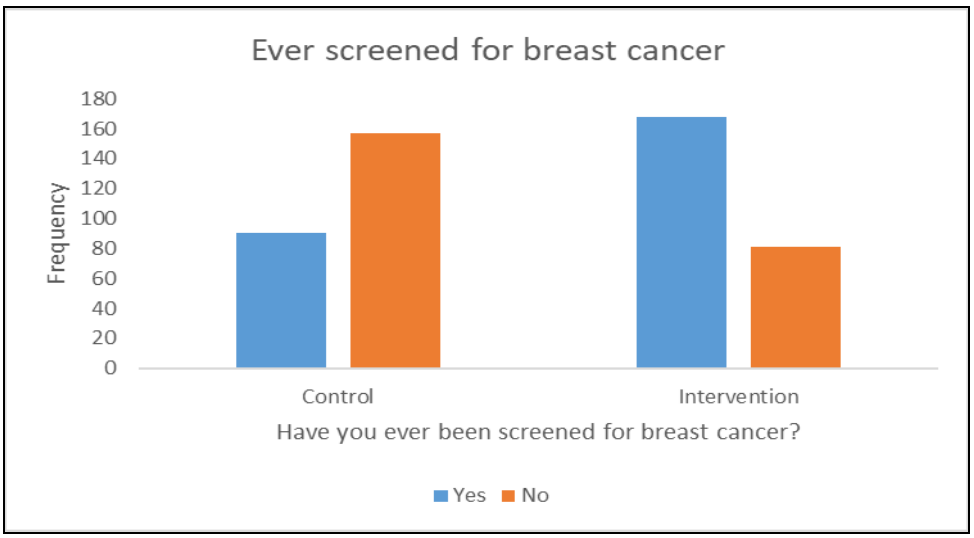

Figure 4.2: Ever Sought Breast Cancer Services among Control and intervention groups (End line)

4.4.1.2 Change in breast Cancer screening uptake in intervention and control sites

Table 4.38 provides a summary of comparison made in proportions of screening uptake for breast cancer between end term and baseline survey for the control group that indicated a difference of 4.7% (36.5%-31.8%). A Z score test performed revealed no significant difference between the two proportions (Z score =1.3829, P>0.05).

In the intervention site, uptake of breast cancer screening services increased by 38% (difference in the proportions 67.5%-29.5%). A Z score test performed to test this difference established that the change in proportions was significant (Z score = 10.8466, P<0.05).

Table 4.38: Z score Tests testing change in Breast Cancer screening Proportions

Study Site	Base line	End term	Z-Score test and P values (Baseline Vs. End term)
Intervention	73/246 (29.5%)	168/249 (67.5%)	Z score = 10.8466, P<0.05 (38% difference is significant)
Control	78/245 (31.8%)	90/247 (36.5%)	Z score =1.3829, P>0.05, (4.7% Difference is not significant)

4.4.1.3 Net Change in breast Cancer screening uptake in intervention and control sites

Difference in Differences (DiD) Statistic established that in the 8 months intervention time, there was a 33.3% net increase in women who sought facility-based breast cancer screening in the intervention site. The following is a demonstration of how DiD statistic was calculated.

(67.5%-29.5%) -(36.5%-31.8%) =33.3%

4.4.1.4 Observed Change in Breast Cancer screening uptake in the intervention arm

Null hypothesis:

The CBHI does not have an effect on breast cancer screening uptake among the intervention group; therefore, there is no significant difference in the odds of respondents who had ever been screened for breast cancer in the intervention arm at endline survey compared to baseline survey.

A binary logistic regression analysis at end line indicated that there was a significant difference in the odds of respondents who had ever been screened for breast cancer between the intervention and control. Therefore, respondents in the intervention group were 3.0 times more likely to have ever been screened for breast cancer than the control group respondents (Crude OR=3.604, P<0.05, 95%CI of OR: 2.698-4.813).

Table 4.39 indicates that after adjusting for socio-demographic characteristics as potential confounders, the odds of respondents in the intervention group who had ever been screened for breast cancer increased to 4.0 (*Adj*. OR=4.458, P<0.05, 95%CI: 3.204-6.202).

Table 4.39: Odds of ever screening for breast cancer at endline

Variables in the Equation					
Study Phase		Sig	OR	95%C.I.	
Endline (18 Months)	Have you ever sought breast cancer screening services?	.000	4.458	3.204	6.202
	Age of respondent	.003	1.675	1.197	2.345
	Number of children of respondent	.004	.690	.534	.891
	Level of education of respondent	.002	.657	.506	.854
	Primary Occupation of respondent	.000	.265	.178	.394
	Marital status	.161	1.236	.919	1.664
	Total monthly household income	.000	1.000	1.000	1.000
	Constant	.336	1.504		

Table 4.40 shows a comparative summary of the odds of screening for breast cancer between baseline survey and end-term surveys in both intervention and control sites. The hypothesis test statistic is in bold.

Table 4.40: Comparison of the Odds of ever screening for breast cancer between baseline and end line

Surveys	**Crude & Adj.**	**Sig**	**OR**	**95%CI**
Baseline Survey	Crude	0.463	0.894	0.662-1.206
	Adjusted	0.506	0.884	0.615-1.270
End term Vs Baseline (Hypothesis test)		0.0001*		
	Crude	0.0001*	3.604	2.698-4.813
	Adjusted		4.458	3.204-6.202

*Table legend: * means test statistic is significant at P<0.05*

Based on this test, the null hypothesis was rejected and the alternative hypothesis (In the intervention arm, there was a significant difference in the odds of respondents who had ever been screened for breast cancer at endline compared to baseline) was accepted.

4.4.2 Effect of the CBHI on Cervical Cancer screening among Women of Reproductive Age

4.4.2.1 Proportions in cervical cancer screening for both baseline and end line survey

Table 4.41 indicates that a low proportion of respondents in both the control and intervention groups had ever been screened for cervical cancer at 20.4% (50) and 22% (54) respectively.

After CBHI was rolled out, there was an increase in the proportion of respondents who had ever undertaken cervical cancer screening among the intervention at 52.6% (131).

Table 4.41: Comparison on Cervical Cancer screening between baseline and end line survey for both intervention and control

Survey	Intervention site		Control Site	
	Have you ever sought Cervical cancer screening services?		Have you ever sought Cervical cancer screening services?	
	Frequency	%	Frequency	%
Baseline	54/246	22.0	50/245	20.4
End-Term (8 months)	131/249	52.6	53/247	21.5

Figure 4.3 provides the general distribution of respondents who had ever screened for cervical cancer at baseline.

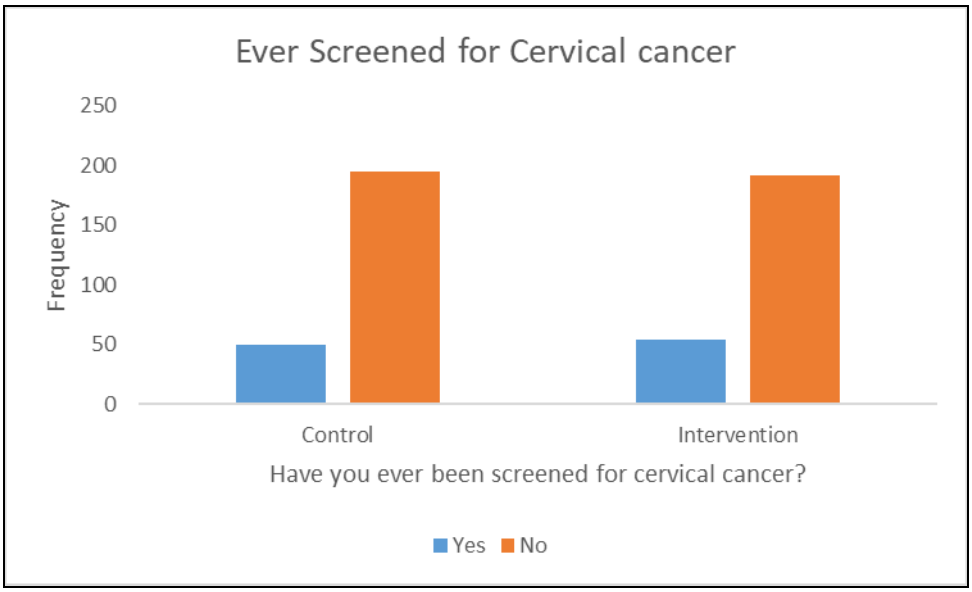

Figure 4.3: Ever Screened for Cervical Cancer among intervention and Control Groups (Baseline)

Figure 4.3 indicates the general distribution of respondents who had screened for cervical cancer screening among the control group and the intervention group at the end line.

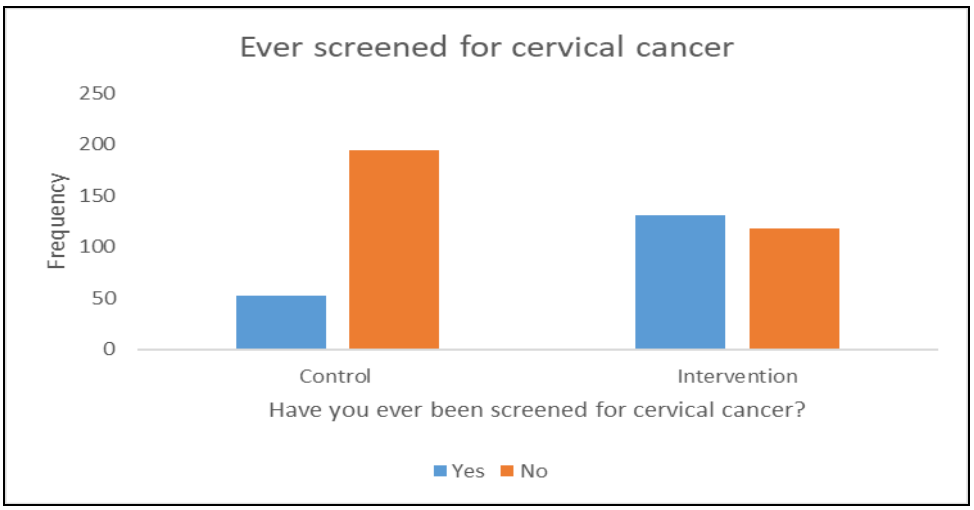

Figure 4.4: Ever Screened for Cervical Cancer among Intervention and Control Groups (Endline)

4.4.2.2 Change in proportion of respondents who had ever been screened for cervical cancer in intervention and control groups

Table 4.42 provides results of a Z score statistic test conducted to establish if there was any difference in the proportion of participants who sought cervical cancer screening tests at baseline compared to control which indicated that in the intervention there was a 30.6% significant increase of participants who sought cervical cancer screening services in the intervention site (Z score =8.9978, P<0.05). In the control site, there was a 1.1% increase in the number of women who sought cervical cancer screening services. This change was not significant (Z score= 0.3782, P>0.05).

Table 4.42: Z score Tests Testing Change in Proportions of Cervical Cancer Tests

Study Site	Base line	End term	Z-Score test and P values (Baseline Vs. End term)
Intervention	54/246 (22.0%)	131/249 (52.6%)	Z score = 8.9978, P<0.05 (30.6% difference is significant)
Control	50/245 (20.4%)	53/247 (21.5%)	Z score =0.3782, P>0.05, (1.1% Difference is not significant)

4.4.2.3 Net change in proportion of women who had ever been screened for cervical cancer between Intervention and control over the 8 months period

A Difference in Differences (DiD) test statistic indicated that there was a net increase of 29.5% of participants who sought Cervical cancer screening services in the 8 months period of the intervention. The following equation illustrates the DiD calculations.

(52.6%-22.0%) - (21.5%-20.4%) =29.5%

4.4.2.4 Observed Change in cervical cancer screening in the Intervention Arm

Null hypothesis

The CBHI does not have an effect on cervical cancer screening uptake among the intervention group; therefore, there is no significant difference in the odds of respondents who had ever been screened for cervical cancer in the intervention arm at end-term survey compared to baseline survey.

A binary logistic regression analysis at end line indicated a significant difference in the odds of respondents who had ever been screened for cervical cancer between the intervention and control. Therefore, respondents in the intervention group were 4.0 times more likely to have ever been screened for cervical cancer than the control group respondents (Crude OR=4.051, P<0.05, 95%CI of OR: 2.982-5.503).

Table 4.43 shows that after adjusting for socio-demographic characteristics as potential confounders (Age, Number of children, Level of education, Primary Occupation, Marital status and total monthly household income), the odds of respondents in the intervention group who had ever been screened for cervical cancer increased to 10.0 (*Adj.* OR=10.307, P<0.05, 95%CI: 6.284-16.904).

Table 4.43: Odds of ever screening for cervical cancer at endline

Study Phase		Sig.	OR	95%C.I.	
Endline (18 Months)	Have you ever gone for Cervical cancer screening?	.000	10.307	6.284	16.904
	Age of respondent	.020	1.486	1.064	2.077
	Number of children of respondent	.049	.774	.600	.998
	Level of education of respondent	.007	.692	.529	.906
	Primary Occupation of respondent	.000	.231	.151	.354
	Marital status	.020	1.427	1.057	1.926
	Total monthly household income	.000	1.000	1.000	1.000
	Constant	.269	1.611		

Table 4.44 shows a comparative summary of the odds of screening for cervical cancer between baseline survey and end-term surveys in both intervention and control sites. The hypothesis test statistic is in bold.

Table 4.44: Comparison of the Odds of ever screening for cervical cancer between baseline and end line

Surveys	Crude & Adj.	Sig	OR	95%CI
Baseline Survey	Crude	0.571	1.103	0.786-1.546
	Adjusted	0.237	1.300	0.841-2.009
End term Vs Baseline (Hypothesis test)	Crude	0.0001*	4.051	2.982-5.503
	Adjusted	0.0001*	10.307	6.284-16.904

*Table legend: * means test statistic is significant at P<0.05*

Based on this test, the null hypothesis was rejected and the alternative hypothesis (In the intervention arm, there was a significant difference in the odds of respondents who had ever been screened for cervical cancer at end-term survey compared to baseline survey) was accepted.

CHAPTER FIVE

DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.1 Discussion

5.1.1 Awareness on breast and cervical cancer among women of reproductive age

Before the intervention was implemented proportions of respondents who were aware of breast cancer in Kitui East and Mwingi West were comparable along the three domains. At baseline, at least 59% of the respondents in both sites were aware of the danger signs of breast cancer while on average 50% were aware of the age-related risk. Respondents who were married were more likely to be aware of the danger signs of breast cancer. This could be attributed to partner as well as family support in seeking health information on breast cancer. Information could also have been obtained during the routine health education sessions provided to women while seeking health care. This concurs with the study by Moodley *et al*. (2020) in Uganda which established that marital status or women who lived with a partners exhibited a higher awareness of the symptoms and risk factors for breast cancer.

Further the age of the respondents as well as the number of children was found to significantly affect the levels of knowledge on breast cancer. This could be attributed to exposure for the older respondents who may perceive themselves to be at risk compared to the younger. Consequently, respondents who had children could have obtained information during health education sessions provided during attendance of antenatal care service.

With regard to the third domain, most of the respondents (62%) in Kitui East and Mwingi West were aware of at least one breast cancer screening method. This could be interpreted to mean that respondents in the intervention site and control site were homogenous at baseline and exhibited similar levels of awareness on the three aspects on awareness of breast cancer.

These findings are comparable to those of Ajayi *et al*. (2014) who established that while many women are familiar with breast cancer as a disease many lack the knowledge of the aspects of cervical cancer. However, there was no correlation between screening for breast cancer and its awareness.

In addition, a study at the Coastal region of Kenya made a similar inference by establishing that while most respondents had heard about breast cancer; very few had knowledge about risks factors associated with the disease (Sayed *et.al*, 2018).

Similarly, awareness on cervical cancer was established before the intervention was implemented. The Cervical Cancer Awareness Measure (C-CAM) provides for three domains to assess levels of awareness on cervical cancer. At baseline, near equal proportions of respondents (23%) in both Kitui East and Mwingi West were aware of at least two danger signs of cervical cancer. Similar trends were observed for age most likely to develop cervical cancer with at least 50% of the respondents in both sites being aware of the age-related risk. Further, the level of education was found to have a statistical significance on awareness of age-related risk. Respondents with secondary school education and above were more likely to be aware of the risks.

Most respondents (62%) were aware of at least two risk factors associated with development of cervical cancer in both Kitui East and Mwingi West. These findings indicate that most respondents in both sites were aware of cervical cancer although this did not translate to screening. Moodley *et al.* (2020) established similar findings that majority of women in both South Africa and Uganda were aware of the risk factors for cervical cancer.

These findings are also comparable to Assoumou *et al.* (2015) who established that women in Libreville, Gabon had low level of knowledge on cervical cancer, HPV and the available screening approaches. However, screening uptake was low among the respondents. Further, Gatumo *et al*. 2018 established that a high proportion of women in both Isiolo and Tharaka Nithi Counties in Kenya had heard about cervical cancer although very few had been screened.

5.1.3 Effect of the CBHI on level of awareness on breast and cervical cancer among women of reproductive age in Kitui County

The intervention caused a marked increase in proportions of respondents who were aware of the said domains for both cancers in both sites. It was however observed that the increase in proportion of respondents aware was relatively higher among the intervention group compared to the control group. After the intervention there was a 28.3% increase in proportion of respondents aware of at least two danger signs of breast cancer. Further analysis established that respondents in Kitui East were 3.8 times more likely to be aware of at least two danger signs of breast cancer compared to baseline. The slight increase in the control site could be attributed to the existing awareness programs that are provided to the general public through the mainstream media and other platforms.

Further, the intervention was found to increase the proportion of respondents by who were aware of the age at risk of developing breast cancer as well as the screening methods available. At the endline survey, respondents in the intervention site (Kitui East) were four times more likely to have knowledge on age related risk associated with breast cancer compared to baseline. Subsequently, they were seven times more likely to be aware of the breast cancer screening methods at endline compared to baseline. This is a clear indication that the CBHI had a positive impact in increasing awareness on breast cancer among women of reproductive age and therefore the respondents are more likely to access screening for the same.

These findings concur with those of Zhu *et al*. (2021) who established that in South Korea, a community-based education intervention had a significant and positive impact in increasing not only the knowledge on breast cancer but uptake of screening services for the same. Further, the current study findings are in line with findings by Agide *et al*. (2018) who established that after a systematic review of 22 studies, community-based health promotion interventions helped in improving knowledge of breast cancer and enhanced utilization of screening services for breast cancer.

With regard to awareness on cervical cancer the intervention increased significantly the proportion of respondents who were aware of the cancer at endline. There was a

33.5% increase in proportion of respondents who were aware of the danger signs of cervical cancer. Further analysis indicated that respondents in Kitui East were four (4) times more likely to know the danger signs of cervical cancer at endline compared to baseline.

Further the intervention increased the proportion of respondents who were aware of the age most likely to develop cervical cancer by 13%. Further analysis established that at endline, respondents in the intervention site were three times more likely to be aware of the age most likely to develop cervical cancer compared to baseline. This confirms that the intervention had a positive effect on this domain.

The third domain on cervical cancer focused on awareness of the risk factors that are associated with development of cervical cancer. After the intervention, the proportion of respondents who were aware of the risk factors associated with development of cervical cancer increased by 27.8%. Further analysis established that respondents in Kitui East were ten (10) times more likely to know the risk factors associated with cervical cancer development compared to baseline. This therefore implies that the community-based health education intervention played a key role in increasing levels of awareness on cervical cancer. Increased awareness is most likely to translate to screening for these respondents.

Abiodun *et al*. (2014) established similar findings in his study which indicated that health education programmes implemented in rural areas in Nigeria significantly increased the awareness of cervical and breast cancer among people in the intervention sites. Further, a study by Swanson *et al*. 2018 that evaluated the effect of a community based cervical cancer screening programme in Western Kenya established that nearly a third of eligible women in Ngodhe were screened for cervical cancer.

5.1.4 Breast and cervical cancer screening uptake as a result of the CBHI among women of reproductive age in Kitui County.

After implementation of the CBHI, it was established that there was a significant increase (38%) in the proportion of women who reported visiting health facilities for screening services in the intervention site at endline compared to baseline survey.

Respondents in the Kitui East were four (4) times more likely to screen for breast cancer at end line compared to baseline. This therefore implies that the health education intervention led by community health workers (CBHI) was effective in increasing awareness on importance of breast cancer screening in intervention site and this led to increased uptake of health facility-based breast cancer screening services. The fact that respondents were aware of the risks associated with development of breast cancer and the attendant perceived risk could have contributed to the increase in screening uptake.

For the smaller proportion (32.5%) who did not seek care despite being aware of the various risk factors as well as where to get the screening tests, various reasons could be attributed to this. The varying attitudes among respondents on seeking care, cultural issues such as exposure of breasts could have contributed to this considering the women in the rural areas are quite conservative on matters that expose their bodies. Other factors could be due to the environment where these respondents live where most of the time is spent looking for basic amenities such as water, food and therefore screening for cancers may not be a priority.

Overall, the uptake of breast cancer screening services was higher compared to the KDHS 2014 findings that indicated breast cancer screening was at 10.9% in the former Eastern Province where Kitui County is located. This implies that the County governments can leverage on community-based health education interventions to improve screening uptake for breast cancer.

These findings are consistent with those of a study conducted in Iran which revealed that health education intervention was effective in improving utilization of breast cancer screening services among women of reproductive age (Rezaeian *et al*., 2014). A study in southern Dallas which evaluated a Community based intervention aimed at promoting breast cancer awareness and screening also established higher odds in uptake of breast cancer screening services in intervention groups compared to control groups (Cardarelli *et al*., 2015). Further, the findings are also aligned to findings by Orindi (2016) who undertook a study to determine the impact of breast cancer knowledge on uptake of screening services. The study established a strong

correlation between knowledge of breast cancer and eventual uptake and utilization of screening services.

With regard to cervical cancer screening, the study revealed that the intervention increased the proportion of women who were screened for cervical cancer by 30.6 % over the 8 months of the intervention time. The results also revealed that at endline, women of reproductive age in Kitui East were ten (10) times more likely to screen for cervical cancer compared to baseline. These statistics imply that the intervention was successful in promoting utilization of cervical cancer screening services in the intervention site.

These findings indicate a higher proportion of screening for cervical cancer compared to the KDHS 2014 findings which indicated a national screening of 14% whereas only 12.8% of respondents had been screened for cervical cancer in the former Eastern Province.

This concurs with findings by Rees *et al*. (2018) who undertook a systematic review on studies of interventions to improve breast and cervical cancer screening uptake, established that targeted interventions by lay advisors were effective and that there was a statistically significant increase in screening uptake among the targeted populations. Similar findings were observed in a study on a community-based intervention that sought to increase participation in cervical cancer screening among immigrants in Norway. It was established that the intervention significantly increased screening uptake among the respondents with at least 78% of the targeted women screening for cervical cancer (Qureshi *et al*., 2019).

Subsequently, a study conducted by Ngángá *et al*. (2018) in Kenya established that the high level of awareness of cervical cancer was not commensurate to the cervical cancer screening. Further, the findings are in concurrence with Kessler *et al.* (2016) study which established that comprehensive approaches, such as prevention, early diagnosis, effective screening, and treatment programs could help reduce the high cervical cancer mortality rate.

5.2 Conclusion

Key conclusions from the study are as follows:

1. Despite the existence of prevention efforts by the MoH and the county, there is still a big proportion of women of reproductive age who are not aware of both breast and cervical cancer and are therefore exposed to the risk of developing these cancers. For the proportion who were found to be aware of these cancers, they are most likely to seek health care services and therefore improved health outcomes for this particular group.
2. The Community Based Health Education Intervention (CBHI) increased awareness on both breast and cervical cancer among women of reproductive and this cohort was more likely to seek health services as they were aware of the risk factors associated with the two cancers. Community Health Volunteers played a critical role in awareness creation as the women could easily identify with them since they form part of their community.
3. More people were screened for breast and cervical cancer after the intervention which could be as a result of a high-risk perception and therefore benefit in early detection of either cancers contributing to better health outcomes. The few who did not screen had low risk perception and therefore exposed themselves to the dangers associated with late screening leading to late detection of cancers and therefore poor prognosis which could eventually lead to death.

5.3 Recommendations of the Study

1. The Ministry of Health (MoH) and Kitui county government to review existing policies to incorporate an expanded role of the community health volunteers as a critical service provider since they are effective in delivering health messages contributing to improved maternal health service uptake. They form a fundamental link between the community and the health facility.
2. There is need for MoH to embrace the CBHI component into existing guidelines in the management and care of cancer. In addition, devise a

feasible strategy of package for male engagement to realize maximum outcomes/benefits.

3. MoH in conjunction with the Kitui County government to establish health education and promotion departments and strengthen the existing ones. In this regard, formulate a comprehensive engagement framework to engage/expand the scope of Community Health Assistants to incorporate basic breast and cervical cancer screening.
4. Kitui County government to consider implementing home grown solutions or consider domesticating similar community-based interventions in management of health matters and leverage on the existing community structures in form of CHVs to promote primary health care.
5. Ministry of Health (MoH) and Kitui county government to consider implementing more awareness programmes to promote screening for the various forms of cancer as screening is a critical determinant of health outcomes for the various forms of cancers. In addition, devise appropriate and feasible strategies that incorporate perspectives of key stakeholders for sustained health education and promotion.
6. Breast and cervical cancer continue to ravage and subject women and their dependants to unforetold miseries (Psychological, mental, physical and social) and therefore remains a public health concern. As a result, there is need for Kitui County Government to facilitate establishment of a robust and well-functioning psychosocial networks for women affected by breast and cervical cancer for improved livelihoods.
7. The County government to consider implementing a study that will seek to evaluate the level of awareness and screening for other types of cancers within Kitui County to inform a coordinated approach in management of the cancers in the County.

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APPENDICES

Appendix I: Informed Consent Form

(i) Introduction.

This is to inform you that a student namely Fridah Muinde undertaking a Doctor of philosophy in Public Health (PhD) Degree in Jomo Kenyatta University of Agriculture and Technology is carrying out a research to address some pertinent/relevant issues of concern in Public Health.

I will take a few minutes to take you through this consent section to enable you make a decision on whether you will participate in the study or not. Participation in the study is on a voluntary basis and you will not be coerced to participate if you are not willing to participate.

(ii) Reason for the research.

You are being requested to join this study to help the researcher understand some issues with regard to knowledge of breast and cervical cancer and your health seeking behaviour. Further the researcher will undertake to give you some knowledge and skills with regard to breast and cervical cancer with support from Community Health volunteers. Thereafter, an evaluation of the knowledge and skills gained will be undertaken after a certain period of time; approximately 6 months.

(iii) Information about the research.

It has been planned that woman of reproductive age in Kitui county will be chosen and requested to answer a few questions in private regarding their understanding of breast and cervical cancer as well as their health seeking behaviours. It has been preferred that a questionnaire will be filled on your behalf by the researchers. Further as a respondent you will be taken through basic concepts of breast and cervical cancer by the community health workers that you usually interact with. The researcher will after a period of time come back and enquire on the skills that you

gained from the community health workers as well as your current practices with regard to the same.

(iv) Your part in the study.

If you agree, a researcher will take some part of your time which will be approximately 10 – 15 minutes. The study aims at determining knowledge of women of reproductive age on breast and cervical cancer and the patterns of seeking health care. Therefore, if you agree, you will be asked some questions about what you know about breast and cervical cancer and the health services usually sought. There is absolutely no penalty if you decide not to participate/take part in the study.

(v) Benefits of the study.

What the researchers will learn from this study may not help you now. The study findings will inform programmes and policies with regard to breast and cervical cancer. This will further trickle down to benefit you or the health of your child and of other children.

Meanwhile, during the study you will be provided with information on breast and cervical cancer that will help you make informed choices with regard to seeking screening and care with regard to the same. Further, you will obtain information on where to seek help with regard to the same if needed.

(vi) Risks in participating in the study.

There is a chance that things we discuss may make you feel uncomfortable. You may refuse to answer any question at any time. You may as well propose to end your talk at any time.

(vii) Confidentiality.

An individual (Research assistant) will talk with you in a private place. He/she will not ask you your name instead he/she will give you a number. Research study papers will be kept in a secure place. Neither your name nor number will appear anywhere

in the study report. A unique number will be assigned to your questionnaire to ensure that no one links the questionnaire to you.

(viii) Compensation.

Joining the study is on a voluntary basis. There is no compensation available for study participants.

(ix) Leaving the study.

You are free to leave the study at any time. However, we will highly appreciate your co-operation during the study period which will last between 15 to 20 minutes.

(x) Contact Details

In case you need further information or clarification with regard to the study, you can contact the principal investigator on email; fmuinde@gmail.com or mobile number **0722609647.**

(xi) Declaration.

I have read/ listened to the information contained in this document and clearly understood it. I therefore agree to participate in the study.

SIGNATURE…… DATE……

In the presence of (Witness)

SIGNATURE…… DATE……

Appendix II: Questionnaire

Participant ID number

A Questionnaire designed to determine levels of awareness and screening for breast and cervical cancer among women of reproductive age in Kitui county.

Name of Sub-County:

Ward name:

DEMOGRAPHIC QUESTIONS

1. How old are you (In Years)? ☐
2. How many children do you currently have? ☐
3. What is your marital status?
   - Single ☐
   - Married ☐
   - Divorced/separated ☐
   - Widowed ☐
4. What is your primary occupation?
   - Peasant farmer ☐
   - Business ☐
   - Formal employment ☐
   - Not working ☐

5. What is your highest level of education?

- Primary/Elementary ☐
- Secondary ☐
- Tertiary College ☐
- University Bachelors ☐
- Postgraduate ☐

6. What is the level of your income

- ☐ Below 500
- ☐ 500-1,000
- ☐ 1,001-5,000
- ☐ 5,001-10,000
- ☐ 10,001-20,000
- ☐ 20,001-25,000
- ☐ Above 25,000

QUESTIONS ON BREAST CANCER.

DOMAIN 1 AWARENESS OF SYMPTOMS

7. In your opinion what are some of the early warning signs of breast cancer, the ways in which a woman may know first that she has this condition?
8. Do you think any of these are warning signs of breast cancer?

Question	Yes	No	Don't know	Refused
Do you think a change in the position of your nipple could be a sign of breast cancer? *[Explanation]: such as pointing up or down or in a different direction to normal*				
Do you think pulling in of your nipple could be a sign of breast cancer? *[Explanation]: where the nipple no longer points outwards, but into the breast*				
Do you think pain in one of your breasts or armpit could be a sign of breast cancer?				
Do you think puckering or dimpling of your breast skin could be a sign of breast cancer? *[Explanation]: like a dent or orange peel appearance*				
Do you think discharge or bleeding from your nipple could be a sign of breast cancer?				
Do you think a lump or thickening in your breast could be a sign of breast cancer?				
Do you think a nipple rash could be a sign of breast cancer?				
Do you think redness of your breast skin could be a sign of breast cancer?				
Do you think a lump or thickening under your armpit could be a sign of breast cancer?				

DOMAIN 2 AWARENESS OF AGE-RELATED AND LIFETIME RISK

9. Who do you think is most likely to get breast cancer?

   A 30 year old woman ☐

   A 50 year old woman ☐

   A 70 year old woman ☐

   Don't know ☐

   Refused to answer ☐

10. How many women do you think will develop breast cancer in their life time?

    1 woman of every 3 women ☐

    1 woman of every 9 women ☐

    1 woman of every 100 women ☐

    1 woman of every 1000 women ☐

    Don't know

    Refused to answer ☐

DOMAIN 3 AWARENESS OF BREAST SCREENING

11. Breast Screening will be any breast exam/procedure done by a health care professional for the sole reason of preventing cancer on an otherwise normal breast

Question	Yes	No	Don't know	Refused
Are you aware of any Breast Screening Program available to you?				
At what age do you think women be first screened at the Breast Screening Program?				
At what age do you think women should receive their last breast screening at the Breast Screening Program?				
Do you know about Breast Self-Examination?				
Have you ever performed breast self-examination?				
Was there any lump or abnormality detected?				
Have you ever undergone any breast cancer screening?				

SECTION B CERVICAL CANCER AWARENESS MEASURE

12. Do you think any of these are warning signs of cervical cancer?

Question	Yes	No	Don't know	Refused
Do you think vaginal bleeding between periods could be a sign of cervical cancer?				
Do you think persistent lower back pain could be a sign of cervical cancer?				
Do you think a persistent vaginal discharge that smells unpleasant could be a sign of cervical cancer?				
Do you think discomfort or pain during sex could be a sign of cervical cancer?				
Do you think menstrual periods that are heavier or longer than usual could be a sign of cervical cancer?				
Do you think persistent diarrhoea could be a sign of cervical cancer?				
Do you think vaginal bleeding after the menopause could be a sign of cervical cancer?				
Do you think persistent pelvic pain could be a sign of cervical cancer?				
Do you think vaginal bleeding during or after sex could be a sign of cervical cancer?				
Do you think blood in the stool or urine could be a sign of cervical cancer?				
Do you think unexplained weight loss could be a sign of cervical cancer?				

13. In the next one year, who is most likely to develop cervical cancer in Kenya?
    a) A woman aged 20-29 years ☐
    b) A woman aged 30 to 49 years ☐
    c) A woman aged 50 to 69 years ☐
    d) A woman aged 70 or over ☐
    e) Cervical cancer is unrelated to age ☐

14. The following may or may not increase a woman's chance of developing cervical cancer. How much do you agree that each of these can increase a woman's chance of developing cervical cancer?

Question	Strongly disagree	Disagree	Not sure	Agree	Strongly agree
HPV infection-The virus associated with cervical cancer					
Smoking any cigarettes at all					
Having a weakened immune system (e.g. because of HIV/AIDS, immunosuppressant drugs or having a transplant)					
Long term use of the contraceptive pill					
Infection with Chlamydia (a sexually transmitted infection					
Having a sexual partner who is not circumcised					
Starting to have sex at a young age (before age 17)					
Having many sexual partners					
Having many children					
Having a sexual partner with many previous partners					
Not going for regular smear (Pap) tests					

15. How confident are you that you would notice a cervical cancer symptom?

- Not at all confident ☐
- Not very confident ☐
- Fairly confident ☐
- Very confident ☐

16. Have you ever had a breast cancer test?

- Yes ☐
- No ☐
- Don’t know ☐

17. Have you ever had a breast cancer test in the last six months?

- Yes ☐
- No ☐
- Don’t know ☐

18. Have you ever had a cervical cancer test?

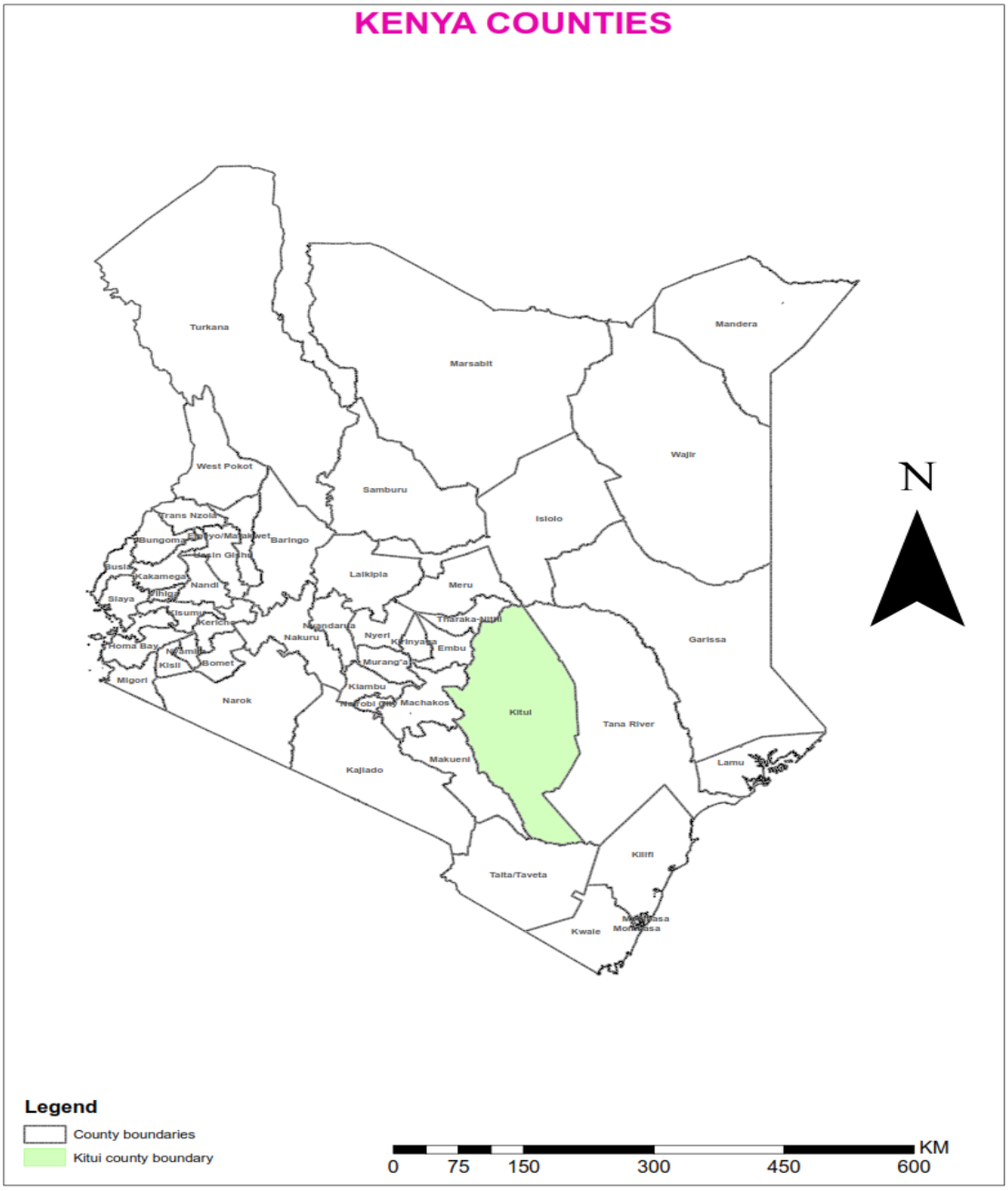
- Yes ☐
- No ☐
- Don’t know ☐

19. Have you ever had a cervical cancer test in the last six months?

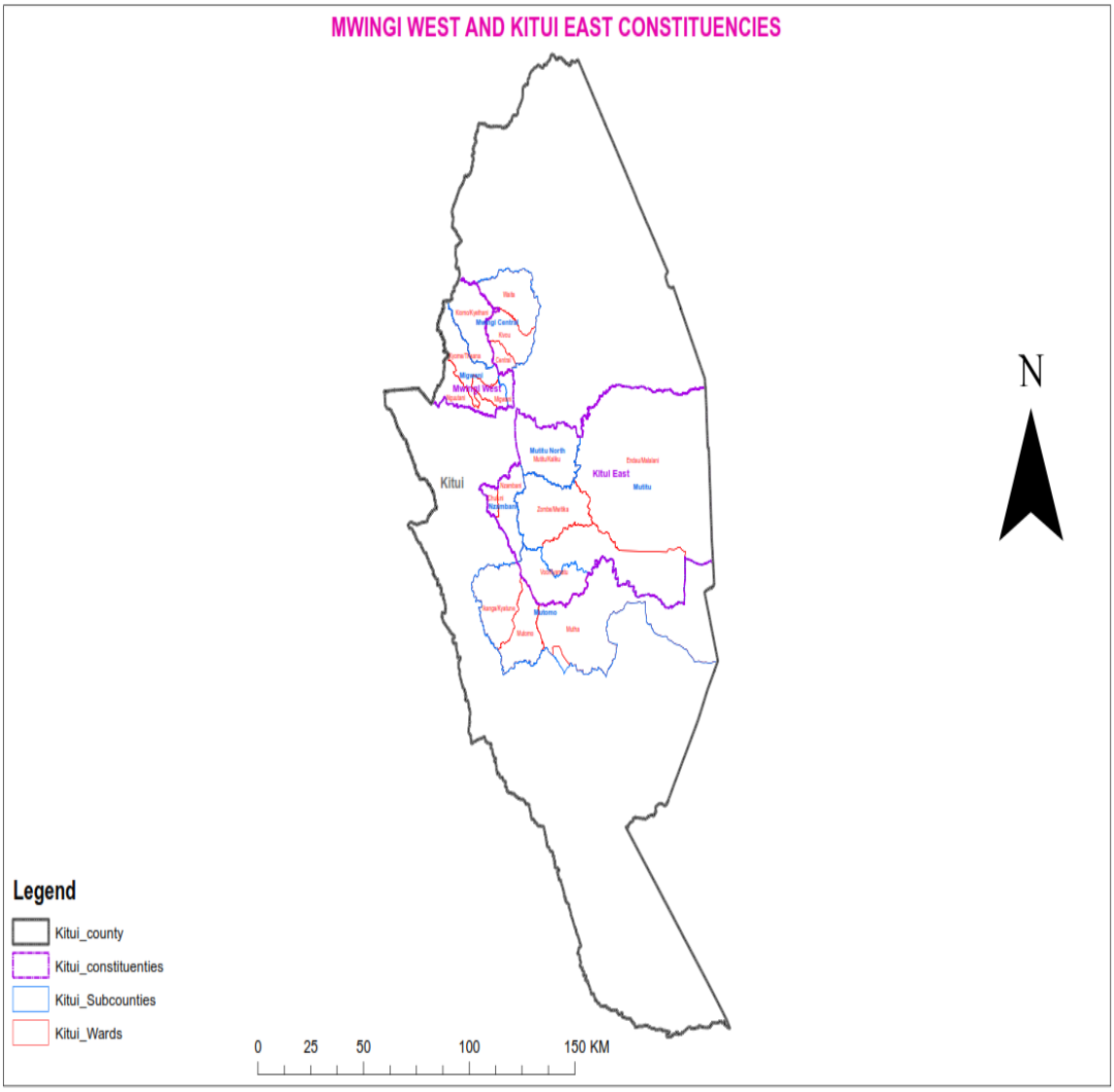
- Yes ☐
- No ☐
- Don’t know ☐

Appendix III: Maps of the Study Area

A map of Kenya showing the study area



A map of Kitui County showing the two Sub-counties of study



Source: Kenya National Bureau of statistics

Appendix IV: Curriculum

Introduction

This curriculum has been developed to support Community Health workers to sensitize women of reproductive age on the two most common cancers (Breast and cervical cancer) among this age group. It provides definitions of key terms and provides an overview of breast and cervical cancers to include; risk factors, signs and symptoms, management and prevention. It is aimed at empowering women in order to promote access to cancer screening for both breast and cervical cancer.

Target Audience

Women of reproductive age in four sub-counties of Kitui county although other women may benefit. It is for purposes of piloting in this age group

The curriculum will be able to be scaled up to all women across the age groups.

Methods/Strategies/Techniques

A participatory approach will be embraced whereby the learners will be expected to contribute actively during the sessions through asking questions and responding to issues where required. Though the curriculum is in English, English, Kiswahili and where applicable the native language will be used during the sessions. Generally the following approaches will be used;

- Presentation and Lecture
- Group discussions
- Demonstrations
- Brainstorming
- Direct instructions

SCOPE AND SEQUENCE

Subject	Description of subject	Timelines
UNIT 1: Introduction to Breast Cancer		
Lesson 1: Definitions and basic facts of breast cancer	Define the basic terms and concepts used in relation to breast cancer. Definitions of; cancer, breast, breast cancer. Orientation into the basic facts of breast cancer	Day 1
Lesson 2: Risk factors and signs symptoms of breast cancer	Explore the risk factors for breast cancer through first probing from the learners and holding discussions. Orientate the learners on the signs and symptoms of breast cancer	
Lesson 3: Management of breast cancer; Preventive and curative	How breast cancer can be managed. Explore both preventive and curative measures and provide details on both methods of management	Day 2
UNIT 2: Introduction to Cervical Cancer		
Lesson 1: Definitions and basic facts of Cervical cancer	Provide definitions on the cervix, cervical cancer and other related terms. An orientation on the basic facts of cervical cancer will be provided.	Day 3
Lesson 2: Risk factors and Signs & symptoms for Cervical cancer	Probe for the risk factors and signs& symptoms of cervical cancer. Provide an orientation into the risk factors as well as how cervical cancer presents itself.	
Lesson 3: Management of cervical cancer; Screening and prevention	Describe management of xcervical cancer to include screening; HPV ad pap tests as well as prevention.	Day 4

Materials

Flip charts

Marker pens

UNIT 1: INTRODUCTION TO BREAST CANCER

Objectives

By the end of the session, the learner should be able to;

- Define breast cancer
- State risk factors for Breast cancer
- Describe the common signs and symptoms
- State the prevention measures

This unit will be undertaken in three lessons for a period of four days.

Lesson 1: Definitions and basic facts on Breast cancer

By the end of the lesson, the learner should be able to;

- Define; cancer, breast and breast cancer
- Provide basic facts on breast cancer

1. Definitions

The following session provides a definition of; Cancer, Breast and breast cancer.

What is Cancer?

Probe: Ask participants to define what cancer is or what they understand of the meaning of cancer.

Explain: Cancer is the Latin word for crab. The ancients used the word to mean a malignancy, doubtless because of the crab-like tenacity a malignant tumor sometimes seems to show in grasping the tissues it invades. Cancer may also be called malignancy, a malignant tumor, or a neoplasm (literally, a new growth).

It is an abnormal growth of cells which tend to proliferate/multiply in an uncontrolled way and, in some cases, to metastasize (spread). Cancer is not one disease but a group of more than 100 different and distinctive diseases.

Cancer can involve any tissue of the body and have many different forms in each body area. Most cancers are named for the type of cell or organ in which they start. If a cancer spreads (metastasizes), the new tumor bears the same name as the original (primary) tumor. Benign tumors are NOT cancer; malignant tumors are cancer. Cancer is NOT contagious.

In Kenya cancer is the third most common cause of death after infectious and cardiovascular diseases with breast cancer contributing to 23.3 % of cancer deaths, cervical cancer 20% and prostate cancer 9.4%. Cancer is estimated to be responsible for 7% of the total annual deaths in Kenya.

BREAST CANCER

Definition of a Breast and facts

Explore; Allow the participants to describe what a breast is and if they know of any specific parts of the breast. Further let them try to define cancer of the breast and if they have ever or know someone who has had breast cancer.

Explain: The breasts are medically known as the mammary glands.

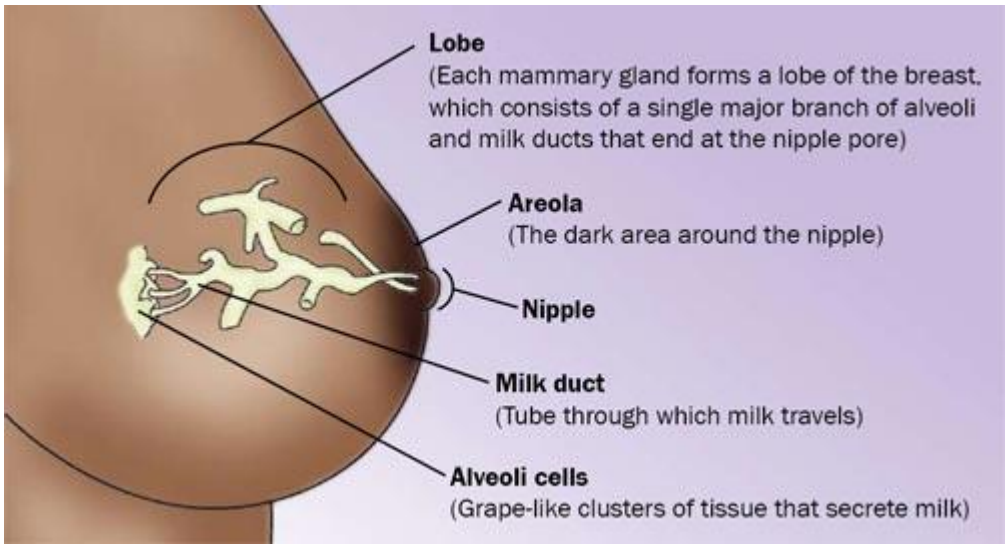
The mammary glands are made up of lobules, milk-producing glandular structures, and a system of ducts that transport milk. Between the glandular tissue and ducts, the breast contains fat tissue and connective tissue.

Lymphatic vessels in the breast drain excess fluid.

Breast growth begins at puberty in humans, in contrast to other types of primates in which breasts enlarge only during lactation.Breast tissue develops in the fetus along the so-called "milk lines," extending from the armpit to the groin.

Both males and females have breasts; the structure of the male breast is nearly identical to that of the female breast, except that the male breast tissue lacks the specialized lobules, as there is no physiologic need for milk production by the male breast.

Enrich; Take them through the different parts of the breast using the illustration.



Basic Facts about Breast cancer

- Breast cancer is a group of cancer cells (malignant tumor) that starts in the cells of the breast
- Breast cancer is the second leading cause of death among women.
- African American women have the highest breast cancer death rate among minority women— 3 2.8 per 100,000 population.
- African American women ages 35-44, have a breast cancer death rate more than twice the rate of White women in the same age group—20.02 deaths per 100,000 compared to 10.2 deaths per 100,000 respectively.
- African American females experience higher death rates from breast cancer than any other racial or ethnic group, even though Whites experience higher incidence rates.
- African Americans are approximately 34 percent more likely to die of cancer than are Whites and more than two times more likely to die of cancer than are Asians or Pacific Islanders, Ameri- can Indians and Hispanics.
- The five-year survival rate for breast cancer among African American women is 75 percent compared to 89 percent among White women

About male breast cancer

Probe: Let them indicate if men can get breast cancer and if so, why?

Clarify: All people, whether male or female, are born with some breast cells and tissue that have the possibility to develop into cancer. However, breast cancer in men is rare, with only about 2,190 diagnoses each year.

Lesson 2:

By the end of the lesson, the learner should be able to;

- State the risk factors for breast cancer.
- Describe the signs and symptoms of breast cancer

Recall: Let the participants run through what they learnt in lesson 1. Are they able to state some basic facts on cancer?

Probe: What causes cancer? Is there any factor that increases your probability of getting breast cancer. If so, state some.

Explain: Causes of breast cancer

Although most people who develop breast cancer will not be able to pinpoint one specific cause, scientists have learned much about risk factors that may indicate a stronger likelihood for cancer.

Risk factors for Breast Cancer

A risk factor is anything that increases your chance of getting a disease, with different risk factors for different diseases. Some risk factors, like someone's race or gender, can't be changed. Other risk factors are behavioral choices, such as smoking, diet and physical activity.

In some cases, there may not be any risk factors associated with getting sick. The risk of breast cancer is not the same for all women but here are some factors that may contribute to a woman's chance of developing the disease.

- **Aging:** Your risk of developing breast cancer increases as you get older. About 1 out of 8 invasive breast cancers are found in women younger than 45, while about 2 out of 3 invasive breast cancers are found in women age 55 or older.
- **Family history of breast cancer:** The risk of breast cancer is higher among women whose close blood relatives have this disease—mother, aunt, sister or grandmother. Having one first-degree relative (mother, sister or daughter) with breast cancer approximately doubles a woman's risk, and having two first-degree relatives increases her risk 5-fold. Anywhere from 20 to 30 percent of women with breast cancer have a family member with this disease
- **Personal history:** Having been diagnosed with breast cancer in one breast increases the risk of cancer in the other breast or the chance of an additional cancer in the original breast.
- **Women diagnosed with certain benign breast conditions** have an increased risk of breast cancer. These include atypical hyperplasia, a condition in which there is abnormal proliferation/multiplication of breast cells but no cancer has developed.
- **Menstruation:** Women who started their menstrual cycle at a younger age (before 12) or went through menopause later (after 55) have a slightly increased risk.
- **Breast tissue:** Women with dense breast tissue have a higher risk of breast cancer.
- **Gender:** Being a woman is the main risk factor for developing breast cancer—about 100 times more common than breast cancer in men.
- **Race:** White women are slightly more likely to develop breast cancer than African American women. But African American women are more likely to die of this cancer because their cancers are often diagnosed later and at an advanced stage when they are harder to treat and cure. There is also some question about whether African American women have more aggressive tumors. Asian, Hispanic and Native American women have a lower risk of developing breast cancer.
- **Having no children or the first child after age 30** increases the risk of breast cancer.
- **Breastfeeding** for one and a half to two years might slightly lower the risk of breast cancer.

Lifestyle-related Risk Factors

- **Alcohol:** Alcohol use is linked to a slightly increased risk of developing breast cancer. Compared with nondrinkers, women who consume one alcoholic drink a day have a very small increase in risk, and those who have 2 to 5 drinks daily have about 1.5 times the risk of women who drink no alcohol.
- **Hormone replacement therapy:** Long-term use of hormone replacement therapy (HRT) after menopause, particularly estrogens and progesterone combined, increase the risk of breast cancer.
- **Being overweight** or obese increases the risk of breast cancer.
- **Use of oral contraceptives** in the last 10 years increases the risk of breast cancer.
- **Exercise** seems to lower the risk of breast cancer.

Explore: Let the participants indicate some signs and symptoms of breast cancer

Explain: Signs and symptoms

The most common sign of breast cancer is a new lump or mass in the breast. In addition, the following are possible signs of breast cancer:

1. Nipple discharge or redness
2. Breast or nipple pain
3. Swelling of part of the breast or dimpling

Cancer symptoms and signs depend on the specific type and grade of cancer.

Although general signs and symptoms are not very specific the following can be found in patients with different cancers: fatigue, weight loss, pain, skin changes, change in bowel or bladder function, unusual bleeding, persistent cough or voice change, fever, lumps, or tissue masses.

DAY 2:

RECAP: Undertake a brief recap of the previous day lessons**.** Warm up and encourage the participants to indicate what they learnt the previous day.

Lesson 3: Management of Breast Cancer

By the end of the lesson, the learner should be able to;

- Describe the preventive management of breast cancer.
- Indicate how cancer can be treated

Probe: Do the participants have an idea on how breast cancer is managed. Are they aware that one can manage through prevention and if one has the condition what are the treatment options.

Further enquire if the nearest health facility provides these services.

Explain: Prevention

There is no guaranteed way to prevent breast cancer. Reviewing the risk factors and modifying the ones that can be altered (increase exercise, keep a good body weight, etc.) can help in decreasing the risk.

The following recommendations are good for breast cancer screenings:

- **Women age 40 and older** should have a screening every year and should continue to do so as long as they are in good health.
- **Women in their 20s and 30s** should have a **clinical breast exam (CBE)** as part of regular health exams by a health-care professional about every three years for women in their 20s and 30s and every year for women 40 years of age and over.
- CBE are an important tool to detect changes in your breast and also trigger a discussion with your health-care provider about early cancer detection and risk factors.
- **Breast self-exam (BSE)** is an option for women starting in their 20s. Women should report any breast changes to their health-care professional.

Preventive management-Breast Self Examination, Mammogram

Enquire: What is your understanding of Breast Self Examination. Have you ever conducted a BSE?

Explain as you engage: Early Detection

Symptoms and Signs

Early warning signs of breast cancer may involve the discovery of a new lump or a change in the breast tissue or skin.

How to Perform a Breast Self-Exam

Women should perform a self breast-exam each month and any changes or abnormalities should be discussed with a doctor or physician.

Step 1: Begin by looking at your breasts in the mirror with your shoulders straight and your arms on your hips.

Here's what you should look for:

- Breasts that are their usual size, shape, and color
- Breasts that are evenly shaped without visible distortion or swelling

If you see any of the following changes, bring them to your doctor's attention:

- Dimpling, puckering, or bulging of the skin
- A nipple that has changed position or an inverted nipple (pushed inward instead of sticking out)
- Redness, soreness, rash, or swelling

Breast Self-Exam — Step 1

Step 2: Now, raise your arms and look for the same changes.

Step 3: While you're at the mirror, look for any signs of fluid coming out of one or both nipples (this could be a watery, milky, or yellow fluid or blood).

Breast Self-Exam — Steps 2 and 3

Step 4: Next, feel your breasts while lying down, using your right hand to feel your left breast and then your left hand to feel your right breast. Use a firm, smooth touch with the first few finger pads of your hand, keeping the fingers flat and together. Use a circular motion, about the size of a quarter.

Cover the entire breast from top to bottom, side to side — from your collarbone to the top of your abdomen, and from your armpit to your cleavage.

Breast Self-Exam — Step 4

Follow a pattern to be sure that you cover the whole breast. You can begin at the nipple, moving in larger and larger circles until you reach the outer edge of the breast. You can also move your fingers up and down vertically, in rows, as if you were mowing a lawn. This up-and-down approach seems to work best for most women. Be sure to feel all the tissue from the front to the back of your breasts: for the skin and tissue just beneath, use light pressure; use medium pressure for tissue in the middle of your breasts; use firm pressure for the deep tissue in the back. When you've reached the deep tissue, you should be able to feel down to your ribcage.

Step 5: Finally, feel your breasts while you are standing or sitting. Many women find that the easiest way to feel their breasts is when their skin is wet and slippery, so they like to do this step in the shower. Cover your entire breast, using the same hand movements described in step 4.

Breast Self-Exam — Step 5

Clinical Breast Exam

A clinical breast exam is performed by a qualified nurse or doctor. A healthcare professional will check for lumps or other physical changes in the breast that may need to be investigated.

Probe: Are you aware there is a test called a mammogram? What does it entail and who is legible for this test?

Explain as you engage: Mammogram

A mammogram is an x-ray that allows a qualified specialist to examine the breast tissue for any suspicious areas.

A mammogram is a test that is done to look for any abnormalities, or problems, with a woman's breasts. The test uses a special x-ray machine to take pictures of both breasts. The results are recorded on film that your health care provider can examine.

Mammograms look for breast lumps and changes in breast tissue that may develop into problems over time. They can find small lumps or growths that a health care provider or woman can't feel when doing a physical breast exam.

Breast lumps or growths can be benign (not cancer) or malignant (cancer). If a lump is found, a health care provider will order a biopsy, a test where a small amount of tissue is taken from the lump and area around the lump.

The tissue is sent to a lab to look for cancer or changes that may mean cancer is likely to develop. Finding breast cancer early means that a woman has a better chance of surviving the disease. There are also more choices for treatment when breast cancer is found early.

Who should get a mammogram?

Women over 40 should get a mammogram every 1 to 2 years. Women who have had breast cancer or breast problems, or with a family history of breast cancer may need to start having mammograms at a younger age or more often.

Talk to your health care provider about how often you should get a mammogram. Be aware that mammograms don't take the place of getting breast exams from a health care provider and examining your own breasts.

If you find a lump or see changes in your breast, talk to your health care provider right away no matter what your age. Your health care provider may order a mammogram for you to get a better look at your breast changes.

Early Detection Plan

An Early Detection Plan enables you to be proactive about your health by reminding you to do monthly breast self-exams and schedule clinical breast exams and mammograms.

Create Your Early Detection Plan

The best way to fight breast cancer is to have a plan that helps you detect the disease in its early stages.

Healthy Habits

Leading a healthy lifestyle can help you reduce your risk factors for breast cancer and other illnesses.

Further Explanation as you engage;

Curative Management/ Treatment for breast cancer

- There are many treatment options for breast cancer. This varies according to the type and stage of cancer. Most treatments include at least one of the following and may include all: surgery, chemotherapy, and radiation therapy.
- The prognosis of cancer can range from excellent to poor. The prognosis depends on the cancer type and its staging with those cancers known to be aggressive and those staged with higher numbers (3 to 4) often have a prognosis that ranges more toward poor.

Below are some of the basic treatment modalities used in the treatment of breast cancer.

Surgery

Most women with breast cancer will require surgery. Broadly, the surgical therapies for breast cancer can be divided into breast conserving surgery and mastectomy.

Breast-conserving surgery; This involves removal of a part of the breast (sometimes referred to as partial mastectomy). The extent of the surgery is determined by the size and location of the tumor.

In a lumpectomy, only the breast lump and some surrounding tissue is removed. The surrounding tissue (margins) are inspected for cancer cells. If no cancer cells are found, this is called “negative” or “clear margins.” Frequently, radiation therapy is given after lumpectomies.

Mastectomy: During a mastectomy (sometimes also referred to as a simple mastectomy), all the breast tissue is removed. If immediate reconstruction is considered, a skin-sparing mastectomy is sometimes performed. In this surgery, all the breast tissue is removed as well but the overlying skin is preserved.

Radiation therapy

Radiation therapy destroys cancer cells with high energy rays. There are two ways to administer radiation therapy:

External beam radiation: This is the usual way radiation therapy is given for breast cancer. A beam of radiation is focused onto the affected area by an external machine. The extent of the treatment is determined by your health-care team and is based on the surgical procedure performed and whether lymph nodes were affected or not.

The local area will usually be marked after the radiation team has determined the exact location for the treatments. Usually the treatment is given five days a week for five to six weeks.

Brachytherapy: This form of delivering radiation uses radioactive seeds or pellets. Instead of a beam from the outside delivering the radiation, these seeds are implanted into the breast next to the cancer.

Chemotherapy

Chemotherapy is treatment of cancers with medications that travel through the bloodstream to the cancer cells. These medications are given either by intravenous injection or by mouth.

Hormone therapy

This therapy is often used to help reduce the risk of cancer reoccurrence after surgery, but it can also be used as adjunct treatment.

Estrogen (a hormone produced by the ovaries) promotes the growth of a few breast cancers, specifically those containing receptors for estrogen (ER positive) or progesterone (PR positive).

UNIT 2: INTRODUCTION TO CERVICAL CANCER

Objectives

By the end of the session, the learner should be able to;

- Define cervical cancer
- State risk factors for Cervical cancer
- Describe the common signs and symptoms
- State the prevention measures

Lesson 1: Definitions and basic facts about cervical cancer

By the end of the lesson the learner should be able to;

- Define the cervix and cervical cancer
- State some basic facts about cervical cancer

Enquire: What do you understand by the word cervix. Can you describe the different parts of the cervix.

Explain: The Cervix

The cervix, or the neck of the womb, and the womb are both parts of a female reproductive system. The female reproductive system consists of:

- Vagina
- Womb (uterus), which includes the cervix
- Ovaries.

Women have two ovaries, one on either side of the lower abdomen (pelvis). Each month one of the ovaries produces an egg. Each ovary is connected to the uterus by a tube called the Fallopian tube.

In between each menstrual period an egg travels down one of the fallopian tubes and into the uterus. They alternate - one month may be the left side, and the next month the right side. When the egg enters the womb its lining thickens in preparation; in case the egg is fertilized by a man's sperm. If fertilization does not occur the thickened lining of the uterus is shed - a period (menses) occurs.

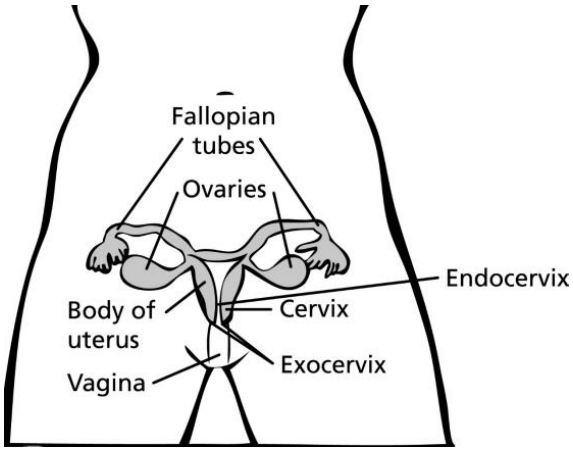
The cervix is the opening from the uterus to the vagina. It is a tight muscle that is normally firmly shut, with a small opening to allow the sperm through and the flow from a menstrual period. During labor (childbirth) the cervix opens.

Probe: What do you understand by cervical cancer? Any facts on cervical cancer that you know of?

Explain and elaborate; What is cervical cancer?

Cervical cancer starts in cells lining the cervix. The cervix is the lower part of the uterus (womb). It is sometimes called the *uterine cervix*. The body of the uterus (the upper part) is where a fetus grows. The cervix connects the body of the uterus to the vagina (birth canal). The part of the cervix closest to the body of the uterus is called the *endocervix*.

The part next to the vagina is the *exocervix* (or *ectocervix*). The 2 main types of cells covering the cervix are squamous cells (on the exocervix) and glandular cells (on the endocervix). The place these cell types meet is called the *transformation zone*. The exact location of the transformation zone changes as you age and with childbirth. Most cervical cancers start in the cells in the transformation zone.



These cells do not suddenly change into cancer. Instead, the normal cells of the cervix gradually develop pre-cancerous changes that turn into cancer. These changes can be detected by the Pap test and treated to prevent cancer from developing.

Although cervical cancers start from cells with pre-cancerous changes (pre-cancers), only some women with pre-cancers of the cervix will develop cancer. The change from pre-cancer to cancer usually takes several years − but it can happen in less than a year. For most women, pre-cancerous cells will remain unchanged or even go away without any treatment. Still, in some women pre-cancers turn into true (invasive) cancers. Treating all pre-cancers can prevent almost all true cancers.

Fast facts on cervical cancer

Here are some key points about cervical cancer.

- Cervical cells are most likely to become cancerous in the transformation zone, found at the opening of the cervix.
- Women can be asymptomatic during the early stages of cervical cancer.
- Cervical cancer risk factors include smoking, giving birth at a young age and having a weakened immune system.
- Experts state that cervical cancer screening should not occur more than once every 3-5 years.
- It is estimated that the majority of cervical cancer deaths would be prevented if all women underwent cervical cancer screening.
- Cervical cancer screening should begin from the age of 21, or within three years of the first sexual encounter.

- Like all cancers, there are various stages of severity to cervical cancer, numbered from 0-4.
- Treatment for cancer that is confined to the cervix has a high rate of success - around 80%-95%.
- Cervical cancer risk can be reduced through various measures, including the human papillomavirus vaccine and practicing safe sex.

Lesson 2:

By the end of the lesson the learner should be able to;

- State risk factors for cervical cancer
- Indicate the signs and symptoms of cervical cancer

Probe; What is the cause of cervical cancer. Any facts that you know of which increases a person's chance of getting cervical cancer?

Explain;

Causes of cervical cancer

Cancer is the result of the uncontrolled division of abnormal cells. Most of the cells in our body have a set lifespan; when they die new cells are produced to replace them. Abnormal cells can have two problems:

1. They do not die
2. They continue dividing.

This results in an excessive accumulation of cells which eventually form a lump - a tumor. Scientists are not completely sure why cells become cancerous. However, there are some risk factors which are known to increase the risk of developing cervical cancer.

Risk Factors

Risk factors for cervical cancer include:

HPV (human papilloma virus)

Human papilloma virus infection is a sexually transmitted virus. There are over 100 different types of HPVs - 15 types can cause cervical cancer; probably 99% of them. In addition there are a number of types which can cause genital warts. It is estimated that HPV types 16 and 18 cause about 70% of cases cervical cancer while HPV types 6 and 11 cause 90% of genital warts.

Many sexual partners, becoming sexually active early

Cervical cancer-causing HPV types are nearly always transmitted as a result of sexual contact with an infected individual. Women who have had many sexual partners generally have a higher risk of becoming infected with HPV, which raises their risk of developing cervical cancer. There is also a link between becoming sexually active at a young age and a higher risk of cervical cancer.

If a woman develops cervical cancer it does not mean she had several sexual partners, or became sexually active earlier than most other females. It is just a risk factor. Women who only ever had one sexual partner can develop cervical cancer.

Smoking

Smoking increases the risk of developing many cancers, including cervical cancer.

Weakened immune system

People with weakened immune systems, such as those with HIV/AIDS, or transplant recipients taking immunosuppressive medications have a higher risk of developing cervical cancer.

Certain genetic factors

Scientists at Albert Einstein College of Medicine of Yeshiva University found that women with certain gene variations appear to be protected against cervical cancer.

Long-term mental stress

A woman who experiences high levels of stress over a sustained period may be undermining her ability to fight off HPV and be at increased risk of developing cervical cancer it can cause, scientists at the Fox Chase Cancer Center reported.

Giving birth at a very young age

Women who gave birth before the age of 17 are significantly more likely to develop cervical cancer compared to women who had their first baby when they were aged 25 or over.

Several pregnancies

Women who have had at least three children in separate pregnancies are more likely to develop cervical cancer compared to women who never had children.

Contraceptive pill

Long-term use of some common contraceptive pills slightly raises a woman's risk.

Other sexually transmitted diseases (STD)

Women who become infected with chlamydia, gonorrhea, or syphilis have a higher risk of developing cervical cancer. Scientists at the Medical University of South Carolina found that HPV infections last longer if Chlamydia also is present.

Socio-economic status

Studies in several countries have revealed that women in deprived areas have significantly higher rates of cervical cancer, compared to women who live in other areas. Studies have also found higher rates in women of working age in manual jobs, compared to women in non-manual jobs. The most likely reason is a difference in the proportion of women who have regular screening.

Probe; State some signs and symptoms of cervical cancer that you know of.

Explain;

Symptoms of cervical cancer

Often during the early stages people may experience no symptoms at all. That is why women should have regular cervical smear tests.

The most common symptoms are:

- Bleeding between periods

- Bleeding after sexual intercourse
- Bleeding in post-menopausal women
- Menstrual bleeding that is longer and heavier than usual
- Discomfort during sexual intercourse
- Smelly vaginal discharge
- Increased vaginal discharge
- Vaginal discharge tinged with blood
- Pelvic pain.

Any of these symptoms should be reported to your doctor. If these symptoms appear, it is important to talk with your doctor about them even if they appear to be symptoms of other, less serious conditions. The earlier precancerous cells or cancer is found and treated, the better the chance that the cancer can be prevented or cured.

Lesson 3: Management of Cervical cancer

By the end of the lesson, the learner should be able to;

- Describe the preventive management of cervical cancer including screening.
- Indicate some treatment modes for cervical cancer

Probe;

Can cervical cancer be prevented and if so, how?

Explain;

Management- Screening and prevention

Prevention

Cervical cancer can often be prevented by having regular screening to find any precancers so they can be treated. Preventing precancers means controlling possible risk factors, such as:

- Delaying first sexual intercourse until the late teens or older
- Limiting the number of sex partners
- Avoiding sexual intercourse with people who have had many partners
- Avoiding sexual intercourse with people who are obviously infected with genital warts or show other symptoms

- Quitting smoking
- Get vaccinated

A HPV vaccine has been proven to work. The vaccine protects one from the HPV strains that are known to cause cervical cancer and precancerous lesions. Girls as young as 10 years can vaccinated.

Enquire; What do you understand by screening and what are some of the screening methods that you know of?

Explain;

Screening

Screening is used to look for cancer or abnormalities that may become cancerous before you have any symptoms or signs. Scientists have developed, and continue to develop, tests that can be used to screen a person for specific types of cancer before signs or symptoms appear. The overall goals of cancer screening are to:

- Reduce the number of people who die from the cancer, or completely eliminate deaths from cancer
- Reduce the number of people who develop the cancer

The following tests and procedures may be used to screen for cervical cancer:

Bimanual pelvic exam

In this examination, the doctor will check a woman's body for any unusual changes regarding her cervix, uterus, vagina, ovaries, and other nearby organs. To start, the doctor will look for any changes to the woman's vulva outside the body and then, using an instrument called a speculum to keep the vaginal walls open, the doctor will look inside the woman's body.

Some of the nearby organs are not visible during this exam, so the doctor will then insert two fingers of one hand inside the patient's vagina while the other hand gently presses on the lower abdomen to feel the uterus and ovaries. This exam typically takes a few minutes and is done in an examination room at the doctor's office.

HPV test

This test is done on a sample of cells removed from the woman's cervix, the same sample used for the Pap test.This sample is tested for the strains of HPV most commonly linked to cervical cancer. HPV testing may be done by itself or combined with a Pap test. This test may also be done on a sample of cells from a woman's vagina that she can collect herself.

Pap test

The Pap test has been most common test for early changes in cells that can lead to cervical cancer. This test is also called a Pap smear. A Pap test involves gathering a sample of cells from the cervix and is often done at the same time as a pelvic exam. HPV testing may be done along with a Pap test.

Recap

Let the participants briefly explain what breast cancer is and what are some of the key take home messages.

Let the participants provide a brief overview on cervical cancer and key take home messages.

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Appendix V: Ethical Clearance from KNH-UoN ERC

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COLLEGE OF HEALTH SCIENCES
P O BOX 19676 Code 00202
Telegrams: varsity
Tel:(254-020) 2726300 Ext 44355

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KENYATTA NATIONAL HOSPITAL
P O BOX 20723 Code 00202
Tel: 726300-9
Fax: 725272
Telegrams: MEDSUP, Nairobi

Ref: KNH-ERC/A/108

27th March 2017

Fridah N. Muinde
Reg. No.TM410-0996/2011
College of Health Sciences
J.K.U.A.T

Dear Fridah

REVISED RESEARCH PROPOSAL – ROLE OF A COMMUNITY BASED HEALTH INTERVENTION IN IMPROVING BREAST AND CERVICAL CANCER HEALTH OUTCOMES AMONG WOMEN OF REPRODUCTIVE AGE IN KITUI COUNTY, KENYA(P862/11/2016)

This is to inform you that the KNH- UoN Ethics & Research Committee (KNH- UoN ERC) has reviewed and **approved** your above revised proposal. The approval period is from 27th March 2017 – 26th March 2018.

This approval is subject to compliance with the following requirements:

a) Only approved documents (informed consents, study instruments, advertising materials etc) will be used.
b) All changes (amendments, deviations, violations etc) are submitted for review and approval by KNH-UoN ERC before implementation.
c) Death and life threatening problems and serious adverse events (SAEs) or unexpected adverse events whether related or unrelated to the study must be reported to the KNH-UoN ERC within 72 hours of notification.
d) Any changes, anticipated or otherwise that may increase the risks or affect safety or welfare of study participants and others or affect the integrity of the research must be reported to KNH- UoN ERC within 72 hours.
e) Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. (*Attach a comprehensive progress report to support the renewal*).
f) Clearance for export of biological specimens must be obtained from KNH- UoN ERC for each batch of shipment.
g) Submission of an *executive summary* report within 90 days upon completion of the study. This information will form part of the data base that will be consulted in future when processing related research studies so as to minimize chances of study duplication and/ or plagiarism.

For more details consult the KNH- UoN ERC website **http://www.erc.uonbi.ac.ke**

"Protect to Discover"

Yours sincerely,

PROF M. L. CHINDIA
SECRETARY, KNH-UoN ERC

c.c. The Principal, College of Health Sciences, UoN
The Director, CS, KNH
The Assistant Director, Health Information, KNH
The Chair, KNH-UoN ERC
Supervisors: Prof. Peter Mwaniki, Prof. Mohammed Karama

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Ref. No.KNH/ERC/R/60

March 27th 2018

Fridah N. Muinde
Principal Investigator
Reg. No.TM410-0996/2011
INTROMID, KEMRI
JKUAT

Dear Fridah

Re: Approval of Annual renewal Role of a community based health intervention in improving breast and cervical cancer health outcomes among women of reproductive age in Kitui County, Kenya (P862/11/2016)

Your communication dated March 9, 2018 refers.

This is to acknowledge receipt of your study progress report and hereby grant you annual extension approval for ethical research protocol P862/11/2016.

The study renewal dates are 27th March 2018 – 26th March 2019.

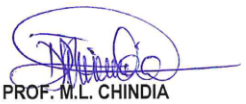
This approval is subject to compliance with the following requirements:

a) Only approved documents (informed consents, study instruments, advertising materials etc) will be used.
b) All changes (amendments, deviations, violations etc) are submitted for review and approval by KNH-UoN ERC before implementation.
c) Death and life threatening problems and serious adverse events (SAEs) or unexpected adverse events whether related or unrelated to the study must be reported to the KNH-UoN ERC within 72 hours of notification.
d) Any changes, anticipated or otherwise that may increase the risks or affect safety or welfare of study participants and others or affect the integrity of the research must be reported to KNH- UoN ERC within 72 hours.
e) Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. (*Attach a comprehensive progress report to support the renewal*).
f) Clearance for export of biological specimens must be obtained from KNH- UoN ERC for each batch of shipment.
g) Submission of an *executive summary* report within 90 days upon completion of the study.

This information will form part of the data base that will be consulted in future when processing related research studies so as to minimize chances of study duplication and/ or plagiarism.

For more details consult the KNH- UoN ERC website **http://www.erc.uonbi.ac.ke**

Yours sincerely,



PROF. M.L. CHINDIA
SECRETARY, KNH-UON ERC

c.c. The Principal, College of Health Sciences, UoN
The Director CS, KNH
The Chair, KNH- UoN ERC

Appendix VI: Permission from Kitui County Government

THE COUNTY GOVERNMENT OF KITUI

Office of the Chief Officer
Health and Sanitation
P.O. Box 460-90200
KITUI

MINISTRY OF HEALTH AND SANITATION

Ref:KTI/GEN.CORRES/VOL.VIII/06 Date: 4th May, 2018

Fridah N Muinde
Principal Investigator
Reg. No.RM410-0996/2011
INTROMID, KEMRI
JKUAT

RE: RESEARCH AUTHORIZATION

Reference is made to the letter ref no.KNH/ERC/R/60 dated 27th March, 2018 in which ethical approval was granted by KNH-UON ERC.

Authority is hereby granted for you to carry out research titled "Role of a community based health intervention in improving breast and cervical cancer health outcomes among women of reproductive age" in Kitui County.

CHIEF OFFICER HEALTH AND SANITATION
KITUI COUNTY
04 MAY 2018
P. O. Box 460 - 90200, KITUI

Dr. Allan Owino
Ag. County Director of Health
Kitui County

Appendix VII: List of Published Papers

1. **Fridah Muinde,** Nzioki Mativo, Mohammed Karama (2020): Effect of a CHW intervention on uptake of breast cancer screening services among women of reproductive age in Kitui County, Kenya. Published with the African Journal of Health Sciences Vol 33, Issue No. 2.

2. **Fridah Muinde**, Nzioki Mativo, Mohammed Karama (2020): Knowledge levels of Breast Cancer among women of reproductive age in Kenya: A Case of Kitui county. Published with the Central African Journal of Public Health Vol 6, Issue No. 5.

3. **Fridah Muinde**, Nzioki Mativo, Mohammed Karama (2021): Effect of a CHW based public Health promotion intervention on uptake of cervical cancer screening services among women of reproductive age in Kitui County, Kenya. Published with the African Journal of Health Sciences Vol 33, Issue No. 5.

Appendix VIII: Published Papers

Effect of a Community Health Worker Intervention on Uptake of Breast Cancer Screening Services among Women of Reproductive Age in Kitui County, Kenya

*Fridah Ndinda Muinde1, Japheth Mativo Nzioki1, Mohamed Karama Mahmoud2

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Summary

INTRODUCTION

While communicable diseases remain the leading killers in many developing countries, the incidence and mortality from non-communicable diseases such as breast cancer and other cancers is rising rapidly. By 2015, estimated 2.4 Million new cases of breast cancer globally was reported. Screening is one way of improving the survival rate by reducing morbidity and mortality of Breast cancer. The annual incidence of cancer in Kenya was close to 37,000 new cases with annual mortality of over 28,000. Cervical and breast cancer were the leading diseases in women occurring at a rate of 40.1/100,000 and 38.3/100,000. The uptake of cancer screening services in Kenya was as low as 13.5%. Engaging CHWs in health service delivery especially in resource poor countries was found to be an achievement [6, 7] .

OBJECTIVES

In many developing countries, Community Health Workers (CHWs) provide a variety of services including outreach, counseling and patient home care services. This study aim was to assess the effect of a CHW led intervention on uptake of breast cancer screening services among women of reproductive age in Kitui County, Kenya.

MATERIALS AND METHODOLOGY

This was a quasi-experiment with one pre-intervention and a post intervention survey conducted in both intervention (Kitui East) and control site (Mwingi West) respectively. The intervention site received Community-Based Health Education (CBHE) aimed at promoting awareness and screening of both breast and cervical cancer. A total sample size of 422 participants were identified in each survey, based on Fisher et al 1998 formula. Purposive and simple random sampling method was used in identifying study area and respondents similarly. Data was collected using a research assistant administered questionnaire. Data analysis was done using frequencies and percentages, Z score tests, and ODDs Ratios. The study was subjected to the KNH-UoN Ethics Review committee (ERC) for ethical review and approval.

RESULTS

The intervention of CHWs increased the proportion of women seeking facility-based breast cancer screening services significantly by 38% in the intervention site. A Difference in Differences(DiD) statistic indicated 33.3% net increase in the proportion of women seeking the services within the 8-month of intervention period. The odds of seeking breast cancer screening services were higher (4.5 times higher) [(crude OR=3.604: 95%CI of OR=2.698-4.813, P<0.05)

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(Adjusted OR=4.458: 95%CI of OR=3.204-6.202, P<0.05)] in intervention site compared to control site.

CONCLUSION AND RECOMMENDATIONS

Conclusively, the CBHE intervention improved breast cancer screening among women of reproductive age in Kitui County. To reduce the high prevalence of breast cancer and the economic burden of treating breast cancer cases in Kenya, we recommend adoption of Community based strategies like CBHE's help in promoting early screening and treatment of breast cancer among women of reproductive age.

Keywords: Community Health Workers, CBHE, Breast Cancer, Screening

[*Afr. J.* Health Sci. 2020 33(2) : 35 - 43]

Introduction

Cancer is one of the major non-communicable diseases (NCDs) that together with cardiovascular diseases, diabetes and chronic respiratory diseases cause over 60% total global mortality yearly.

It was estimated that cancer kills over 7.9 million people annually constituting close to 13% of total deaths worldwide. While communicable diseases remain the leading killers in many developing countries the incidence and mortality from non- communicable diseases was rising rapidly. That has resulted in a 'double burden' of diseases imposing strain on existing health systems [16]. Cancer was an increasingly crucial public health problem in developing countries, including Africa.

As public and professional awareness of the cancer problem expanded, so has interest in the pattern of disease presentation, its epidemiology and treatment outcome [3]. Breast cancer was the most common cancer among women of reproductive age worldwide then. Between 2010 and 2012 over 1.6 - 1.67 million new cases of breast cancer were reported globally[8]. By 2015, the estimated number of new cases of breast cancer escalated and was reported to have reached 2.4 Million cases [1]

A recent study conducted to establish the incidence rate of breast cancer in Africa affirmed a growing incidence of breast cancer in the continent. Observed crude incidence rate of breast cancer in the study was 24.5 per 100 000 person yearly. [1]

Control of modifiable breast cancer risk factors such as maintaining a healthy weight, regular exercise and reducing alcohol intake could eventually have an impact in reducing the incidence of breast cancer. However, these strategies cannot eliminate majority of breast cancers.

Therefore, early detection in order to improve breast cancer outcome and survival remains the cornerstone of breast cancer control. Breast cancer screening is one way of reducing morbidity and mortality while improving the survival rate [9].

The second Kenya National Cancer Control Strategy 2017 - 2022 acknowledged that, Kenya was experiencing a double burden of infectious diseases remaining a significant cause of ill health coupled with a rising incidence and mortality from Non-Communicable Diseases (NCDs) [15]. Cancer was estimated to be the third leading cause of death after infectious and cardiovascular diseases. Among the NCDs related deaths, cancer was the second leading cause of death accounting for 7% of overall national mortality after cardiovascular diseases [15].

The annual incidence of cancer in Kenya was close to 37,000 new cases with annual mortality of over 28,000. Cervical and breast cancer are the leading cancers in women in Kenya occurring at a rate of 40.1/100,000 and 38.3/100,000 [15]. In future cancer deaths can be reduced significantly by early screening, detection and treatment. Breast self-examinations (physical examinations) of the breasts performed by self or examined by medical professionals or mammography were recommendable methods for the early detection of breast cancer [13].

The uptake of cancer screening services in Kenya was low. The 2014 Kenya Demographic and Health Survey (KDHS) indicated that the percentage of women who reported to have had a doctor or a health care provider perform an examination for breast cancer was 13.5% [12]. Low uptake of cancer preventive services in the country justified the need to innovate intervention measures to help increase screening and early detection. Ultimately to reduce morbidity and mortality associated with breast cancer in Kenya. Engaging CHWs in health service delivery especially in resource poor countries was found to be effective [6, 7] . There was a plethora of evidence demonstrating the positive potential of CHWs in improving equitable access to care and health outcomes [20].

In many developing countries, CHWs provide a variety of services, including outreach, counseling and patient home care. In Kenya, CHWs are in level one of the Kenyan healthcare service provision system and thus are a central pillar of primary health care delivery at the community level [14]. The aim of this study was to assess the effect of a CHW led intervention on uptake of breast cancer screening services among women of reproductive age in Kitui County.

Materials and Methodology

The study was carried out in Kitui County which had eight sub- counties namely Kitui rural, Kitui Central, Kitui West, Kitui East, Kitui South, Mwingi North, Mwingi West and Mwingi Central. This was a quasi-experiment with one pre-intervention and a post intervention survey conducted in both intervention and control sites. Kitui East was the intervention site while Mwingi West was the control site. The intervention site received a Community Based Health Education intervention (CBHEI) targeting on promoting awareness and screening of both breast and cervical cancer. The focus of the CBHEI was to raise awareness and promote early screening of both cervical and breast cancer in the intervention site. Therefore the intervention was designed following a validated United Kingdom breast and cervical cancer awareness modules [4] and [19].

The key elements of the intervention included the following: developing a breast and cervical cancer awareness training curriculum and manual which include:

1. Awareness of screening methods and importance of early breast cancer screening.
2. Validation of the training messages and materials.
3. Recruiting voluntary Community Health Workers and training them on breast cancer awareness.
4. Screening.
5. Assigning CHWs to train community members in their areas of jurisdiction (Community Units).
6. Lastly following up to ensure CHWs carry out the trainings.

Purposive and simple random sampling was employed in this study. Purposive sampling was employed to identify the intervention and control sites while simple random sampling was used to identify the study participants. The predicted total population of women in Kitui county by 2018 was 579,230. Total number of women in Kitui East was 10,187 and Mwingi West was 10,639 (Intervention and control site) respectively [11]. This being over 10,000, sample size was determined as 422 participants based on the formula by Fisher et al [10].

At baseline, a sampling frame of 5320, and 6415 households with a woman of reproductive age was established in intervention and control sites. 422 women were randomly identified from each sampling frame. Data was collected from 402 and 404 women in control and intervention sites, respectively. In end term survey a sampling frame of 6124 and 5397 women were identified. After selecting 422 households in both intervention and control, data was collected from 405 and 409 respondents in control and intervention sites, respectively. Data was collected using a research assistant administered questionnaire.

The quasi-independent variable in this study was the CHWs led intervention. The dependent variable was uptake of breast cancer screening services. Data analysis was done using frequencies and percentages, Z score tests, and ODDs Ratios. The study was subjected to the KNH-UoN Ethics Review committee (ERC) for ethical review and approval.

Results

Socio-Demographic Characteristics

The following table *(Table 1)* is a table representing a summary of the sociodemographic characteristics of the study population.

Table 1: Social - Demographic Characteristics of the Study Participants

Variables	Categories	Baseline Survey				End term Survey (8 months)			
		Control		Intervention		Control		Intervention	
Age		**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
	16-20 years	12	3.0	0	0	20	4.9	21	5.1
	21-25 years	63	15.7	31	7.7	76	18.8	64	15.6
	26-30 years	134	33.3	106	26.2	117	28.9	112	27.4
	31-35 years	139	34.6	149	36.9	138	34.1	132	32.3
	36-40 years	50	12.4	113	28.0	54	13.3	80	19.6
	41-45 years	4	1.0	5	1.2	0	0	0	0
	Total	**402**	**100**	**404**	**100**	**405**	**100**	**409**	**100**
Parity		**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
	1 Child	23	5.7	12	3.0	30	7.4	13	3.2
	2 children	22	5.5	15	3.7	13	3.2	19	4.6
	3 children	58	14.4	60	14.9	67	16.5	64	15.6
	4 children	124	30.8	105	26.0	89	22.0	122	29.8
	5 children	89	22.1	93	23.0	99	24.4	99	24.2
	6 children	70	17.4	63	15.6	82	20.2	65	15.9
	7 and above	16	4.0	56	13.9	25	6.2	27	6.6
	Total	**402**	**100**	**404**	**100**	**405**	**100**	**409**	**100**
Education Level		**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
	No education	10	2.5	33	8.2	5	1.2	27	6.6
	Primary level	80	19.9	138	34.2	112	27.7	96	23.5
	Secondary level	227	56.5	143	35.4	167	41.2	206	50.4
	College/ University	85	21.1	90	22.3	121	29.9	80	19.6
	Total	**402**	**100**	**404**	**100**	**405**	**100**	**409**	**100**
Occupation		**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
	Not working	10	2.5	7	1.7	15	3.7	29	7.1
	Peasant Farmer	227	56.5	201	49.8	222	54.8	223	54.5
	Business	114	28.4	102	25.2	101	24.9	99	24.2
	Employment	51	12.7	94	23.3	67	16.5	58	14.2
	Total	**402**	**100**	**404**	**100**	**405**	**100**	**409**	**100**
Marital Status		**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
	Single	31	7.7	18	4.5	34	8.4	33	8.1
	Married	344	85.6	297	73.5	327	80.7	310	75.8
	Widowed	17	4.2	65	16.1	26	6.4	48	11.7
	Separated/ Divorced	10	2.5	24	5.9	18	4.4	18	4.4
	Total	**402**	**100**	**404**	**100**	**405**	**100**	**409**	**100**

Facility Breast Cancer Screening Proportions: Baseline Vs. End Term

Baseline data indicates that proportion of women who ever sought breast cancer screening services from health facilities was 29.5% and 31.8% at intervention and control sites respectively. At end term survey data shows that 67.5% and 36.5% of women sought breast cancer screening services at the facilities in intervention and control sites. ***Table 2:*** below represents a summary of these data.

Table 2: Proposition of Uptake of Facility Breast Cancer Screening Services

Survey	Intervention site: Have you ever sought breast cancer screening services?		Control Site: Have you ever sought breast cancer screening services?	
	Frequency	%	Frequency	%
Baseline	119/404	29.5	128/402	31.8
End-Term (8 months)	276/409	67.5	148/405	36.5

Z-Score Tests Testing Significance between Baseline and End Term Proportions

A further analysis established that uptake of breast cancer screening services increased by 38% in the intervention site. A Z-score test performed to test this difference established that, the change in proportions was statistically significant. The following (***Table 3***) represents a summary of this data.

Table 3: Z-Score Tests Testing Change in Breast Cancer Screening Proportions

Study Site	Base line	End term	Z-Score test and P values (Baseline Vs. End term)
Intervention	119/404 (29.5%)	276/409 (67.5%)	Z score = 10.8466, P<0.05 (38% difference is significant)
Control	128/401 (31.8%)	148/405 (36.5%)	Z score =1.3829, P>0.05, (4.7% difference is not significant)

Difference in Differences (DiD) Statistic

DiD Statistic established that in a period of 8-month intervention, there was a 33.3% net increase in women who sought facility-based breast cancer screening in that site. The following is a demonstration of how DiD statistic was calculated: (67.5%-29.5%) - (36.5% - 31.8%) = 33.3%. Odds of Seeking Facility-Based Breast Cancer Screening Services in Intervention Site Compared to Control Site

Binary logistic regression analysis revealed that at baseline, there was no significant difference in the odds of seeking health facility breast cancer screening services between intervention site and control site [(crude OR=0.894: 95%CI of OR=0.062-1.206, P>0.05) (Adjusted OR=0.884: 95%CI of OR=0.615-1.270, P>0.05]. The following (***Tables 5 and 6***) indicate summary of these findings

Table 5: ODDS of Facility Breast Cancer Screening at Baseline (Crude)

Variables in the Equation								95% C.I. for EXP(B)	
Study Phase		B	S.E.	Wald	df	Sig.	Exp(B)	Lower	Lower
Baseline Step 1a.	Have you ever sought breast cancer screening services?	-.112	.153	.539	1	.463	.894	.662	1.206
	Constant	.039	.085	.216	1	.642	1.040		

a. Variable(s) entered on step 1: Have you ever sought breast cancer screening services?

Table 6: ODDS of Facility Breast Cancer Screening at Baseline (Adjusted)

Variables in the Equation								95% C.I. for EXP(B)	
Study Phase		B	S.E.	Wald	df	Sig.	Exp(B)	Lower	Upper
Baseline Step 1a.	Have you ever sought breast cancer screening services?	-.123	.185	.443	1	.506	.884	.615	1.270
	Age of respondent	.924	.160	33.185	1	.000	2.518	1.839	3.448
	Number of children of respondent	-.523	.115	20.647	1	.000	.593	.473	.743
	Level of education of respondent	-.860	.143	35.962	1	.000	.423	.320	.561
	Primary Occupation of respondent	.225	.161	1.961	1	.161	1.252	.914	1.716
	Marital status	.599	.158	14.334	1	.000	1.820	1.335	2.482
	Total monthly household income	.000	.000	21.857	1	.000	1.000	1.000	1.000
	Constant	-1.718	.532	10.435	1	.001	.179		

a. Variable(s) entered on step 1: Have you ever sought breast cancer screening services?

A comparison of end term survey results with baseline survey results indicated that the odds of seeking health facilities for breast cancer screening services were higher in intervention sites compared to control site. Women in the intervention site were 3.6 and 4.5 times more likely to seek health facility breast cancer screening services than control site in the crude and adjusted odds respectively [(crude OR = 3.604: 95% CI of OR = 2.698 - 4.813, $P < 0.05$) (Adjusted OR = 4.458: 95% CI of OR = 3.204- 6.202, $P < 0.05$)]. The following *Tables (7 and 8)* indicate summary of these findings

Table 7: ODDS of Facility Breast Cancer Screening at End Term Survey (Crude)

Variables in the Equation								95%C.I. for EXP(B)	
Study Phase		B	S.E.	Wald	df	Sig.	Exp(B)	Lower	Upper
End-term (8 Months) Step 1a	Have you ever sought breast cancer screening services?	1.282	.148	75.416	1	.000	3.604	2.698	4.813
	Constant	-.659	.107	38.030	1	.000	.518		

***a. Variable(s) entered on step 1:** Have you ever sought breast cancer screening services?*

Table 8: ODDS of Facility Breast Cancer Screening at End Term Survey (Adjusted)

Variables in the Equation								95%C.I. for EXP(B)	
Study Phase		B	S.E.	Wald	df	Sig.	Exp(B)	Lower	Upper
End-term (18 Months) Step 1a.	Have you ever sought breast cancer screening services?	1.495	.168	78.695	1	.000	4.458	3.204	6.202
	Age of respondent	.516	.171	9.063	1	.003	1.675	1.197	2.345
	Number of children of respondent	-.371	.131	8.074	1	.004	.690	.534	.891
	Level of education of respondent	-.420	.134	9.826	1	.002	.657	.506	.854
	Primary Occupation of respondent	-1.329	.203	42.779	1	.000	.265	.178	.394
	Marital status	.212	.152	1.962	1	.161	1.236	.919	1.664
	Total monthly household income	.000	.000	45.003	1	.000	1.000	1.000	1.000
	Constant	.408	.425	.924	1	.336	1.504		

a. Variable(s) entered on step 1: Have you ever sought breast cancer screening services?
Age of respondent, Number of children of respondent, Level of education of respondent, PrimaryOccupation of respondent, Marital status, Total monthly household income.

Discussion

The key highlights in this data suggest that there was a significant increase in intervention site compared to control site by the end of the 8 months CBHE intervention. Data showed that. the proportion of women seeking facility-based breast cancer screening services significantly increased by 38% in the intervention site. A DiD statistic also reported a net increase in the same proportion by 33.3%.

Incidentally, there was no significant difference in the odds of women who sought health facility-based

breast cancer screening services between intervention and control at baseline. However, in the end term survey the odds of seeking facility-based breast cancer screening services were still higher (4 times higher after adjusting for potential confounding factors (social-demographic characteristics)) in intervention site compared to the control. This affirms only one possibility that, the health education intervention led by Community Health Workers (CHWs) was effective by increasing awareness on the importance in Kitui thus, resulting to increased uptake of health facility-based breast cancer screening services.

These findings are supported by a study conducted in South Korea which established that a community-based intervention improved knowledge on breast cancer and increased uptake of breast cancer screening services [17]. A recent systematic review published in the European Journal of Public Health in which evidence from 22 studies was reviewed also established that community based health promotion interventions helped in improving breast cancer knowledge and increasing uptake of breast cancer screening services [2]. Another study conducted in Iran revealed that health education intervention was effective in improving utilization of breast cancer screening services among women of reproductive age [18]

A study in southern Dallas which evaluated a Community based intervention aimed at promoting breast cancer awareness and screening also established higher odds in uptake of breast cancer screening services in intervention groups compared to control groups [5]. All these findings provide adequate evidence suggesting that community-based health promotion interventions targeting cancer prevention are more likely to be effective in promoting uptake of breast cancer screening services within the communities they are implemented. These reports support the findings in this study.

Conclusion and Recommendations

The Community Based Health Education Intervention (CBHEI) increased the proportion of women seeking facility-based breast cancer screening services significantly by 38% in the intervention site. A Difference in Differences statistic indicated 33.3% net increase in the proportion of women who sought breast cancer screening services within the 8-month intervention period. Regression analysis indicated that the odds of seeking breast cancer screening services were higher (4.5 times higher) [(crude OR=3.604: 95%CI of OR=2.698-4.813, P<0.05) (Adjusted OR=4.458: 95%CI of OR=3.204-6.202, P<0.05)] in intervention site compared to control site. In overall, the CBHE intervention improved breast cancer screening among women of reproductive age. To reduce the high prevalence of breast cancer and the economic burden of treating breast cancer cases in Kenya, we recommend adoption of Community-based strategies like CBHE that help in promoting early screening of breast cancer among women of reproductive age.

Competing Interests

The authors declare no competing interest.

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Knowledge Levels of Breast Cancer Among Women of Reproductive Age in Kenya, a Case Study of Kitui County

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Abstract: Background: Breast cancer is one of the leading causes of mortality among women in the world today. Therefore there is need for concerted efforts to advance interventions that seek to mitigate challenges associated with its screening. In Kenya, breast cancer accounts for 23% of cancerous diseases that affect women. The purpose of this study was to determine the knowledge levels on breast cancer among women of reproductive age in Kitui County, roll out community based health education intervention (CBHI) targeted at enhancing breast cancer knowledge, and finally to assess the effect of the CBHI on knowledge levels. Methods: The study design adopted was quasi-experimental. This was adopted because it enables researchers to evaluate causal relationships when interventions or agents of causation are induced. This study was undertaken with the causal mechanism being the rollout of CBHI and the impact in knowledge of breast cancer. Two groups were evaluated; intervention and control groups. The knowledge among these groups was evaluated between two time intervals; end line and at baseline. Data was collected using questionnaire instruments, analyzed using SPSS v23 and presented in form of tables and frequencies. Inferential analysis was achieved through binary logistic regression and Difference in Difference scores. Results: The individual score analysis on different aspect of breast cancer knowledge and awareness indicated that there was a direct positive impact of the CBHI on the knowledge on breast cancer among the respondents. Significant changes observed upon the implementation of CBHI on breast cancer included; respondents in the intervention group who knew at least two danger signs for breast cancer increased to 3.8 (Adj. OR=3.895, P<0.05, 95%CI: 2.538-5.979), those who knew the age related risks associated with breast cancer increased by 4.1 (Adj. OR=4.128, P<0.05, 95%CI: 2.940-5.797), and finally, those who knew at least one Breast cancer screening method increased 7 fold among the intervention group after the rollout of CBHI (Adj. OR=7.011, P<0.05, 95%CI: 4.138-11.880). Conclusion: The impact of CBHI on knowledge of breast cancer was significant. As a result, more people in the intervention group were cognizant of different warning signs of breast cancer, breast cancer screening methods, and that these opportunities facilitate early detection of breast cancer. The actionable strategies recommended by this study is implementation of community based strategies to enhance knowledge levels on breast cancer in order to improve screening uptake and therefore early detection of breast cancer.

Keywords: Breast Cancer Knowledge, Mammogram, Screening, Danger Signs, Community Based Health Intervention

1. Introduction

Critical health infrastructure in developing countries remains a cause for concern especially regarding female sexual reproductive health and health matters in general. Consequently, there are inherent challenges relating to the detection mechanisms associated with the various cancerous diseases. Breast and cervical cancer are two among many other types of cancer diseases that affect women globally. Prolla, Silva, Netto, Goldim, & Ashton-Prolla [1] noted that breast cancer is one of the leading causes of mortality for

women in the world over. Further, the epidemiological excerpts reviewed indicate that proportion of breast cancer to the total cancerous diseases associated with women in Kenya was at 23% [2]. In addition to this finding, [2] it was established that one of the inhibiting factor to treatment for breast cancer patients in Kenya is delayed access to diagnostic services or lack thereof. Much as such burdens are visibly heavy on low-income countries, the USA, for instance, has approximately 200,000 women diagnosed with breast cancer annually [3]. The report further noted that the number of deaths recorded every year as reported in 2014 was estimated at 40,000 deaths every year.

The incidence of the disease is geographically diverse and other factors exist that determine these occurrences. Prolla, Silva, Netto, Goldim, & Ashton-Prolla [1] noted that the incidence rates observed for Brazil were estimated at 52 cases per hundred thousand. Kenya was estimated to have an incidence of 44 infections per 100,000 people. Much as Brazil had an incidence of 52 per 100,000, other developed regions such as Northern Europe had a higher incidence of about 84 per 100,000 of the population of interest [4]. A sharp contrast is depicted by the statistics since the trio reported that 60% of all mortalities associated with breast cancer are from developing countries like Brazil and Kenya among others. One of the reasons attributed to this is because of low uptake of breast cancer screening. Further, low knowledge levels and inadequate access to diagnostic services also contribute to this.

Several barriers exist especially in rural populations because of lack of adequate knowledge. In Nebraska, it was established that despite the relatively high uptake of mammogram test, instances of late diagnosis and treatment was more in the rural areas than in the urban settings [2]. There are several breast cancer diagnostic approaches that cover both clinical and non-clinical diagnostic procedures. According to Sayed, et al [2], people residing in rural area have minimal knowledge with regard to the screening and diagnostic approaches. Breast self-examination (BSE) for instance was the least used screening method as people did not have information on how to conduct BSE. Further, early detection of cancer was found to be lacking in most of the areas included in their research. One of the reasons cited for this shortcoming is that most of the women did not have access to formal education. Further, the referral infrastructure tracking individuals requiring mammography or further treatment after identification was found to be lacking [2]. This paper seeks to evaluate the knowledge of breast cancer, screening approaches employed in its identification and further determine the effect that a Community Based Health Education Intervention (CBHI) would have on the knowledge levels.

2. Methods

2.1. Study Location

This study was conducted in Kitui County between March 2018 and April 2019. It was undertaken in the two sub-counties of Kitui East and Mwingi West. Kitui East formed the intervention group while Mwingi West was the Control group.

Table 1. Demographic Characteristics of the respondents.

Variable	Categories	Baseline Survey				End term Survey (8 months)			
		Control		Intervention		Control		Intervention	
		F	%	F	%	F	%	F	%
Age	16-20 years	12	3.0	0	0	20	4.9	21	5.1
	21-25 years	63	15.7	31	7.7	76	18.8	64	15.6
	26-30 years	134	33.3	106	26.2	117	28.9	112	27.4
	31-35 years	139	34.6	149	36.9	138	34.1	132	32.3
	36-40 years	50	12.4	113	28.0	54	13.3	80	19.6
	41-45 years	4	1.0	5	1.2	0	0	0	0
	Total	402	100	404	100	405	100	409	100
Parity	1 Child	23	5.7	12	3.0	30	7.4	13	3.2
	2 children	22	5.5	15	3.7	13	3.2	19	4.6
	3 children	58	14.4	60	14.9	67	16.5	64	15.6
	4 children	124	30.8	105	26.0	89	22.0	122	29.8
	5 children	89	22.1	93	23.0	99	24.4	99	24.2
	6 children	70	17.4	63	15.6	82	20.2	65	15.9
	7 and above	16	4.0	56	13.9	25	6.2	27	6.6
	Total	402	100	404	100	405	100	409	100
Education Level	No education	10	2.5	33	8.2	5	1.2	27	6.6
	Primary level	80	19.9	138	34.2	112	27.7	96	23.5
	Secondary level	227	56.5	143	35.4	167	41.2	206	50.4
	College/ University	85	21.1	90	22.3	121	29.9	80	19.6
	Total	402	100	404	100	405	100	409	100
Occupation	Not working	10	2.5	7	1.7	15	3.7	29	7.1
	Peasant Farmer	227	56.5	201	49.8	222	54.8	223	54.5
	Business	114	28.4	102	25.2	101	24.9	99	24.2
	employment	51	12.7	94	23.3	67	16.5	58	14.2
	Total	402	100	404	100	405	100	409	100

Variable	Categories	Baseline Survey				End term Survey (8 months)			
		Control		Intervention		Control		Intervention	
		F	%	F	%	F	%	F	%
Marital Status	Single	31	7.7	18	4.5	34	8.4	33	8.1
	Married	344	85.6	297	73.5	327	80.7	310	75.8
	Widowed	17	4.2	65	16.1	26	6.4	48	11.7
	Separated/ Divorced	10	2.5	24	5.9	18	4.4	18	4.4
	Total	402	100	404	100	405	100	409	100

Table 2. Monthly Income.

Total monthly household income (Baseline)		
Control	N	402
	Mean	4267.41
	Median	2500.00
	Mode	2000
	Std. Deviation	4691.081
	Minimum	500
	Maximum	25000
Intervention	N	404
	Mean	5875.00
	Median	4000.00
	Mode	2500
	Std. Deviation	4274.669
	Minimum	1000
	Maximum	22000
Total monthly household income (End line)		
Control	N	405
	Mean	4343.21
	Median	2500.00
	Mode	2000
	Std. Deviation	4665.227
	Minimum	500
	Maximum	24000
Intervention	N	409
	Mean	5374.08
	Median	3500.00
	Mode	3000
	Std. Deviation	5235.687
	Minimum	0
	Maximum	26000

2.2. Study Design and Study Population

The study adopted a quasi-experimental design. The design was deemed appropriate because of its dichotomous approach of evaluating more than one group of respondents on a phenomenon. It is particularly important in defining the causal relationships between certain health issues by comparing how impactful interventions employed in controlled trials are [5]. In this particular case, the study sought to evaluate the knowledge levels of breast cancer at baseline and at end line after implementation of the CBHI. The classification of the response set was done such that there was a control and study or intervention group. The instances of measurement was done at two different intervals with a selection of the two groups done at the onset of the study. The study was designed to have a pre-intervention survey and a post intervention survey. A number of select variables were studied and changes in the variables recorded on the underpinnings of time and variations in the variables that were of interest to the researcher. In order to gravitate towards a more impactful assessment of the intervention, two sub-counties were selected in order to ensure that there was a buffer zone between them. The zoning helped eliminate biases accounted for by inter-sub-county migration.

3. Results

3.1. Demographic Characteristics of the Sample

An analysis on the level of income revealed that the mean monthly household income was relatively low among the control group (M=4267.62, SD=4692.08) compared to the intervention group respondents (M=5875.00, SD=4274.67). The high standard deviation from the mean indicates that there was a huge variation in the levels of income reported by different respondents within the study cohorts. The minimum amount in the level of income reported in the control group was 500 Kenyan Shillings while the highest income reported in the same category was 25,000 Kenyan Shillings. The intervention group minimum income was 1,000 Kenyan Shillings while the maximum was 22,000 Kenyan shillings. Both groups exhibited a wide range in terms of the levels of income and hence the high degree of dispersion from the means attributed to both groups. See Table 2.

At end line, the distribution of mean monthly household income was found to be higher in the intervention group (M=5374.08, SD=5235.687) than in the control group (M=4343.21, SD=4665.227). The minimum income reported for the control group was KSh. 500 with the intervention reporting a minimum of zero income. However, the maximum income differed slightly for both groups with the reported maximum for control being KSh. 24,000 while the intervention group was KSh. 26,000. See Table 2.

Besides the distribution of income, other defining characteristics of the population were analyzed. They included the age distribution of the respondents, marital status, parity, occupation, and the level of education. In terms of age distribution for the intervention and control groups, a general deduction made was that majority of the respondents were aged between 26 and 40 years of age. However, the age-group with the greatest proportion of respondents were aged 31-35 years. This observation was made across intervention and control group respondents for both baseline and end line evaluation respectively. Majority of the respondents reported their parity to be between 4 and 5 children. Most respondents reported their highest level of education as secondary. However, it was noted as presented in Table 1 that there were more people also recording lower levels of education. This seemed to influence the occupation of the individuals. At baseline, most of the respondents reported their occupation as peasant farmers at 56% and 49.8% among the control and

intervention groups respectively. During the end term survey, 54.8% of respondents in the control arm and 54.5% in the intervention group reported that they were peasant farmers. Finally, over 70% of the respondents sampled indicated that they were married as shown in Table 1.

3.2. Level of Breast Cancer Knowledge Among Women of Reproductive Age

Table 3 shows the results on the evaluation of danger signs of breast cancer knowledge among women of reproductive age. The level of knowledge on danger signs of breast cancer was deduced based on whether they knew at least two danger signs of breast cancer. The proportion of respondents who knew at least two danger signs of breast cancer was found to be near equal in proportion for both control and intervention groups at 59.5% (239) and 59.2% (239) respectively. Therefore, at baseline, there was minimal differences in breast cancer knowledge between the intervention and control groups. This is partly informed by the fact that no intervention had been initiated and that both groups had similar characteristics. An adjustment against various demographic indicators and probable determinants of the levels of knowledge on breast cancer was done using the binary logistic regression. This was preceded by a crude odds ratio analysis.

Table 3. Knowledge of breast cancer danger signs (Baseline).

Site	Baseline Survey	
	Mothers Knows at least 2 danger signs of Breast cancer	
	Frequency	%
Intervention site	239/404	59.2
Control Site	239/402	59.5

No significant differences were established from the binary logistic regression between the intervention and control group respondents at baseline (Crude OR=0.988, P>0.05, 95%CI of OR: 0.746-1.308). After adjusting for sociodemographic characteristics (Age, Number of children, Level of education, Primary Occupation, Marital status and total monthly household income) as potential confounders, it was established that there was no significant difference in the odds of respondents who knew at least two danger signs of breast cancer between intervention and control (Adj. OR=1.008, P>0.05, 95%CI of OR: 0.699-1.455). See Table 4.

Table 4. Danger signs of breast cancer at Baseline survey in Intervention Vs Control.

Baseline Survey	Crude vs Adj.	Sig.	OR	95% CI
Intervention Vs Control (Kitui East Vs Mwingi West)	Crude OR	0.932	0.988	0.746-1.308
	Adjusted OR	0.965	1.008	0.699-1.455

3.3. Knowledge on Age at Risk of Developing Breast Cancer

Table 5 presents results on the knowledge of age-related risk of developing breast cancer among respondents in both the intervention and control groups at baseline. Respondents were assessed on their knowledge of the age that is at risk of developing breast cancer. It was established that more respondents in the control group (211, 52.2%) had knowledge of the age at risk of developing breast cancer compared to 193 (47.8%) in the intervention group.

Table 5. Knowledge on age at Risk of Developing Breast Cancer.

Site	Baseline survey Mother Knows the age at risk of developing Breast cancer	
	Frequency	%
Intervention site	193/404	47.8
Control site	211/402	52.5

Binary logistic regression was undertaken that sought to achieve two measures. One was to evaluate the difference between the comparison groups based on crude odds ratio, while the second was made on the basis of adjusted odds ratio. The adjustment was made on the basis of the various demographic components that the study presumed to have an effect on the knowledge of breast cancer. The odds of respondents who knew the age at risk of developing breast cancer between intervention and control were not statistically significant (Crude OR=0.828, P>0.05, 95%CI of OR: 0.628-1.092) at baseline. This means that there was no difference between the two groups because they had the same characteristics. The adjusted odds ratio on the other hand was also statistically non-significant meaning that there was no significance difference in the knowledge on age related risks of developing breast cancer between the two comparison groups (Adj. OR=0.782, P>0.05, 95%CI of OR: 0.565-1.084). See Table 6.

Table 6. Odds of knowledge on age at Risk of Developing Breast Cancer at Baseline survey in Intervention Vs Control.

Baseline Survey	Crude vs Adj.	Sig.	OR	95% CI
Intervention Vs Control (Kitui East Vs Mwingi West)	Crude OR	0.181	0.828	0.628-1.092
	Adjusted OR	0.140	0.782	0.565-1.084

3.4. Knowledge of at Least one Breast Cancer Screening Method

Table 7 presents the results of respondents who were aware of at least one breast cancer screening method. At baseline, an evaluation was made on the respondents' knowledge of at least one breast cancer screening method. Majority of respondents in both the control group (62.2%, 253) and intervention group (62.9%, 386) indicated that they were aware of at least one method of breast cancer screening.

Table 7. Mother Knows one breast cancer screening method.

Site	Baseline survey	
	Mother knows one Breast cancer screening method	
	Frequency	%
Intervention site	253/404	62.6
Control site	253/402	62.9

The binary logistic regression undertaken showed no significant statistical relationship between the intervention and control group respondents at baseline on the knowledge of at least one breast cancer screening method. An analysis of the crudes odds ratio between the two groups was found to be statistically non-significant (Crude OR=0.987, P>0.05, 95%CI of OR: 0.742-1.313). The adjusted odds also did not reveal a statistically significant difference between the two comparison groups (Adj. OR=0.982, P>0.05, 95%CI of OR: 0.686-1.406). See Table 8.

Table 8. Odds of knowledge on at least one Breast cancer screening method (Baseline).

Baseline Survey	Crude vs Adj.	Sig.	OR	95% CI
Intervention Vs Control	Crude OR	0.927	0.987	0.742-1.313
(Kitui East Vs Mwingi West)	Adjusted OR	0.921	0.982	0.686-1.406

3.5. Effect of Community Based Health Intervention on Breast Cancer Knowledge

To determine whether there was a difference in knowledge between the control and intervention groups at baseline and end line respectively, a binary logistic regression model was used that provided for both crude and adjusted ODDS ratio. The adjusted ODDS ratio was done for Age, Number of children, and Level of education, Primary Occupation, Marital status and total monthly household income as potential confounders.

Null hypothesis: There is no significant difference in the odds of respondents who have knowledge on breast cancer in the intervention arm at end-term survey compared to baseline survey.

3.5.1. Effect of the CBHI on Knowledge on Danger Signs of Breast Cancer

The proportion of respondents who knew at least two danger signs of breast cancer were found to be near equal in proportion for both control and intervention groups at 59.5% (239) and 59.2% (239) respectively at baseline. During the end line evaluation, there were more respondents in the intervention group (358, 87.5%) that were aware of at least two danger signs of breast cancer than there were in the control group (298, 73.6%). See Table 9.

Table 9. Comparison of Knowledge of at least 2 Danger Signs of Breast Cancer (Baseline and end term) for intervention and control groups.

Survey	Intervention site		Control Site	
	Mothers Knows at least 2 danger signs of Breast cancer			
	Frequency	%	Frequency	%
Baseline	239/404	59.2	239/402	59.5
End-Term (8 months)	358/409	87.5	298/405	73.6

A binary logistic regression analysis conducted at end line after the Community Based Health Education Intervention was rolled out, indicated a significant difference in the odds of knowledge on danger signs for breast cancer between the intervention and control. The intervention group respondents were 2.520 times more likely to know at least two danger signs of breast cancer than the control group respondents. (Crude OR=2.520, P<0.05, 95%CI of OR: 1.746-3.639)

After adjusting for sociodemographic characteristics (Age, Number of children, Level of education, Primary Occupation, Marital status and total monthly household income) as potential confounders, the odds of respondents in the intervention group who knew at least two danger signs for breast cancer increased to 3.8 (Adj. OR=3.895, P<0.05, 95%CI: 2.538-5.979).

Table 10. Comparison of Odds of knowledge on danger signs of breast cancer.

Surveys	Crude & Adj.	Sig	OR	95%CI
Baseline Survey	Crude	0.932	0.988	0.746-1.308
	Adjusted	0.965	1.008	0.699-1.455

Surveys	Crude & Adj.	Sig	OR	95%CI
End term Vs Baseline (Hypothesis test)	Crude	0.000*	2.520	1.746-3.639
	Adjusted	0.000*	3.895	2.538-5.979

Table legend: * means test statistic is significant at P<0.05.

3.5.2. Effect of the CBHI on Knowledge on Age at Risk of Developing Breast Cancer

Regarding knowledge of the age that is at risk of developing breast cancer, it was established that more respondents in the control group (211, 52.2%) had knowledge of the age at risk of developing breast cancer compared to 193 (47.8%) in the intervention group as indicated in Table 11. Knowledge on the age at risk of developing breast cancer was found to have increased in proportion at end line compared to baseline. At end line, those who reported to have knowledge on age at risk of developing breast cancer was 306 (74.8%) compared to 193 (47.8%) in the intervention group at end line and baseline respectively. The proportion of the control group respondents reporting to have knowledge of age at risk of developing breast cancer was 194 (47.9%).

Table 11. Comparison of knowledge on age at Risk of Developing Breast Cancer between baseline and end term survey among intervention and control.

Survey	Intervention site		Control Site	
	Mother Knows the age at risk of developing Breast cancer			
	Frequency	%	Frequency	%
Baseline	193/404	47.8	211/402	52.5
End-Term (8 months)	306/409	74.8	194/405	47.9

Binary logistic regression analysis conducted at end line indicated a significant difference in the odds of knowledge on age at risk of developing breast cancer between the intervention and control. The intervention group respondents were 3.2 times more likely to know the age at Risk of Developing Breast Cancer than the control group respondents. (Crude OR=3.231, P<0.05, 95%CI of OR: 2.402-4.346) After adjusting for sociodemographic characteristics (Age, Number of children, Level of education, Primary Occupation, Marital status and total monthly household income) as potential confounders, the odds of respondents in the intervention group who knew age at risk of developing breast cancer increased to 4.1 (Adj. OR=4.128, P<0.05, 95%CI: 2.940-5.797).

The following table (Table 12) shows a comparative summary of the odds of knowledge on age at risk of developing breast cancer between baseline survey and end-term surveys in both intervention and control sites. The hypothesis test statistic is in bold.

Table 12. Comparison of the Odds of knowledge on age at risk of developing breast cancer between baseline and end line.

Surveys	Crude & Adj.	Sig	OR	95%CI
Baseline Survey	Crude	0.181	0.828	0.628-1.092
	Adjusted	0.140	0.782	0.565-1.084
End term Vs Baseline (Hypothesis test)	Crude	0.000*	3.231	2.402-4.346
	Adjusted	0.000*	4.128	2.940-5.797

Table legend: * means test statistic is significant at P<0.05.

3.5.3. Effect of the CBHI on Mothers' Knowledge of at Least One Breast cancer Screening Method

At baseline, majority of the respondents in both the control group (76.8%, 311) and intervention group (94.4%, 386) indicated that they were aware of at least one method of breast cancer screening. At end line, almost all the respondents in the intervention group were aware of at least one breast cancer screening method (386, 94.4%). The control arm had 311 (76.8%) of its respondents reporting to be aware of at least one method of breast cancer screening. See *Table 13*.

Table 13. Comparison on knowledge of at least one Breast Cancer Screening method between baseline and end line survey for both intervention and control.

Survey	Intervention site		Control Site	
	Mother knows one Breast cancer screening method			
	Frequency	%	Frequency	%
Baseline	253/404	62.6	253/402	62.9
End-Term (8 months)	386/409	94.4	311/405	76.8

Table legend: * means test statistic is significant at P<0.05.

A binary logistic regression analysis at end line indicated a significant difference in the odds of knowledge on at least one breast cancer screening method between the intervention and control. Therefore the intervention group respondents were 5.0 times more likely to know at least one Breast cancer screening method than the control group respondents (Crude OR=5.073, P<0.05, 95%CI of OR: 3.139-8.196).

After adjusting for sociodemographic characteristics (Age, Number of children, Level of education, Primary Occupation, Marital status and total monthly household income) as

potential confounders, the odds of respondents in the intervention group who knew at least one Breast cancer screening method increased to 7.0 (Adj. OR=7.011, P<0.05, 95%CI: 4.138-11.880). The following table (*Table 14*) shows a comparative summary of the odds of knowledge of at least one Breast cancer screening method between baseline survey and end-term surveys in both intervention and control sites. The hypothesis test statistic is in bold.

Table 14. Comparison of the Odds of knowledge on at least one Breast cancer screening method between baseline and end line.

Surveys	Crude & Adj.	Sig	OR	95%CI
Baseline Survey	Crude	0.927	0.987	0.742-1.313
	Adjusted	0.921	0.982	0.686-1.406
End term Vs Baseline (Hypothesis test)	Crude	0.000*	5.073	3.139-8.196
	Adjusted	0.000*	7.011	4.138-11.880

Table legend: * means test statistic is significant at P<0.05.

Hypothesis Testing: Based on the results of the above three domains, the null hypothesis was rejected and the alternative hypothesis (In the intervention arm, there was a significant difference in the odds of respondents who have knowledge on breast cancer at end-term survey compared to baseline survey) was accepted.

3.5.4. Screening Services Provided in the County for Breast Cancer

The study further sought to establish the capacity of health care facilities in the provision of breast cancer screening services. The Kitui County Referral hospital was the main reference point, as it is the main facility that most patients are referred in case of screening for breast and / or cervical cancer. Through information obtained from the health care workers it was indicated that the following services were available for breast cancer screening: Breast exam, Breast ultra sound and removal of biopsy for testing.

One of the main challenges that the study established with regard to breast cancer services was the lack of sufficient technologies to facilitate proper diagnosis and treatment. In the case of Kitui County, services such as mammography which is instrumental in diagnosing breast cancer were not available. These services serve a big role in complementing the traditionally acclaimed methods of breast cancer screening.

Past records in the hospital, as reported by one of the healthcare givers, indicated that the level of uptake of breast cancer services was considerably low. For instance, records covering the past four months at baseline study showed that only 151 clients had been screened for breast cancer. Even though this number was considerably high as per the hospital records, it did not match up the population dynamics within the county.

Even though the diagnostic technologies remains a persistent challenge, low awareness and knowledge levels on cervical and breast cancer were the main impediments to the uptake of the services. Besides being unaware of the availability of these services in the Referral Hospital, most of the women had low risk perceptions associated with breast cancer. This implies that most women do not attempt to seek screening for breast cancer and therefore a delay in early detection. It is imperative that women of reproductive age undertake regular checks to improve the chances of early detection of precancerous lesions, which can be managed early before progressing to late stages of the disease whose prognosis is poor.

The study therefore proposed that there is need to sensitize the community on the available services for screening of breast cancer to enhance uptake. Community Health Extension workers (CHEWs) and Community Health Volunteers (CHVs) were proposed as the best resource persons for sensitizing the community. The modes of sensitization proposed ranged from outreaches, one on one facilitation, use of IEC materials, health education in the health care facilities, social media, and use of mainstream media.

4. Discussions and Findings

The primary objective of this extract is to determine the knowledge levels of breast cancer among women of reproductive age. To assess the levels of knowledge, a baseline study was done. Two groups of respondents were selected to participate in the study with two study timelines drawn to facilitate ease of comparison. At baseline, two groups were defined: a control group and an intervention group with the intention of introducing the CBHI (Community Based Health Education Intervention). A determination was made on the basis of knowledge levels obtained from the baseline study in order to deduce the extent to which the intervention would influence the levels of knowledge on breast cancer at end line.

The CHBI was developed as informed by the baseline findings and further informed by a validated United Kingdom breast cancer awareness module developed specifically to enhance breast cancer awareness. The knowledge level for breast cancer was determined in reference to the following indicators: knowledge on danger signs of breast cancer, age related risk of developing breast cancer and knowledge of at least two breast cancer screening methods

At baseline, the level of knowledge of the respondents was significantly low. Results indicated that the levels of knowledge on danger signs of breast cancer stood at 59.2% among the intervention group at baseline. Further, there was no difference between the intervention and the control group respondents when asked on whether they knew at least two danger signs of breast cancer [(Crude OR=0.988, P>0.05, 95%CI of OR: 0.746-1.308) (*Adj.* OR=1.008, P>0.05, 95%CI of OR: 0.699-1.455)]. The introduction of CBHI programmes

increased the levels of awareness of breast cancer by 38% in the intervention site with a Z score test indicating that this change in proportions was significant (Z score=10.8466, $P<0.05$).

At baseline, knowledge level on at least two danger signs of breast cancer was found to be average at 59% and near equal in proportion for both control and intervention groups. With regard to knowledge on age related risk of developing breast cancer, this was found to be slightly higher among the control compared to intervention at 52.5% and 47.8% respectively. Respondents in both arms were found to have above average (62%) knowledge on at least one breast cancer screening method. For the three domains, there was no difference in the odds of knowledge among the intervention and control groups at baseline. These findings are consistent with those of a cross-sectional study conducted in Southern and Northern geopolitical zones of Nigeria to determine awareness of Breast and Cervical Cancer among Women in the Informal Sector in Nigeria which established that while women are familiar with breast cancer, little is known about cervical cancer, and the awareness of the former is not correlated with participation in screening [6].

After the roll out of the CBHI program, the levels of knowledge on the said indicators increased for both the control and intervention groups. It was however observed that the intervention group proportions had a significant increase in knowledge levels compared to the control (those that were not offered CHBI). Whereas the odds of knowledge on danger signs of breast cancer between the control and the intervention groups were not statistically significant at baseline, the intervention group was 3.8 times more likely to understand at least two danger signs of breast cancer compared to the control group respondents at end line.

Similarly, the CBHI was found to increase knowledge levels on age related risk associated with breast cancer development and knowledge of breast cancer screening methods. At baseline, there was no significant difference in knowledge levels on age related risk for breast cancer among the intervention and control groups. However, at end line, there was an increase in knowledge on age related risk with respondents in the intervention group having increased knowledge by an odds of 4.00 compared to the control group that did not receive any intervention. Knowledge on at least one breast cancer screening method increased by 7.00 fold among the intervention compared to the control group at end line. This is a clear indication that the Community based intervention increased the knowledge levels on breast cancer among women of reproductive age in Kitui County.

These findings are consistent with those of a study conducted in South Korea which established that a community-based intervention improved knowledge on breast cancer and increased uptake of breast cancer screening services [7]. A recent systematic review published in the European journal of public health in which evidence from 22 studies was reviewed also established that community based health promotion interventions helped in improving breast cancer knowledge and increasing uptake of breast cancer screening services [8].

Access to primary screening services for breast cancer remains a challenge to advancing maternal health in Africa and in Kenya. According to a research conducted by CDC [3], knowledge on breast cancer screening methods reduced the fatalities associated with it. This is because early detection using tests such as the mammogram tests and other tests have drastically reduced deaths attributed to the disease by facilitating early detection and treatment.

These findings also concur with a study to determine the impact of breast cancer knowledge on service uptake among women in the UK [7]. There was a strong association between breast cancer knowledge and access to breast cancer screening. It is on the basis of this that the number of individuals that accessed breast cancer services increased with the rollout of the CBHI program.

The effect of the CBHI compares with those of studies conducted in over 10 countries where the CHWs and CHVs were involved in rolling out Maternal and Child Health (MCH) programs. Home visitations by the two groups of care providers were found to have increased MCH in the countries where the community programs were rolled out [9].

Further, a study conducted in rural Bangladesh to establish whether community level interventions have an impact on utilization of maternal health care established that the intervention increased utilization of antenatal care. This study concluded that in order to sustain increased utilization of these services, there was need to have a continuous provision of free home based services in the communities living in Rural Bangladesh [10].

A similar study conducted in Bangladesh to assess a Community Health Worker innovation aimed at achieving universal health coverage demonstrated that it was possible to achieve exceptional MCH outcomes despite economic poverty by using a Community Health Worker led program to provide MCH services such as; family planning, immunization, oral rehydration therapy, vitamin A supplementation and other services [10].

The study established that Kitui County Referral hospital was the main reference point, as most patients are referred in case of screening for either breast and / or cervical cancer. It was established that the main services offered for breast cancer screening included Clinical Breast examination, Breast ultra sound and removal of biopsy for testing.

However, the facility did not have modern screening equipment for breast cancer. It was further established that only few staff have knowledge and expertise on screening for breast cancer. This further served as a hindrance to patients seeking breast cancer screening, treatment and care services. Therefore, patients who required advanced treatment were usually referred to facilities outside the County for further treatment and management.

In Kenya, a study conducted on Prevalence and Capacity of Cancer Diagnostics and Treatment: A Demand and Supply Survey of Health-Care Facilities in Kenya targeting 10 counties, indicated that 80% of reported cancer cases were diagnosed at advanced stages. This was mainly attributed to

low awareness of cancer signs and symptoms, inadequate screening services, inadequate diagnostic facilities, and a poorly structured referral system. It further indicated that the country had few cancer specialists concentrated in a few health facilities in Nairobi resulting in long waiting times and thus causing some previously curable tumors to progress to incurable stages. It also indicated that preventive services were very limited at the respective facilities with only preventive vaccinations, breast self-examination, and Pap smear being provided [11].

Similarly, a study on breast and cervical cancer screening: Investing in Health care systems established that the likelihood of breast cancer development in developing countries was found to have a huge variation that is occasioned by the lean infrastructural capacity for the diseases to be diagnosed and treated. Further, the knowledge deficit associated with these services has undermined efforts to detect early, diagnose and treat these diseases [12].

Access to primary screening services for breast cancer remains a challenge to advancing maternal health in Africa and in Kenya. According to a research conducted by CDC [3], knowledge on cervical and breast cancer screening methods reduced the fatalities associated with it.

5. Conclusion

Breast cancer remains one of the major causes of morbidity and mortality among women in the world compared to other cancerous diseases affecting them. Several strategies have been implemented aimed at promoting screening uptake and subsequent management of the same. However challenges still abound both behavioral and infrastructural. In most developing countries, and specifically in Kenya, one of the challenges associated with poor management of these diseases stems from the fact that most people remain uneducated or unaware of these diseases [13]. It was therefore elemental for this study to seek and understand the breast cancer awareness levels to determine the specific packages that would address the various aspects of knowledge of respondents on the disease. Once this was determined, a CBHI program was rolled out and comparison made in terms of knowledge in breast cancer for both control and intervention group respondents at baseline and at end line.

The implementation of CBHI programs yielded quite positive results in terms of educating people about the potential signs and risks associated with the disease. This led to an increase in knowledge on breast cancer as evidenced in the results. The study therefore recommended that in order to promote the uptake of breast cancer services, there is need to equip people with the necessary knowledge. Further, there is need to enhance specific knowledge domains defined within the healthcare curriculum by international bodies such as WHO or that which was adopted for this study. There is also need to consider scale up of community based awareness programs as they have been found to be effective in enhancing knowledge on health matters. This is achieved by identifying the specific grey areas through conducting regular surveys and rolling out targeted interventions. There is therefore need to equip the existing health care facilities with up-to date equipment to facilitate screening and care services.

Finally, it has been established that among the people residing in rural areas, the low level of uptake of breast cancer services was because most people had little faith in conventional medicine [2]. Besides this, the other barrier noted is the financial burden associated with the disease. Rural areas are defined by an overwhelming under-coverage of health insurance among poor patient populations which in turn reduces their ability to seek medical treatment and diagnostic services [14]. The findings of this study indicated that the overall or level of income was significantly low. However, Subramanian et al. [15] reaffirmed that Kenya has underutilized health insurance coverage. It is therefore apparent that such constraining factors associated with health insurance coverage must be addressed to enhance access to breast cancer services.

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Effect of a Community Health Worker Based Health Promotion Intervention on Uptake of Cervical Cancer Screening Services among Women of Reproductive Age in Kitui County, Kenya

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Summary

INTRODUCTION

Cervical cancer is a malignant neoplasm of the cervix uteri. It is the second most common cancer among women worldwide, with an estimated 528,000 new cases and 266,000 deaths among women each year. Cervical cancer is associated with a huge financial and social burden especially in the developing world. Diagnosing cervical cancer at an early stage and providing access to effective treatment is key to reducing its burden. In Kenya, cervical cancer screening is very low at 14%.The aim of this study was to assess the effect of a Community Health Worker (CHW) led health education intervention in promoting uptake of cervical cancer screening in Kitui County-Kenya.

METHODS

The study was carried out in Kitui County. This was a quasi-experiment with one pre-intervention and one post intervention survey conducted in both intervention and control sites. Kitui East and Mwingi West were intervention and control sites respectively. The intervention site received a Community Based Health Education (CBHE) intervention aimed at promoting awareness and screening of both breast and cervical cancer. A total sample size of 422 participants were identified in each survey based on Fisher et al (1998) formula. Purposive and simple random sampling methods were used in identifying study area and study participants respectively.

RESULTS

The CHW led Health education intervention increased the proportion of women who sought cervical cancer screening services by 29.5% over the 8 months of the intervention period.

The odds of seeking cervical cancer screening services were 10 times higher in the intervention site compared to control site respectively [(crude OR=4.051: 95%CI of OR=2.982-5.503, P<0.05) (Adjusted OR=10.307: 95%CI of OR=6.284-16.904, P<0.05].

CONCLUSION AND RECOMMENDATION

The CHW led health education intervention was effective in increasing utilization of cervical cancer screening services in Kitui County. CHWs providing level one health services, therefore, need to integrate cervical cancer awareness and screening messages in their service delivery. This will promote cervical cancer screening and trigger early treatment and management of cervical cancer, hence bringing down the burden of cancer in the country.

Keywords: Cervical cancer, Screening, Community Health Workers, Health Promotion

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Introduction

Cervical cancer is the malignant neoplasm of the cervix uteri. It is the second most common cancer among women worldwide, with an estimated 528,000 new cases and 266,000 deaths among women each year. A disproportionate number of these cases (85 %) and deaths (87 %) occur among women living in low- and middle-income countries. Women living with HIV are at increased risk of developing cervical cancer and experience more rapid progression of the disease (Finocchario-Kessler et al., 2016). While industrialized countries have reduced its incidence by over 70% in the last 50 years, the burden seems to be on the rise in less developed countries. It is expected that the incidence of cervical cancer in developing countries will rise from 444,546 to 588,922 between 2012 and 2025 (Abiodun et al., 2014) and (United Nations, 2019).

Cervical Cancer is a social disease especially of the poor and less educated for whom the risk factors are most prevalent (Abiodun et al., 2014). Research has established that the high mortality rate from cervical cancer globally could be reduced through a comprehensive approach that includes prevention, early diagnosis, effective screening and treatment programmes (Finocchario-Kessler et al., 2016)(Topazian et al., 2016). Screening aims at detecting precancerous changes, which, if not treated, may lead to cancer. Women who are found to have abnormalities on screening need follow-up, diagnosis and treatment, in order to prevent the development of cancer or to treat cancer at an early stage. The World Health Organization (WHO) has reviewed the evidence regarding the possible modalities to screen for cervical cancer to include the following: screening should be performed at least once for every woman in the target age group (30-49 years) when it is most beneficial. HPV testing, cytology and visual inspection with acetic acid (VIA) are all recommended screening tests. Cryotherapy or loop electrosurgical excision procedure (LEEP) can provide effective and appropriate treatment for the majority of women who screen positive for cervical pre-cancer, and screen-and-treat" and "screen, diagnose and treat" are both valuable approaches (World Health Organization, 2014).

Cervical cancer is associated with a huge financial and social burden, particularly in countries where screening programmes are not available. Diagnosing cervical cancer at an early stage and providing access to effective treatment can significantly improve the likelihood of survival. Currently, in many low resource settings, the disease is often not identified until it is advanced or treatment is inaccessible resulting in a higher rate of death from cervical cancer (World Health Organization, 2014). The National Cancer Control Strategy 2017-2022 indicates that, in Kenya cancer is the third most common cause of death after infectious and cardiovascular diseases with cervical cancer contributing 20% of cancer deaths (Ministry of Health, 2017). The Kenya Demographic Health survey 2014 indicates that uptake of cervical cancer screening services is very low at 14%. In the Eastern region of Kenya, only 12.8% have ever had a cervical cancer examination (Kenya National Bureau of Statistics (KNBS) and ICF Macro, 2015).

Engaging Community Health Workers in health service delivery especially in resource poor countries has been found to be effective (Chowdhury et al., 2013)(Chhetry et al., 2005). The World Health Report 2006 argued that community health workers (CHWs) have the potential to be part of the solution to the human resource crisis affecting many countries. CHWs provide a variety of functions, including outreach, counseling and patient home care as well as representing a resource to reach and serve disadvantaged populations. There has been mounting evidence to demonstrate the positive potential of community health workers in improving equitable access to care and health outcomes (World Health Organization and Global Health Workforce Alliance, 2012). In Kenya, CHWs are in level one of the Kenyan healthcare service provision and a central pillar of primary health care delivery at the community level (Kisia et al., 2012). The aim of this study was to assess the effect of a Community Health Worker led health education intervention in promoting uptake of cervical cancer screening services in Kitui County-Kenya.

Materials and Methods

The study was carried out in Kitui County. Kitui county has eight sub-counties namely Kitui rural, Kitui central, Kitui West, Kitui East, Kitui South, Mwingi North, Mwingi West, and Mwingi Central.

This was a quasi-experiment with one pre-intervention and one post intervention survey conducted in both intervention and control sites. Kitui East was the intervention site while Mwingi West was the control site. The intervention site received a Community Based Health Education intervention (CBHEI) targeting on promoting awareness and screening of both breast and cervical cancer. The focus of the CBHEI was to raise awareness and promote early screening of both cervical and breast cancer in the intervention site. Therefore, the intervention was designed following a validated United Kingdom breast and cervical cancer awareness modules (Cancer Research UK, 2010) and (UCL Health Behaviour Research, 2008).

The key elements of the intervention included the following: developing a breast and cervical cancer awareness training curriculum and manual which included awareness of screening methods as well as importance of early breast cancer screening; validation of the training messages and materials; recruiting voluntary Community Health Workers (CHW) and training them on breast cancer awareness and screening; assigning CHWs to train community members in their various jurisdictions (Community Units); and lastly following up to ensure CHWs carry out the trainings.

Purposive and simple random sampling were employed in this study. Purposive sampling was employed to identify the intervention and control sites while simple random sampling was used to identify the study participants. The predicted total population of women in Kitui county by 2018 was 579 230. Total number of women in Kitui East and Mwingi West (Intervention and control site respectively) was 10,187 and 10,639 respectively (Kenya National Bureau of Statistics, 2019). This being over 10,000, sample size was determined as 422 participants based on a formula by Fisher found in (Fisher A.A, Laing J.E, Stoeckel J.E., 1998).

At baseline, a sampling frame of 5320, and 6415 households with a woman of reproductive age was established in intervention and control sites respectively. 422 women were randomly identified from each sampling frame. Data was collected from 402 and 404 women in control and intervention sites respectively. In end term survey a sampling frame of 6124 and 5397 women were identified. After selecting 422 households in both intervention and control, data was collected from 405 and 409 respondents in control and intervention sites respectively. Data was collected using a research assistant-administered questionnaire.

The CHW intervention was the quasi-independent variable while the dependent variable was uptake of cervical cancer screening services. Data analysis was done using frequencies and percentages, Z score tests, and ODDs Ratios. This study was subjected to the Kenyatta National Hospital-University of Nairobi Ethics Review committee (KNH-UON ERC) for ethical review and approval.

Results

Socio Demographic Characteristics

Table 1 at the end of this article represents a summary of the socio-demographic characteristics of the study population.

Uptake of Cervical Cancer Screening Services

At baseline survey, data revealed that 22% and 20.4% of the participants had sought cervical cancer tests in intervention and control sites respectively. At the end time survey this proportion increased to 52.6% in intervention site. In the control site, a slight increase to 21.5% was observed. Table 2 represents a summary of this data.

Z-Score Tests: Change in Proportions of Cervical Cancer Tests

A Z score statistic test conducted to establish if there was any difference in the proportion of participants who sought cervical cancer screening tests at baseline compared to control indicated that in the intervention there was a 30.6% significant increase of participants who sought cervical cancer screening services in the intervention site (Z score =8.9978, $P<0.05$). In the control site, there was a 1.1% increase in the number of women who sought cervical cancer screening services, however, this change was not significant (Z score= 0.3782, $P>0.05$). Table 3 presents a summary of these results.

Difference in Differences (DiD) Tests

A DiD test statistic indicates that there was a net increase of 29.5% of participants who sought cervical cancer screening services in the 8 months period of the intervention. The following equation illustrates the DiD calculations: **(52.6%-22.0%) - (21.5%-20.4%) =29.5%.**

Odds Ratios Indicating Probabilities of Seeking Cervical Cancer Tests in Intervention Site Compared to Control

At baseline survey, a regression analysis established that there was no significant difference in the odds of seeking cervical cancer screening services in both intervention and control sites [(crude OR=1.103: 95%CI of OR=0.786-1.546, P>0.05) (Adjusted OR=1.300: 95%CI of OR=0.841-2.009, P>0.05]. Table 4 and 5 represent a summary of these findings.

A comparison between intervention and control sites at end term survey revealed a significant difference in the odds of utilization of cervical cancer tests among the participants of the two groups. The odds of utilization of cervical cancer tests were higher in intervention site compared to control site in both the crude and adjusted odds ratios. Women in intervention site were 4 and 10 times more likely to seek cervical cancer screening tests in the crude and adjusted odds ratios respectively [(crude OR=4.051: 95%CI of OR=2.982-5.503, P<0.05) (Adjusted OR=10.307: 95%CI of OR=6.284-16.904, P<0.05]. Tables 6 and 7 represent a summary of these findings.

Discussion

The key findings in this study revealed that the intervention increased the proportion of women who sought cervical cancer screening services by 29.5% over the 8 months of the intervention time as shown by the DiD statistic.

The results also revealed that the odds of seeking cervical cancer screening services were 10 times higher in the intervention site compared to control sites. These statistics imply that the intervention was successful in promoting utilization of cervical cancer screening services in the intervention site. This can be justified mostly by the higher odds of utilization of cervical cancer services in intervention site compared to control and also the net increase in the proportion of women utilizing such services in the intervention site over the 8 months of implementation time.

The implication is that CHWs were effective in promoting the importance of seeking cervical cancer services among women of reproductive age in the intervention site and this is the reason why an increase (though not 100% increase) was observed in the intervention site compared to control site.

A systematic review in which researchers reviewed; randomized control trials (43 studies), pre-post with concurrent comparison groups (11 studies), and or pre-post (12 studies) established that interventions engaging CHWs to increase demand and access to cervical cancer screening are not only cost-effective but also promote cancer screening (Community Preventive Services Task Force, 2019).

A scoping literature search of 11 major databases and the grey literature performed between 1978 and 2018 and in which 420 articles screened also revealed that community-based approaches to cervical cancer screening are feasible, although the sociocultural context plays an important role in the acceptability of these interventions. From the 15 studies identified and included in the re- view, CHWs were noted to play a role in community education and awareness raising initiatives, assisting in or conducting screening, and follow-up during the screening process (O'Donovan et al., 2019).

The systematic together with the scoping reviews provide overwhelming evidence suggesting that CHW interventions have been very effective in promoting cervical cancer screening at the community level. This indicates that the findings of this study are consistent with the body of knowledge from findings of other studies conducted in this topic globally.

Conclusion and Recommendations

The CHW led Health education intervention was effective in increasing utilization of cervical cancer screening services in Kitui County. The odds of seeking cervical cancer screening services were 10 times higher in the intervention site compared to control site respectively [(crude OR=4.051: 95%CI of OR=2.982-5.503, P<0.05) (Adjusted OR=10.307: 95%CI of OR=6.284-16.904, P<0.05].

The Ministry of Health of Kitui County and at the national level (Kenya) need to embrace level one health service deliver in order to reduce the burden of cervical cancer in the country. CHWs providing level one health services need to integrate cervical cancer awareness and screening messages. This will promote cervical cancer screening and trigger early treatment and management of cervical cancer cases. This will help bring down the burden of cancer in the country.

Competing Interests

The authors declare no competing interest.

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Appendix

Table 1: Social Demographic Characteristics of the Study Participants

Categories	Baseline Survey				End term Survey (8 months)			
Age	Control		Intervention		Control		Intervention	
	F	%	F	%	F	%	F	%
16-20 years	12	3.0	0	0	20	4.9	21	5.1
21-25 years	63	15.7	31	7.7	76	18.8	64	15.6
26-30 years	134	33.3	106	26.2	117	28.9	112	27.4
31-35 years	139	34.6	149	36.9	138	34.1	132	32.3
36-40 years	50	12.4	113	28.0	54	13.3	80	19.6
41-45 years	4	1.0	5	1.2	0	0	0	0
Total	402	100	404	100	405	100	409	100
Parity	F	%	F	%	F	%	F	%
1 Child	23	5.7	12	3.0	30	7.4	13	3.2
2 children	22	5.5	15	3.7	13	3.2	19	4.6
3 children	58	14.4	60	14.9	67	16.5	64	15.6
4 children	124	30.8	105	26.0	89	22.0	122	29.8
5 children	89	22.1	93	23.0	99	24.4	99	24.2
6 children	70	17.4	63	15.6	82	20.2	65	15.9
7 and above	16	4.0	56	13.9	25	6.2	27	6.6
Total	402	100	404	100	405	100	409	100
Education Level	F	%	F	%	F	%	F	%
No education	10	2.5	33	8.2	5	1.2	27	6.6
Primary level	80	19.9	138	34.1	112	27.7	96	23.4
Secondary level	227	56.5	143	35.4	167	41.2	206	50.4
College/ University	85	21.1	90	22.3	121	29.9	80	19.6
Total	402	100	404	100	405	100	409	100
Occupation	F	%	F	%	F	%	F	%
Not working	10	2.5	7	1.7	15	3.7	29	7.1
Peasant Farmer	227	56.5	201	49.8	222	54.8	223	54.5
Business	114	28.4	102	25.2	101	24.9	99	24.2
employment	51	12.7	94	23.3	67	16.6	58	14.2
Total	402	100	404	100	405	100	409	100
Marital Status	F	%	F	%	F	%	F	%
Single	31	7.7	18	4.5	34	8.4	33	8.1
Married	344	85.6	297	73.5	327	80.7	310	75.8
Widowed	17	4.2	65	16.1	26	6.4	48	11.7
Separated/ Divorced	10	2.5	24	5.9	18	4.5	18	4.4
Total	402	100	404	100	405	100	409	100

Table 2: Uptake of Cervical Cancer Screening Services

Survey	Intervention site		Control Site	
	Have you ever sought Cervical cancer screening services?		Have you ever sought Cervical cancer screening services?	
	Frequency	%	Frequency	%
Baseline	89/404	22.0	82/402	20.4
End-Term (8 months)	215/409	52.6	87/405	21.5

Table 3: Z score Tests Testing Change in Proportions of Cervical Cancer Tests

Study Site	Base line	End term	Z-Score test and P values (Baseline Vs. End term)
Intervention	89/404 (22.0%)	215/409 (52.6%)	Z score = 8.9978, P<0.05 (30.6% difference is significant)
Control	82/402 (20.4%)	87/405 (21.5%)	Z score =0.3782, P>0.05, (1.1% Difference is not significant)

Table 4: Crude Odds Ratio for ever Screened for Cervical Cancer (Base line)

Study Phase			B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B) Lower	Upper
Baseline	Step 1[a]	Have you ever gone for Cervical cancer screening?	.098	.172	.321	1	.571	1.103	.786	1.546
		Constant	-.016	.079	.039	1	.843	.984		

a. Variable(s) entered on step 1: Have you ever gone for Cervical cancer screening?

Table 5: Adjusted Odds Ratios for ever Screened for Cervical Cancer (Baseline)

Study Phase		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B) Lower	Upper
Baseline Step 1[a]	Have you ever gone for Cervical cancer screening?	.262	.222	1.397	1	.237	1.300	.841	2.009
	Age of respondent	.925	.160	33.383	1	.000	2.522	1.843	3.451
	Number of children of respondent	-.529	.115	21.030	1	.000	.589	.470	.739
	Level of education of respondent	-.927	.146	40.246	1	.000	.396	.297	.527
	Primary Occupation of respondent	.217	.161	1.819	1	.177	1.242	.906	1.702
	Marital status	.593	.158	14.029	1	.000	1.810	1.327	2.468
	Total monthly household income	.000	.000	19.692	1	.000	1.000	1.000	1.000
	Constant	-1.606	.533	9.072	1	.003	.201		

a. Variable(s) entered on step 1: Have you ever gone for Cervical cancer screening? Age of respondent, Number of children of respondent, Level of education of respondent, Primary Occupation of respondent, Marital status, Total monthly household income.

Table 6: Crude Odds Ratio for ever Screened for Cervical Cancer (End Term)

Study Phase			B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B) Lower	Upper
End-term (18 Months)	Step 1[a]	Have you ever gone for Cervical cancer screening?	1.399	.156	80.058	1	.000	4.051	2.982	5.503
		Constant	-.494	.091	29.427	1	.000	.610		

a. Variable(s) entered on step 1: Have you ever gone for Cervical cancer screening?

Table 7: Adjusted Odds Ratios for Ever Screened for Cervical Cancer (End Term)

Study Phase			B	S.E.	Wald	df	Sig.	Exp (B)	95% C.I.for EXP(B) Lower	Upper
End-term (18 Months)	Step 1[a]	Have you ever gone for Cervical cancer screening?	2.333	.252	85.408	1	.000	10.307	6.284	16.904
		Age of respondent	.396	.171	5.389	1	.020	1.486	1.064	2.077
		Number of children of respondent	-.256	.130	3.892	1	.049	.774	.600	.998
		Level of education of respondent	-.368	.137	7.188	1	.007	.692	.529	.906
		Primary Occupation of respondent	-1.464	.217	45.644	1	.000	.231	.151	.354
		Marital status	.356	.153	5.393	1	.020	1.427	1.057	1.926
		Total monthly household income	.000	.000	15.215	1	.000	1.000	1.000	1.000
		Constant	.477	.431	1.224	1	.269	1.611		

a. Variable(s) entered on step 1: Have you ever gone for Cervical cancer screening?, Age of respondent, Number of children of respondent, Level of education of respondent, Primary Occupation of respondent, Marital status, Total monthly household income.