EFFECTS OF TWO TRAINING APPROACHES ON BREAST SELF-EXAMINATION FOR CANCER DETECTION AMONG WOMEN IN SELECTED LOCAL GOVERNMENT AREAS IN IBADAN

BY

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CERTIFICATION

This is to certify that this study was carried out by BAIYEWU, Sakinat Tope in the Department of Health Promotion and Education, Faculty of Public Health, College of Medicine, University of Ibadan, Nigeria under my supervision.

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DEDICATION

Read!!! in the Name of Thy lord who created….

Read!!! And the lord is most bounteous

He who taught man by the pen!

He taught man what he knew not! (Quran 96 vs 2-6)

This piece of work is dedicated wholly to the giver of life, the Greatest Teacher, the best Healer, the knower of the hidden and the manifest…Allah the Almighty.

….. also, to all survivors and victims of breast cancer all over the world especially my beloved mentor, late Prof. Mojisola Olayinka Edema and my sweet friend Nurat Oluwatosin Gbadamosi.

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….and He gave you from all you asked Him, and if you should count the favour of Allah, you could not enumerate them…(Q12:34). I thank God for His countless favours upon me.

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ABSTRACT

Breast Cancer (BC) is a leading cause of cancer-related deaths among women especially in developing countries. Late detection and presentation of BC result in poor treatment outcomes. Breast Self-examination (BSE) is a cost-effective screening method recommended for early BC detection in developing countries. Currently, the effects of trained Role-Model Mothers (RMMs) and Community Health Extension Workers (CHEWs) in educating Community Women (CW) on BSE is rarely documented. Therefore, this study was designed to assess the effects of training approaches by RMMs and CHEWs on knowledge, attitude and practice of BSE among CW in three semi-urban Local Government Areas (LGAs) in Ibadan, Nigeria.

A quasi-experimental design and multi-stage sampling technique were adopted in this study. Three semi-urban LGAs were randomly selected out of the six in Ibadan and allocated by balloting into Experimental Group I (EGI): Ido LGA, Experimental Group II (EGII): Akinyele LGA and Control Group (CG): Egbeda LGA. One hundred CW were randomly recruited from each LGA. Ten Focus Group Discussions (FGDs) were conducted among the CW in each study LGA. Quantitative data were collected using a pre-tested interviewer-administered semi-structured questionnaire which included 29-point knowledge, 14-point attitude and 12-point practice scales. Knowledge scores of ≤14 and >14 were categorised as poor and good, respectively. Attitude scores of ≤7 were categorized as negative and >7 as positive. Practice scores ≤6 were considered wrong and >6 as correct. Baseline results were used in designing interventions for CW. Ten RMMs in EGI and 10 CHEWs in EGII conducted a weekly training for CW on BSE for six months in form of lectures, step-wise demonstration and return demonstration using breast models. Post-intervention evaluation was conducted on the CW in the three study groups using the same instrument. Qualitative data was analysed using a thematic approach while quantitative data was analysed with ANOVA, paired t-test and independent sample t-test at $\alpha 0.05$.

Respondents' mean ages across the three groups were 40.3±9.7, 39.4±9.2 and 31.8±7.7 years in EGI, EGII and CG, respectively. A significantly higher proportion of respondents had tertiary education in CG (46.0%) compared to EGI (34.0%) and EGII (12.0%) ($p<0.001$). The FGD revealed misconceptions about BC and BSE including being caused by spiritual forces, putting money in braziers and wearing fairly-used braziers. Mean scores of knowledge (EGI:11.4±4.2; EGII:11.7±4.2; CG:13.0±4.8; $p=0.067$), attitude (EGI:5.2±1.8; EGII:5.1±1.80; CG:4.5±1.1; $p=0.125$) and practice (EGI:3.3±1.7; EGII:3.8±1.8; CG:3.9±1.9; $p=0.467$); were obtained at baseline. At endline, these scores significantly improved across the three study groups ($p<0.05$) with higher improvement in EGI and EGII [Mean scores of knowledge (EGI:19.8±3.7; EGII:18.5±3.4; CG:14.3±2.4; $p=0.018$), attitude (EGI:11.7±1.8; EGII:11.3±1.5; CG:7.4±1.2; $p=0.027$), and practice (EGI:10.0±2.7; EGII:8.8±2.6; CG: 6.09±1.64; $p=0.018$)]. There were no significant differences in knowledge and attitude between CW in the two experimental groups but CW in EGI demonstrated a significant difference in practice ($p<0.001$).

Role-Model Mothers improved Breast Self-examination practice among community women. They should be formally engaged as trainers for Breast Self-examination practice at community level to promote early detection of Breast Cancer.

Keywords: Breast Cancer, Breast Self-examination, Community Health Extension Workers, Community women, Role-Model Mothers

Word count: 487

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LIST OF ABBREVIATIONS

ACS	American Cancer Society
ACT	Artemisinine Combined Therapy
AHRQ	Agency for Healthcare Research and Quality
AICR	American Institute of Cancer Research
AIDS	Acquired Immuno-Deficiency Syndrome
ANCOVA	Analysis of Covariance
ANOVA	Analysis of Variance
ASHA	Accredited Social Health Activist
BC	Breast cancer
BHGI	Breast Health Global Initiative
BMJ	British Medical Journal
BRCA	Breast Cancer Antigen
BSE	Breast Self-Examination
CBE	Clinical Breast Examination
CG	Control Group
CHEW	Community Health Extension Workers
CHRBN	Community Health Practitioners Regulatory Board of Nigeria
CI	Confidence Interval
CIS	Carcinoma in-situ
CS	Carcinoma in Situ
CT	Cognitive Theory
DHS	Demographic and Health Survey
DMPA	Depo Medroxy-progesterone Acetate
EA	Enumeration Area
EG	Experimental Group

FFTP	First Full Term Pregnancy
FGD	Focus Group Discussion
GLOBOCAN	Global cancer
HBM	Health Belief Model
HIV	Human Immune Deficiency Virus
HER2	Human Epidemiological growth Receptor 2
IARC	International Agency for Research in Cancer
IBCR	Ibadan Based Cancer Registry
ICCP	International Cancer Control Plan
ICLEI	International Council for Local Environment Initiatives
IDI	In-depth Interview
KII	Key Informant Interview
LFT	Lewin's Field Theory
LGA	Local Government Area
LLC	Limited Liability Company
LMIC	Low and Middle Income Countries
MDG	Millennium Development Goals
MRI	Magnetic Resonance Imaging
NCCN	National Comprehensive Cancer Network
NCD	Non-communicable disease
NDHS	Nigerian Demographic Health Survey
NMCP	National Malaria Control Program
OCP	Oral Contraceptive Pills
OR	Odds ratio
Pg	Page
PHC	Primary Health Care
PHW	Primary Health Worker

PMS	Percentage Mean Score
RA	Research Assistant
RCT	Randomized Control Trials
RMM	Role-model mothers
SDG	Sustainable Development Goals
SEER	Surveillance, Epidemiology and End Results
SPSS	Statistical Package for Social Science
SRT	Stimulus Response Theory
UCH	University College Hospital, Ibadan
UK	United Kingdom
USA	United States of America
USAID	United States Agency for International Development
USS	Ultrasound Scan
VET	Value Expectant Theory
WCRF	World Cancer Research Fund
WHO	World Health Organization
WHR	Waist/Hip Ratio
ZUMS	Zahedan University of Medical Sciences

OPERATIONAL DEFINITIONS

Cancer: This is the growth of malignant or abnormal cells which can affect any part of the body. They are called malignant because the cells acquire independent self-regulation; thereby, excluding themselves from the regulated body mechanism which causes serious harm to the affected organ (American Cancer Society, 2014)

Breast Cancer: The growth of a malignant tumour in the breast tissue to the auxiliary tail of the breast which often starts as a painless and fixed lump; more common in females than males.

Breast Self-Examination: A do-it-yourself procedure for Breast Cancer screening. It is a check-up that a woman does by herself involving the examination of her breasts to observe changes or problems affecting the tissues such as swellings or lumps. (Sister Network Chapter, Chicago. *Step-by-step guide to conducting Breast Self-Examination*)

Clinical Breast Examination: This involves the physical examination of the breast performed by a skilled health worker like a Doctor, Nurse or other trained health personnel. The health worker palpates the breasts to examine the presence of signs or warning signs of breast cancer in accordance to International guidelines and regulations. (Saslow *et al* 2004)

Mammography: Use of soft tissue X-rays to examine the breast in order to identify abnormalities that could be suggestive of Breast Cancer. (Health Council of the Netherlands 2002)

Breast Ultrasound: Involves the use of Ultra sound equipment to examine the breast to identify abnormalities suggestive of breast cancer. (Health Council of the Netherlands 2002).

Community: A community is defined as a grouping within a population, such as a town, village or census enumeration area.(UNICEF MICS, 2021)

Community Health Worker: A Community Health Worker (CHW) can be defined as a health worker who receives standardized training outside of the formal nursing or medical curricula to deliver a range of basic health, promotional, educational and mobilization services, and has a defined role within the community system and larger health system (USAID Health Communication Capacity Collaborative, 2015).

Role Model Mothers: They are respectable women in the community considered as lay workers who are trained and supervised closely to perform routine screenings thereby freeing formal medical staff for more skilled tasks (Wadler et al, 2011).

Breast Palpation: A technique involving the physical examination of the breast with fingers in a circular pattern and along the nipple or along the radial lines or vertical segments including the tail near the axilla. (Sister Network Chapter, Chicago. *Step-by-step guide to conducting Breast Self-Examination*).

Effect: The anticipated outcomes of the interventions.

CHAPTER ONE

INTRODUCTION

1.1 Background

According to World Health Organisation (WHO, 2015) cancer factsheet, cancer is a non-communicable disease, which is becoming an increasingly important cause of death worldwide for both economic and social reasons. The Stedman's medical dictionary indicates that the term, cancer, can be used interchangeable with tumour. A tumour is said to be malignant (cancerous) if the cells can grow into (invade) surrounding tissues or spread (metastasize) to distant areas of the body, resulting in morbidity and eventually leading to the death of the individual if not detected and managed early (Park, 2007). The cause of cancer is multifactorial consisting of a combination of genetic and environmental factors including, but not limited to, tobacco smoking, dietary intake and alcohol consumption.

Worldwide, breast cancer is recognized as a leading cause of cancer and cancer–related death (Anderson *et al*., 2006). A recent systematic review on the rising global burden of breast cancer found that 25% and 15% of all new cancer cases and cancer deaths respectively among females worldwide were due to breast cancer (Azubuike *et al.,* 2018). Furthermore, the global statistics showed that, of the over one million new cases of breast cancer diagnosed annually, about 375,000 deaths occurred; indicating that breast cancer is a disease associated with high mortality rates. Unfortunately, most of these deaths occur in developing countries (Groot *et al*., 2006; Azubuike *et al.,* 2018; Francies *et al*., 2020).

For over two decades now, breast cancer incidence and mortality rates have remained relatively stable and probably trending downwards in many developed countries. Comparatively, the contrary is taking place in many parts of Africa (especially sub-Saharan Africa where focus remains low for non-communicable diseases probably due to the high burden of communicable diseases), Asia, Central and South America as shown in Figure 1.1 (Ferlay, 2012; Youlden, 2012). Perhaps the most troubling statistics is the fact that while this rising incidence of breast cancer in the African region remains at a lower level than in other continents except Asia, its age-standardized mortality rate still ranked highest worldwide, particularly in Nigeria (Figure 1.2), the most populous African nation, which has the highest breast cancer mortality rate (Azubuike *et al.,* 2018). Furthermore, in Nigeria, there had been a previous report that breast cancer accounted for 56.6% of all cancers diagnosed in the country over a 7-year period from

1995 to 2004 (Parkin *et al.,* 2003a). These alarming figures become more worrisome when the projections by Jedy-Agba *et al.* (2012) are considered. According to the projection, a steady rise in the incidence of breast cancer among Nigerian women has been happening since 1960 (Figure 1.3) with cases projected to reach a staggering rate of 84.2 per 100,000 women by 2030 due to a spiking population growth. It implies that with an already poor mortality statistic from breast cancer in Nigeria as depicted, more cases due to rising incidence will translate to more cancer-related deaths if deliberate steps are not taken to control either the incidence or death rates. Considering this high death rate associated with breast cancer in Nigeria, it is important to establish the reasons behind these serious statistics. One of the most reported reasons has been that most of those diagnosed often reported late for treatment at the hospital with advanced stage of the disease when cure is already compromised (Okobia *et al.,* 2006; Ezeome, 2010 & Awofeso *et al.,* 2018). Late presentation often translates to poorer disease survival; several studies have reported a correlation between poor survival after diagnosis of breast cancer and late detection (Singletary *et al.,* 2002; Oluwatosin *et al.,* 2006 & Awofeso *et al*., 2018). Quite recently, up to 72.9% of breast cancer cases seen at a health facility in Nigeria were confirmed to have presented in the late stage of the disease (i.e. presented later than 3 months after the first symptom or sign of the disease) (Awofeso *et al*., 2018). This is staggering considering the global rate of breast cancer late presentation ranges from 14 to 73% with a mean of 33.1% ± 19.5% standard deviation. It has been reported that Nigerian women have one of the world's highest rates of late or delayed presentation for breast cancer. Several reasons have been reported to account for this late presentation. These reasons include the absence of personal initiative, sheer ignorance, poor health-seeking behaviour, higher age at occurrence of disease, absence of a family history of breast cancer, low level of education, low-socioeconomic status and trivialization of early signs of breast cancer like a painless breast lump (Ramirez *et al.,* 1999; Brzozowska, 2014 & Awofeso *et al*., 2018).

According to the American Cancer Society (ACS), breast cancer usually forms a tumour (swelling or lump) that can often be seen on an x-ray (mammography) or felt with the fingers since the breast is a readily accessible organ for such palpation (feeling with the fingers). Breast cancer occurs almost entirely in women, but can occasionally be found in men (American Cancer Society, 2016). This has a significant implication on the reproductive health of females who in addition to other maternity-related diseases also carry the major burden and bear the devastating consequences of this disease.

In the early stages of breast cancer, the developing breast lump is often painless with little or no discomfort and lack of breast awareness may create a scenario of trivializing that early warning sign until the disease begins to invade surrounding tissues spreads around the body, hence the late presentation in most developing countries (Ramirez *et al*., 1999; Awofeso *et al*., 2018). This is further compounded by low socio-economic status and lack of access to health care or health care financing in those settings (Anderson *et al*, 2016). Though, there are diverse risk factors that may contribute to a woman's susceptibility to the disease, studies have shown the increasing importance of screening in detecting breast cancer in its early stages when it is easier to treat and when there is a better chance of disease survival (Smith *et al*, 2007; Karayurt *et al*., 2008).

The American Cancer Society (ACS) recommended local adaption of breast cancer screening techniques such as Breast Self-Examination (BSE), Clinical Breast Examination (CBE), Breast Ultrasound Scan, mammography and Magnetic Resonance Imaging for early detection of breast cancer (Smith *et al.,* 2007 and American Cancer Society factsheet, 2016). It is believed that 95% survival rate could be achieved if cancer is diagnosed at an early stage (Jarvandi *et al,* 2002). Okobia and Osime (2001) noted that screening mammography appears to be the most widely employed of these techniques, though this applies more to the developed world as the prohibitive cost makes it inapplicable for mass screening in Nigeria as well as other countries in Sub-Saharan Africa (Ramirez *et al.,* 1999; Okobia, 2006). Therefore, in the absence of mammography and with poorly structured and poorly funded national health service, community use of breast self-examination becomes particularly important for early breast cancer detection among the at-risk population of women in a developing country like Nigeria (Austoker *et al*., 2009; Ogunbode *et al*., 2013).

Breast Self-Examination (BSE) is an easy and cost-effective method of early detection of breast cancer and should be integrated into the existing public health policies particularly for health promotion at local community level (Onwere *et al.,* 2009 and Shrivastava *et al.,* 2013). With ongoing efforts by developing countries to close identified gaps and unattained targets in the Millennium Development Goals (MDGs) Number 5 and 6, and the ever increasing need and pressure to design and implement locally-adaptable policies aimed at achieving the new targets of Sustainable Development Goal (SDG) Number 3 by 2030 on "Good Health and Well-being", specific measures targeting women health to close gender disparities and inequities have been brought to the forefront of National and Global health action (Lomazzi *et al*, 2014). Equally, there are increasing calls to commence an integrated action for tackling the rising menace of

non-communicable diseases (NCDs) with the same vigour and efforts invested currently in communicable diseases in low-and-middle income countries in order to avoid a future public health implosion (Hosseinpoor *et al*., 2012; Marmot & Bell, 2019).

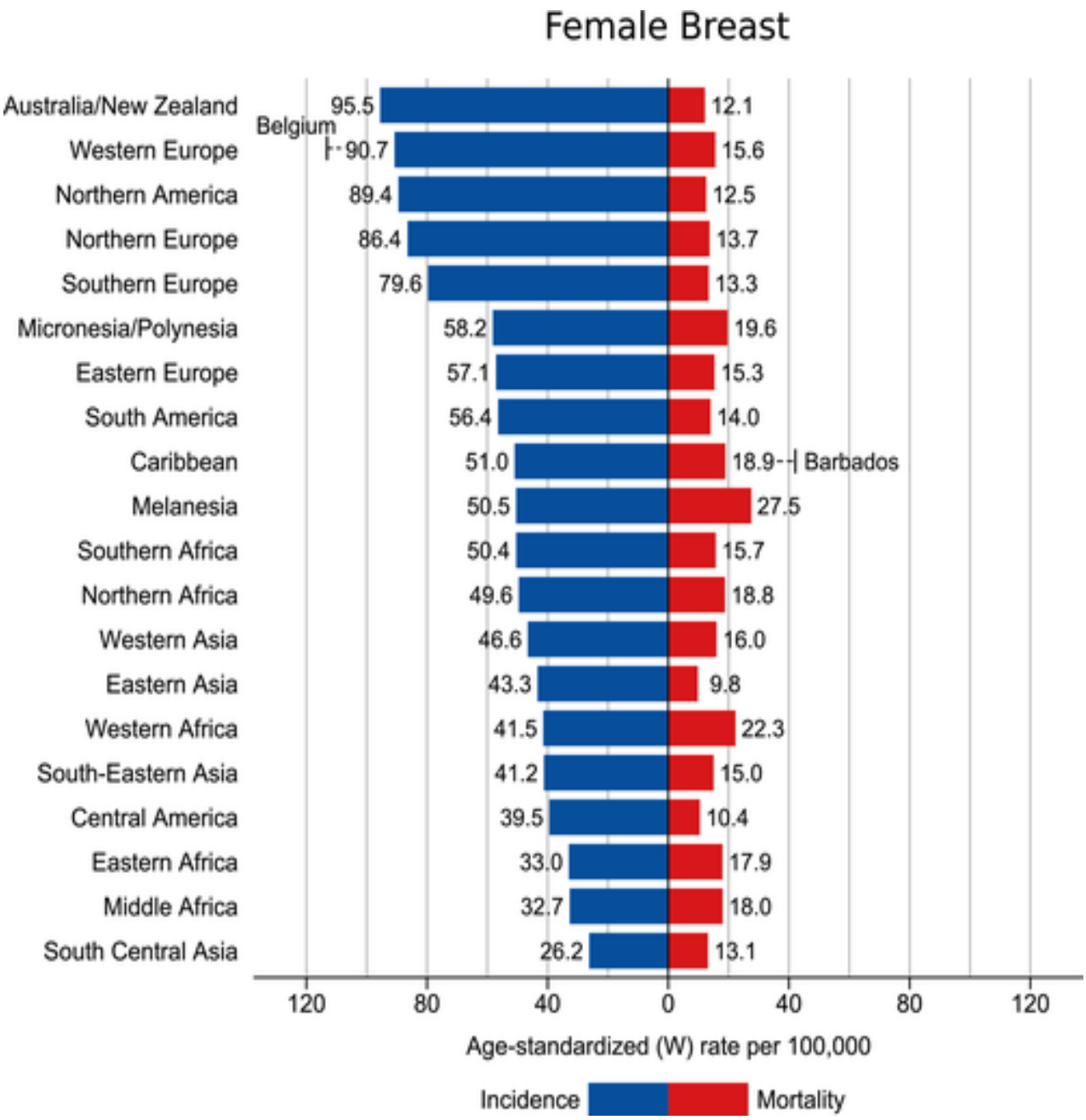

Figure 1.1: Region-Specific Incidence and Mortality Age-Standardized Rates for Female Breast Cancer in 2020. (GLOBOCAN 2020)

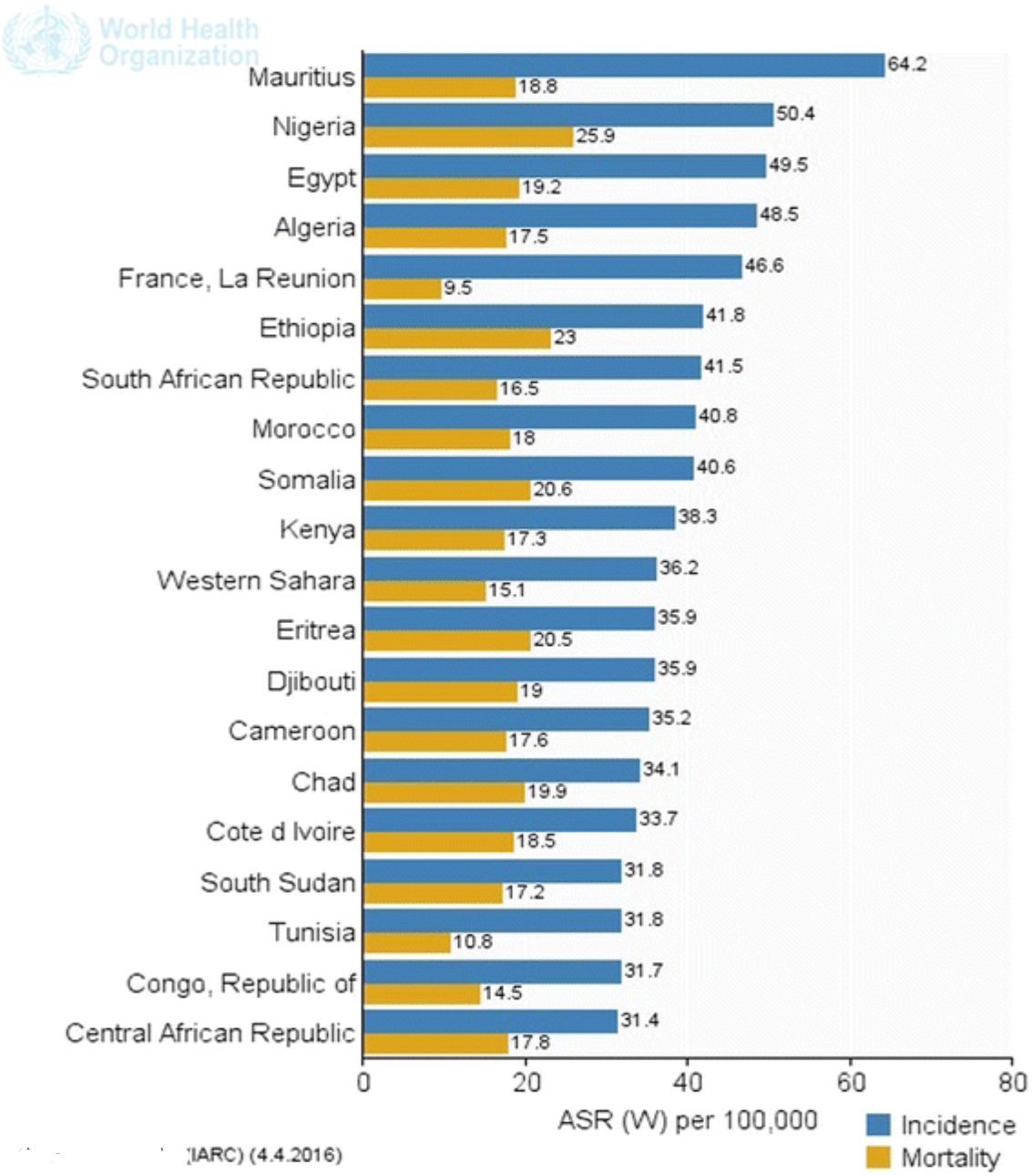

Figure 1.2: Top 20 countries with the highest incidence and mortality associated with breast cancer in Africa (GLOBOCAN 2016)

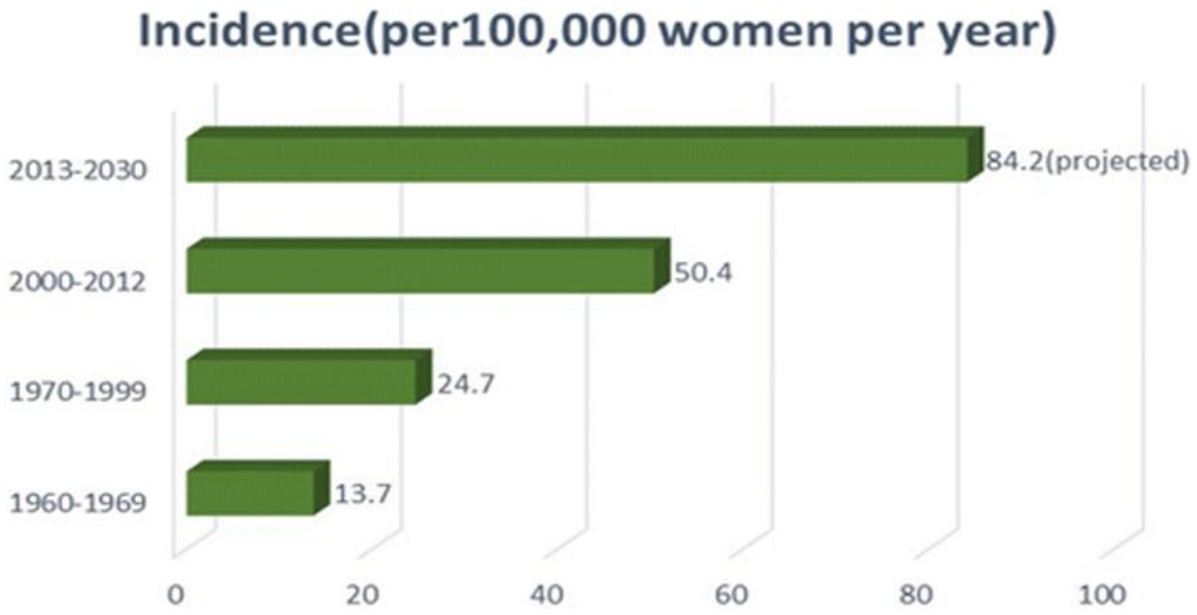

Figure 1.3: Rising incidence of Breast Cancer in Nigerian women since 1960. (Ferlay *et al.* 2015)

The Figure 1.1 shows that Australia/New Zealand has the highest incidence rate while Menalasia and western Africa have the highest mortality rate of breast cancer. A few studies conducted in Nigeria previously by Oluwole (2008) and Oche *et al.,* (2012) reported high level of breast cancer awareness among the population-at-risk but relatively low compliance with BSE as a screening modality for early detection of breast cancer (Oluwole *et al.,* 2008 & Oche *et al.,* 2012). The use of a method of intervention to improve BSE adoption may have implication for breast cancer early detection and good outcomes in local communities especially in rural and semi-urban areas of Nigeria.

1.2 Statement of the Problem

According to the World Health Organisation (WHO) four yearly cancer report of International Agency for Research in Cancer (IARC) in 2008, 2012 and 2016, cancer has, among the major non-communicable diseases (NCD), become a major source of morbidity and mortality globally (Ferlay *et al.,* 2008; Sylla & Wild 2012; GLOBOCAN 2012; GLOBOCAN 2016). Boyle and Levin (2008), relying heavily on the 2008 GLOBOCAN factsheet submissions, observed that, there were 12.7 million new cases and 7.6 million cancer-related deaths in 2008 alone. In developing nations, 56 percent of newly reported cancer cases occurred, and it has been forecasted that by 2030, developing nations would account for 70% of all new cancer cases (Boyle & Levin, 2008).

WHO estimated progressive rise in cancer incidence in the 2012 GLOBOCAN factsheet by stating that there were 14.1 million new cancer cases, 8.2 million cancer deaths and 32.6 million people living with cancer (within 5 years of diagnosis) in 2012 worldwide. Eight million (57%) of new cancer cases, five million and three hundred thousand (65%) of the cancer deaths and fifteen million and six hundred thousand (48%) of the 5-year prevalent cancer cases occurred in the less developed regions. This increasing incidence is associated with population growth and increased life expectancy (Lyerly *et al.,* 2011). Nigeria, which is home to an estimated population of 200 million people (NDHS 2018) and has an estimated percentage of 20% out of the entire African population and a little more than half the West African population, was estimated to contribute 15% of 681,000 new cancer cases in Africa in 2008 alone (Sylla & Wild, 2012). However, Parkin *et al.* (2011) noted that most of these estimates have come from institution-based cancer records rather than from population-based studies or estimates.

Of all cancer types, breast cancer has become a global health concern and a leading cause of morbidity and mortality among all the cancers that affect women (Shrivastava *et al.,* 2013). In

2008, Ferlay *et al*. reported the GLOBOCAN 2008 estimates of prevalence of breast cancer in women aged at least 15 years in Sub-Saharan Africa to be 23.5 per 100,000 women. It has been recognized as a major disease of public health importance in both developed and developing nations because of its high incidence and prevalence, the over-burdened health system and direct socio-economic implications (Bray *et al.,* 2018). As with most gender-based cancers, age–adjusted global statistics show that the annual incidence of breast cancer is also increasing year-on-year with a steep rise occurring in countries with a low incidence rate of breast cancer (Wilson *et al*., 2004). Specifically for Nigeria, though very accurate population-based studies are hard to come by, reports by Jedy-Agba *et al.* (2012) gave the incidence of breast cancer in Nigeria between 2009 and 2010 as 54.3 per 100 000, thereby representing a 100% increase compared to the previous decade. IARC-GLOBOCAN 2016 factsheet estimated crude and age-standardized breast cancer rates of 17 and 25.9 per 100,000 across all ages in Nigeria (Figure 1.2) with some cases occurring among women aged below 30 years as earlier corroborated by Olasehinde *et al.* (2016).

Accordingly, Faronbi *et al,* (2012) confirmed that this prohibitively high incidence of breast cancer in Nigeria, speaks to the need for early detection because of the implications for increasing the treatment options available to affected women and ultimately improving disease-free survival rates. Similarly, in a study by Olaogun *et al.* (2017), breast cancer incidence has steadily increased in Nigeria, from 15.3 per 100,000 in 1976 to 33.6 per 100,000 in 1992, and then to 52.0 and 64.6 per 100,000 in Ibadan and Abuja respectively in 2012. The current rise in the incidence of breast cancer could be attributed to urbanization trends and lifestyle changes. It is now the top cause of cancer fatalities in the Nigeria, accounting for around 23% of all cancer diagnoses and nearly 18% of all cancer deaths (World Health Organization, 2013).

Evidently, with women being the most at-risk of developing breast cancer and a significant number of these women living in settings outside the urban areas where they may not readily have access to information on routine prevention strategies and early detection measures for breast cancer, a significant barrier exists to helping them overcome the challenge that this disease poses (Audu *et al.,* 2014). These information barriers have a tendency to undermine their breast awareness and potentially increase their risk of late-stage disease presentation and by extension lead to poor cancer-related outcomes, if they become afflicted. Furthermore, breast cancers pose a huge reproductive health and financial burden to women at-risk who are in the prime years of their lives and also to their families (Ogunbode *et al,* 2013). These authors also concluded that

all at-risk women need to be 'breast aware' and this can be accomplished through routine breast screening. Bellgam *et al,* 2012) also noted the importance of screening for early detection and diagnosis of diseases and health conditions especially for a major reproductive organ such as the breast. According to the American Cancer Society, a wide range of modern procedures are available and recommended for the screening and early detection of breast cancer. Such procedures include detection of the BRCA 1 and BRCA 2 genes, mammography, breast sonography, and recently, and Magnetic Resonance Imaging (MRI) (American Cancer Society, 2016). Physical breast examination in the form of clinical breast examination (CBE) by a health service provider and breast self-examination (BSE) carried out by women themselves are other screening methods used for early detection of breast cancer. Shulman *et al.* (2010) noted that early detection through the use of expensive imaging protocols like mammography and breast MRI, high-quality surgery, and adjuvant therapies including chemotherapy and targeted therapies, such as hormonal therapy and more recently the HER2-directed agent trastuzumab, can be credited for much of the recent improvement in outcome for women with breast cancer in the United States of America and most other developed countries (Shulman *et al.* 2010). However, even prior to the ubiquitous availability and routine use of mammography or adjuvant therapy, significant improvements were made in breast cancer survival in those climes, and these can be traced to relatively low-cost interventions that are still in use in those high-income countries. In Nigeria of today, these technology-driven imaging screening protocols are scarce and prohibitively expensive to access even in the urban areas.

As explained by Jedy-Agba, *et al* 2017), at present the only demonstrable valid means of reducing morbidity and mortality in a resource-constrained environment like Nigeria should remain low cost and readily available. Therefore, resorting to such inexpensive, readily available and easy to perform screening modalities should have enduring benefits because of these resource challenges. It has been reported that up to 80% of breast cancers not detected by routine mammography are actually detected by the women themselves, often not as a part of a deliberate and orderly breast self-examination, but as a part of daily activities such as showering and dressing up (National Breast Cancer Coalition, 2011). It makes BSE a favoured and encouraged method of screening women for early detection of breast cancer in a developing country like Nigeria with a huge rural and semi-urban female population (Black & Richmond, 2019).

Many sub-Saharan African studies in the past like that of Gueye *et al.* (2009) from Senegal, and Omotara *et al.* (2012) from Nigeria have shown poor knowledge of women in different resource-

poor settings about breast screening techniques and their importance to survival of breast cancer affliction. Summarily, the studies have recommended health education as a way to improve breast health awareness, breast self-examination, and clinical breast examination as they are relatively inexpensive tools that can be easily incorporated into existing primary health structures but none of them specifically mentioned the way to go about it in order to achieve enduring effects and results.

The role of community health workers in health education and promotion is well documented (Viswanatan *et al*, 2007; AHRQ, 2009). Community Health workers in Nigeria also play key roles as role models and educators especially to less empowered women with low level of education and resources and such relationships tend to be commonly found in many local governments in Nigeria. However poor government financing and lopsided 'top-bottom' approach of the Nigerian health care system has meant less confidence is reposed in all the thousands of community health workers spread across the entire landscape of Nigeria. Though technically and theoretically speaking, these are the most accessible health workers at some urban and most rural settings and whose services are the most affordable; gaps in health education about important public health issues still abound and not less so, the issues of education about breast cancer screening. It means, even with the fore-knowledge about the importance of breast self-examination in breast cancer screening, the adoption and routine practice is still not remarkably significant among those interacting with community health workers in Nigeria (Mwai *et al.,* 2013). This is compounded by the fact that trained health workers are difficult to attract and retain in rural settings (Fagbamigbe & Idemudia, 2015).
According to Ajayi *et al.* (2008), it is believed that women with leadership qualities have good potentials to effectively carry out health education activities in the community if appropriately selected, trained and supervised using an intervention protocol designed for that purpose. The crucial role of Role-Model Mothers in the implementation of the Roll-Back malaria programme in Nigeria is well documented particularly in the most remote and the most difficult-to-access rural communities in Nigeria (Adeneye *et al*, 2013). Other than for malaria control, there are no documented studies that report the possible role of these Role-Model Mothers (RMMs) in the community as health educational promoters and health practice facilitators despite their profound influence on their peers and other women groups within their community. Specifically, no research effort has been made so far to determine the effectiveness or otherwise of this unique but readily available pool of human resource as health educators and trainers in the transmission of knowledge and skills of breast self-examination to other women in their immediate

community in an effort to positively influence breast awareness and health-seeking behaviour relating to breast cancer.

1.3 Justification for the Study

This study is justified for the following reasons.

1) Firstly, women make up about half the entire world population. Women are aptly described in African traditional society as being hardworking and resourceful, in the following way: "*They engage themselves in income generating activities of various types such as processing of palm-oil and garri, soap making, weaving, sewing and pottery. Generally, African women carry significant proportions of the workload in food crop production, animal husbandry, food processing and distribution. They combine all these with their traditional role of procreation and home management"* (Ekong, 2008; Amucheazi *et al,* 2012). Therefore, any society that neglects such a large number of highly versatile human resource pool, wilfully or unknowingly, will find it difficult to achieve any meaningful development.

With Breast Cancer being a leading cause of cancer-related death among Nigerian women, part of efforts to improve female life expectancy includes minimising the impact of breast cancer on at-risk women populations. This requires addressing factors that contribute to high morbidity and mortality from Breast Cancer such as late presentation which has been recognized scientifically to worsen outcomes. Contributory factors such as poor knowledge, luke-warm attitude to the adoption and proper practice of early detection methods like Breast Self-examination and improper health-seeking behaviour after detection; had been previously identified (Ogunbode *et al.*, 2013; Akpanekpo, 2017 & Ossai *et al.,* 2019). This will require ready access to appropriate information on breast cancer and its screening methods and techniques to fill those identified knowledge gaps using women-led interventionsin community breast cancer screening. Achieving this will enable a large number of these women to benefit from early curative treatment which potentially assures they can achieve a disease-free survival, especially with a relentless year-on-year rise in breast cancer incidence in Nigeria (Johnson, 2019).

2) Secondly, poor adoption of BSE has been closely tied to lack of adequate knowledge about how to appropriately perform the steps which suggests that maximal benefits from BSE adoption can only be obtained not just by improving women's knowledge about BSE, encouraging better attitude to BSE or the actual adoption of regular BSE performance but also by specifically ensuring women can appropriately perform BSE in the right steps (National Breast Cancer Coalition, 2011; Amoran & Toyobo, 2015). This implies that optimal uptake and regular performance of BSE by women will require educational interventions that not only enhance

women's knowledge, attitude and practice but also prepare them on how to conduct stepwise performance of BSE to ensure they sustain a positive behavioural change to BSE practice in the long term.

Taking a cue from developing countries with structured programmes on public health control of Non-communicable Diseases (NCDs), the United States Office of Disease Prevention and Health Promotion in setting a decade-long goal C-05, to achieve healthy people by the year 2030, prioritised increasing the participation of women in Breast Cancer screening in an effort to significantly reduce cancer-related death and to enhance long-term cancer survival (U.S. Department of Health and Human Services, 2021). Participation of women is very key to achieving a sustainable success with any mass breast screening programme. Enhancing women participation in any breast cancer screening programme requires implementation of behavioural change programme that will ensure all physical and social barriers to accessing the screening programme are overcome to good effect (Kressin *et al.,* 2010). This often employs a rigorously planned educational or training intervention that utilises a sound behavioural change model that is tested and trusted to work.

It is clearly established that women in rural areas are more likely to be influenced by cultural beliefs and social norms that discourage utilization of orthodox medical services (Mekonnen & Asefa. 2019). It is therefore conceivable that in rural settings, directly educating women on their knowledge gaps about common gender-related specific diseases and other health-related information can be achieved by social and behavioural change communication to increase awareness and improve their health-seeking behaviour. Furthermore, it has a higher chance of enhancing their socioeconomic opportunities and status, their decision-making power and the confidence to take immediate and sustained actions about their health (Tiruneh *et al.* 2017; Weitzman 2017). Such basic level of health education requires intermittent or periodic training and re-training by health educators who preferably are domiciled in the same community as the women they intend to influence. They must also be committed to achieving specific educational and training targets within a well-structured programme and platform to ensure a sustainable success (Watson *et al.*, 2020).

In Nigeria, over the last two decades, a number of studies have explored women's barriers to breast self-examination adoption and practice for breast cancer screening. The studies equally attempted to proffer solutions to identified gaps. These studies ranged from those conducted

among specific groups of urban women from Northern Nigeria (Kayode et al, 2005; Gwarzo, Sabitu & Idris, 2009 and Yakubu, Gadanya and Sheshe, 2014) and similar groups of urban women in Southern Nigeria (Agboola *et al.*, 2009; Bellgam & Buowari, 2012; Tobin & Okeowo, 2014; Akpanekpo, 2017 and Ossai *et al*, 2019) as well as among rural Nigerian women (Amoran & Toyobo, 2015). Despite the summary coverage of a wide spectrum of female socio-demographics across the several studies, none of the studies considered educational facilitation or training on stepwise BSE performance by socially influential women groups like female Community Health Extension Workers (CHEWs) and or Role-Model Mothers (RMMs) in the enhancement of uptake and sustained practice of BSE for breast cancer screening.

According to the CHEWs' curriculum and job description, they are expected to perform health education activities on the field (within their catchment communities) for about 70% of their work time (CHRBN, 2006) though this is rarely observed in real life practice largely because health manpower shortages in many rural settings have ensured task shifting from rural medical doctors and nurses to CHEWs for maternity and immunization services as well as multiple communicable disease prevention and control programmes like Tuberculosis, Malaria etc. (Charyeva *et al.*, 2015; Uzondu *et al.*, 2015). It means CHEWs are more engaged within local health facilities and less deployed to the field for health education and promotion. Furthermore, according to Onwere *et al.* (2008) and Eguvbe *et al.* (2014), the attitude and practice of Breast Self-examination among Nigerian primary health care workers is low though a lot of factors may account for that and the generalisation of the study outcome may be too presumptive. In most Nigerian primary health care settings, Community Health Extension Workers (CHEWs) are the fore-bearers of health education but not necessarily practice. On the other hand, Role-model mothers (RMM) have been successfully utilized as lay health workers to fill personnel gaps in community-based intervention on home treatment of malaria at the rural level (Ajayi *et al*., 2008).

No study has explored task-shifting that employs female CHEWs to provide community-based BSE training for women or utilized Role-Model mothers in a similar role. Also, there has not been any study comparing the benefits of using both groups as local health educational facilitators and health practice trainers for BSE interventions among community women.

The Nigerian National Malaria Control Programme (NMCP) strategic plan for 2009 to 2013 involved Role-Model Mothers (RMMs) at community level for intervention in childhood

uncomplicated malaria treatment with artemisinin-combined therapy (ACT) administration after diagnosis of malaria using simple basic techniques on which they were trained, in order to cover the most inaccessible rural communities as part of a comprehensive roll-back malaria initiative. The concept of using Role-Model Mothers involves training members of a community viewed by many mothers as role models in character, ability to lead others and be respected by others, with presence and visibility in that community. Such identified women are perceived with passion and ability to inspire others, commitment to the community and standard of how malaria should be viewed and addressed. In other words, they are seen as exemplary figures on whom others rely for guidance (Nwankwo *et al.,* 2014). After training by the central National Malaria Control Program (NMCP) of 390 Role-model mothers (RMMs) from 13 selected pilot local government areas on malaria detection in children and method of administration of ACTs, they were deployed to the rural communities in January 2009 and by the end of December 2009, 11,051 children had received treatment from RMMs, comprising 5,953 aged 6 months to 3 years, and 5,098 aged 4 to 8 years. The study concluded by recommending the RMM programme as a useful intervention and health promotion model for most resource-constrained communities.

3) Thirdly, in Nigeria, evidence-based strategies that employ health education and training interventions to increase women's uptake and retention of breast self-examination for long term breast cancer screening are scarce. It is worth mentioning that one key consideration in the design of any programme should be its effectiveness. It is also known that public health educational interventions can only be deemed effective if the design appropriately utilizes social theory models (Mazloomi *et al.,* 2010). The Health Belief Model, with its six (6) behavioural constructs, has been extensively studied and found to be very useful and effective in cancer prevention programmes that require educational training to achieve the desired preventative behavioural changes (Eskandri-Torbaghan *et al.,* 2014; NajarKolai *et al.,* 2012).

The use of this model by the current study gives an assurance of generating findings that hold reasonable potentials to designing an implementable community-based model aimed at improving breast awareness within the general population and which is scalable to the national and sub-national levels. It will also provide ample information for designing a clear and sustainable programme and policy for improving mass screening for breast cancer in many resource-constrained and underserved local communities especially in the very rural and semi-urban settings where confidence in existing public health structure and systems is waning due to inefficiencies created by manpower shortage and poor government funding (Charyeva *et al.,*

2015). There is also a potential benefit that findings from this study will shed more light on how much end-user participation in public health intervention programmes influences outcomes of such health interventions.

1.4 Research Questions

1. What is the baseline knowledge, attitude and perception on breast cancer and breast cancer screening practices among women at risk of breast cancer in study communities?
2. What are the barriers to breast cancer screening practices among women (at risk of breast cancer) in study communities?
3. Which of the two BSE training approaches - (a) Breast cancer and BSE training by CHEWs or (b) Breast cancer and BSE training by Role model mothers - will be more effective in influencing study participants' (a) Knowledge (b) attitude (c) practice of Breast Self -Examination?

1.5 Objectives of the Study

1.5.1 Broad objective

The broad objective of the study is to investigate the extent to which two separate training approaches by CHEWs and RMMs can influence study participants' knowledge, attitude, perception and practice of regular Breast Self-Examination (BSE) screening at the community level.

1.5.2 Specific objectives

The specific objectives are to:

1. Determine the baseline level of knowledge, attitude and perception about breast cancer and breast self-examination practices of community women in three selected semi-urban local governments areas in Ibadan;
2. Utilise the findings of the baseline data to design a training program for Community Health Extension Workers (CHEWs) and Role-model mothers (RMM)s, to address identified gaps in knowledge and attitude to breast cancer and breast self-examination practices of the community women
3. Conduct a stepdown educational intervention by RMMs and CHEWs on community women

4. Asses the immediate outcome of the intervention on community women's levels of knowledge and attitude towards breast cancer and appropriate practice of breast self-examination (BSE)

1.6 Hypotheses

The following null hypotheses were tested:

$H_0$1 There is no significant difference in knowledge about breast cancer and of its detection using BSE between women trained by CHEWs and those trained by RMMs.

$H_0$2 There is no significant difference in attitude towards breast cancer and of its detection using BSE between women trained by CHEWs and those trained by RMMs.

$H_0$3 There is no significant difference in correct stepwise practice of breast self-examination between women trained by CHEWs and those trained by RMMs.

CHAPTER TWO
LITERATURE REVIEW

2.1 Cancer as a Disease Entity

According to World Health Organisation (WHO), the term cancer is a generic connotation for a large group of non-communicable diseases (NCDs) that can affect any body part and it is commonly described as malignant tumour or neoplasm in several literatures (WHO, 2015). Cancers can arise from and affect any part of the body. However, irrespective of the organ of origin, all cancers share a common characteristic, which is the rapidity with which abnormal cells of the organ of origin are created so much so that in no time, they grow beyond their usual boundaries, in the process, invading or violating nearby organs or tissues (invasion) and or spreading to other near or far organs from its original site in what is described as metastasis. The morbidity and mortality associated with cancer is due to these two main effects or mechanisms.

According to Ferlay *et al*. (2012), with an estimated 14 million new cases globally in 2012 alone, cancer has remained one of the leading causes of deaths in recent years. The American cancer society estimated 1.8 million new cancer cases diagnosed and 606,520 cancer deaths in the United States. (ACS, 2020). WHO expects a 70% rise in incidence of cancers, when cancer was the second leading cause of worldwide deaths (claiming 8.8 million lives in that year alone). Of these death figures, GLOBOCAN adduced 1 796 144 (18%), deaths to lung cancer, another 830 180 (8.3%), deaths to liver cancer and 935 173 (9.4%) deaths to colon and rectal cancers alone irrespective of the age and gender. Also, stomach cancers were associated with 768 793 (7.7%) deaths while breast cancers were associated with 684 996 (6.9%) deaths (GLOBOCAN 2020). Together, they translate to a global burden of nearly almost 10.0 million deaths as being due to cancer alone. It is estimated that 7 out of 10 cancer-related deaths occur in the developing countries of the world (GLOBOCAN, 2020). These low- and middle-income countries (LMICs) facing such heavy burden of cancer also have challenges with the set-up of their health system and its capacity to cope with the disease. For example, according to Stewart and Wild (2014), only 35% of these LMICs have reported capacity for providing the requisite pathological services for making accurate cancer diagnosis among the general public. It was also reported in the 2020 statistics that, less than one third of LMICs had reliable cancer treatment services for the general public as compared to over 90% in the developed countries. These poor figures could be implicated in the pattern of the disease outcome in LMICs as most cancer victims present in the late stages of the disease due to poor access to diagnostic and treatment services. It is

important to also note that, according to the 2020 report of the Global Initiative for Cancer Registry Development of the International Agency for Research on Cancer (IARC), the cancer research arm of WHO, only one out of every five LMICs has reliable data available to analyse the true situation of cancer in these parts of the world and to influence policy changes in that regard, both locally and internationally. This creates a possibility that despite the highlighted gaps in diagnosis and treatment of cancers in LMICs, there could still be a large hoard of underreported cases especially amongst the most under-served populations which, in most cases, have not been considered in the already alarming and bizarre data of WHO listed.

Beyond the public health implication of cancers, the risk and burden of disease and risk of death, also comes the socioeconomic impact of cancer as a disease and the financial consequences for the society. According to the WHO cancer factsheet, the United States of America alone spent in excess of US$ 1.16 trillion, based on their 2010 estimates alone. This spending covered data gathering, cancer screening and diagnosis, cancer treatment as well as research efforts in cancer prevention, diagnosis and treatment that is relevant to American natives with extension to global health coverage in cancer care. With far less health budget allocations, LMICs have lesser resources to cope with these expenditure trends despite the huge burden of cancer and year-on-year gaps in cancer care appear to be widening compared to developed countries.

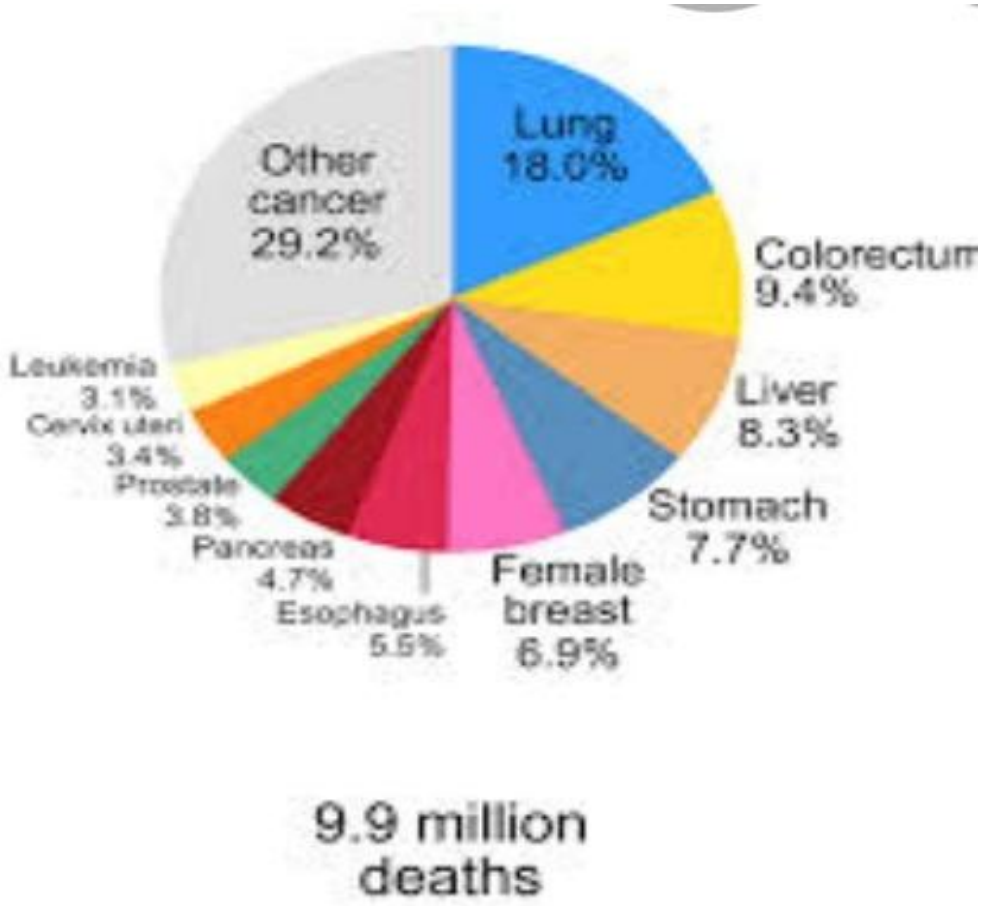

Figure 2.1: GLOBOCAN 2020 Estimate on cancer-related mortality rates among Females across all Ages (GLOBOCAN-IARC, 2020)

2.2 Breast Cancer – Morphology and Population at Risk

All normal humans, male or female, have a pair of breasts from birth which lie on the upper part of the front of the chest. Quoting from the breast section of the anatomy manuscripts by Ellis and Mahadevan (2013), "From birth until puberty (the stage of a female's development when menstruation starts i.e. menarche), the breast consists of lactiferous ducts (pipes for conducting milk), with no alveoli (milk-producing sacs) but at puberty, the ducts start to proliferate (growing rapidly) and their terminations form solid masses of cells which are destined to be the future breast lobules (the firm parts of the breast). This makes the female breasts larger, more voluminous, firmer and have more mass and density. During pregnancy, secreting alveoli appear so that during the early weeks, ductal sprouting and lobular proliferation (rapid growth) occur, withincreased nipple and areola pigmentation (i.e., they become darker). The alveoli, at this time, display a lumen surrounded by the secretory cells. In the last days of pregnancy, the breasts secrete colostrum, a yellow, sticky, serous fluid, which is then replaced by true secretion of milk. When lactation (milk production) ceases, the glandular tissue returns to its resting state. After the menopause (cessation of menses as a woman's age advances into 5th and 6thdecades of life), the glandular tissue of the breast atrophies (shrinks), the connective tissue becomes less cellular, and the amount of collagen (tough and firm tissues) decreases. In some women, marked fatty infiltration (filling-up with fat) of the breast occurs at this stage; in others, the breasts shrink considerably."

In the adult female who has attained puberty, the mass of the breast extends from around the level of the second rib above to the level of the sixth rib below. From the sides, the breast area extends from the edge of the sternum {the bone at the centre of the chest, in the front} to about the level of the centre of the armpit {axilla} (Pandya & Moore, 2011). At the upper outer end of the breast, it extends like a tongue into the armpit. That part is referred to as the axillary tail of the breast. Most of the bulk of the breast mass is usually housed in the upper outer part of the breast. This area is the commonest origin and location of most breast cancer and in most benign lesions of breast tissue (Prendergast, 2013).

Before the age of puberty, the structure of a male and female breast is essentially the same, both consisting of small components of underdeveloped ducts and few non-milk producing alveoli. In the female, the prime function of the breast is lactation, which simply means manufacturing, storage and ejection of breast milk. Therefore, the make-up of a female body after puberty, presupposes that the breast has to develop and be prepared for pregnancy and child birth, all the

time, in anticipation of the need for breast feeding the child product of that natural process of pregnancy. The growth of the breast is rapid at this stage and largely occurs under the influence of female sex hormones (chemicals produced by the body to control and regulate tissue and organ functions), primarily oestrogen and also progesterone (Ellis & Mahadevan, 2013). This sudden prominence of the breast also makes it a source of recognition of feminism and, as such, a secondary female sexual feature. A fatal consequence of this hormone-driven rapid breast growth and development, which lasts the reproductive lifespan of a woman and beyond, is an aberration of abnormal, rapid and uncontrollable growth, which is the breast cancer. When the female then attains menopause, there is then a natural and steep drop in the production of these influential female sex hormones (oestrogen and progesterone). As such, the breast that they influence begins to experience reduction in contents of fat and milk- producing tissues and progressive reduction in density and firmness. That forms the basis for easier detection of breast cancers among menopausal women through mammography than women who are yet to attain menopause {who still have a firm and dense breast}(McGuire, 2015).

While breast cancer can start its growth from different parts of the breast, most breast cancers begin their growth from those ducts (lactiferous ducts) that carry milk to the nipple and, as such, are called ductal cancers while others start in the glands (alveoli lobules) that make breast milk and, as such, are referred to as lobular cancers. There are also other types of breast cancer that are less common and there also exist a small percentage of breast cancers that originate from other tissues in the breast. These cancers are called lymphomas and sarcomas and are not really regarded as breast cancers (Your Guide to the Breast Cancer Pathology Report by Breastcancer.org). Many types of breast cancer cause a lump to form in the breast. Other symptoms of breast cancer exist that should be watched out for, and reported to a health care provider as soon as noticed. It is important to also note that most breast lumps do not necessarily imply breast cancer as a large proportion of these are benign. Benign breast tumours are equally abnormal growths in the breast, but they do not spread outside of the breast and they are not life-threatening by any means though some benign breast lumps can increase a woman's risk of getting breast cancer later in life. Any breast lump or change, once identified by the woman, needs to be checked by a health service provider to determine whether it is benign or harmful, and whether it may have an impact on future cancer risk (American Cancer Society, 2016).

Though it is generally safe to assume that any woman that has attained puberty is at risk of developing breast cancer, several scientific models have been developed by extensive research to

accurately estimate and stratify women's life-time risk and probability of developing breast cancer (Gail *et al.*, 1989; Prout 2000). Perhaps, the two most important risks associated with development of breast cancer are female gender {being a woman} and advancing age {growing up as a woman}(Allen *et al*, 2010).

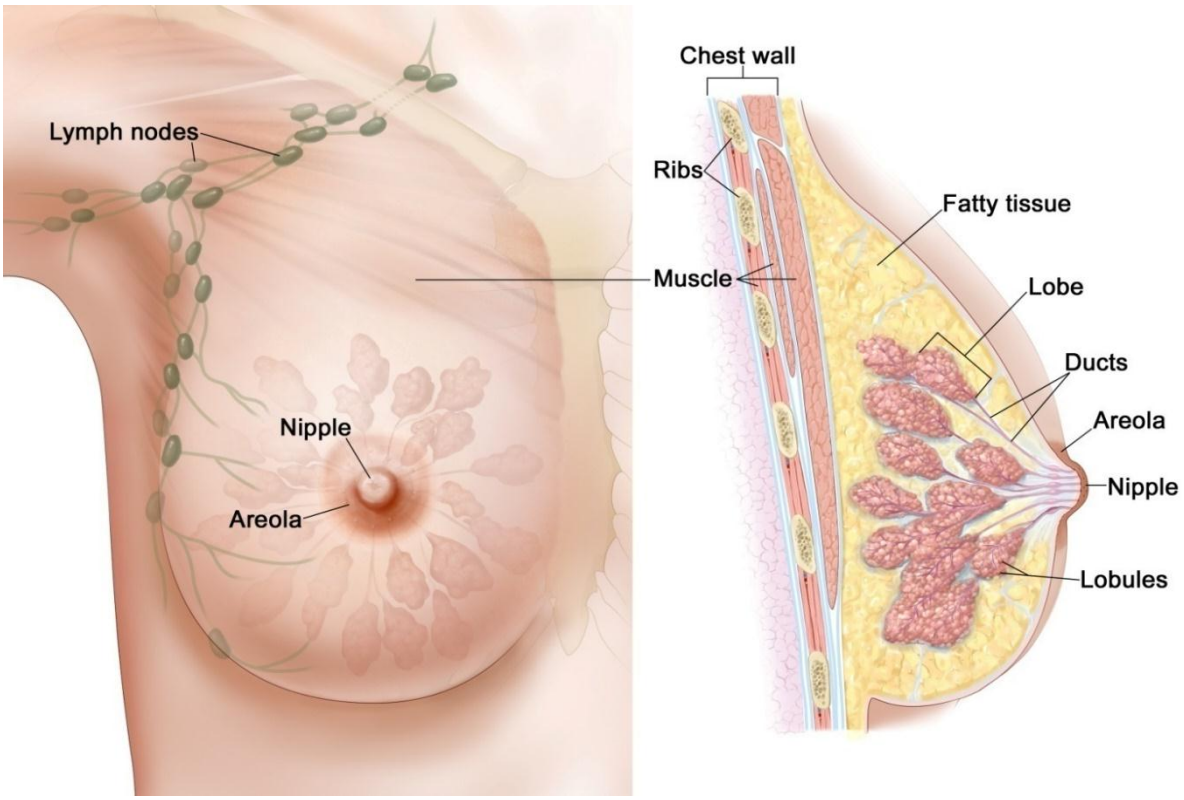

Figure 2.2: Morphology of the breast - Adapted from *Terence Winslow LLC.(2011)*

2.3 The Burden of Breast Cancer - Breast Cancer Incidence, Prevalence, Associated Morbidity and Mortality

According to Sylla & Wild (2012), cancer, like other non-communicable diseases (NCD), has become a major source of morbidity and mortality globally. In 2008 alone, GLOBOCAN reported estimates of 12.7 million new cases and 7.6 million cancer-related deaths (Ferlay *et al,* 2008; GLOBOCAN, 2020). Majority (56%) of these newly reported cancer cases occurred in developing countries and it is projected that by 2030, 70% of all new cases of cancer will be found in developing countries (Boyle, & Levin 2008). In addition, there are previous reports of high morbidity related to late presentation of breast cancer in Nigeria. (Forman *et al* 2014 and Awofeso *et al* 2018).

More recently, the World Health Organization (WHO) also stated in the February 2017 edition of the Fact sheet, that cancer is one of the leading causes of morbidity and mortality globally, with approximately 14 million fresh cases in 2012, which is expected to increase to about 70% over the next two decades. With 8.8 million deaths recorded in 2015 as a result of cancer, WHO rated cancer as the second leading cause of death all over the world.

According to Parkin *et al.* (2001), breast cancer was the most common cancer in women worldwide, with an estimated 1.05 million new cases in the year 2000; and matched gender-for-gender, was second only to lung cancer. While Sen *et al.* (2002) reported an Eastern India prevalence of 22.7% in 2002, and Mohaghehi *et al*. (2009) reported similar findings among women in Iran. The same cannot be said of native African women populations. Parkin *et al.* (2007) studies of breast cancer incidence on the African continent were characterised by regional variation as the incidence was 27% of cancers in North African countries (Algeria and Egypt) compared with 15% in sub- Saharan Africa. However, according to American Cancer Society, the highest rates occur in the United States of America (USA) and Canada, and the lowest rate is found in Asia (American Cancer Society, 2016). Sitas *et al*. (2000) reported cervical cancer to be the most common cancer among women in most of sub-Saharan Africa; however, it has been relegated to the second most common after breast cancer, according to recent data from Jedy-Agba, *et al* 2012. On the contrary,
more recent reports from GLOBOCAN 2020 estimated new cases of cancers in year 2020 to be 24.5% for breast cancer, and a much lower value of 6.5% to cervical cancer. This indicates a change in the direction of the trend as breast cancer takes the lead.

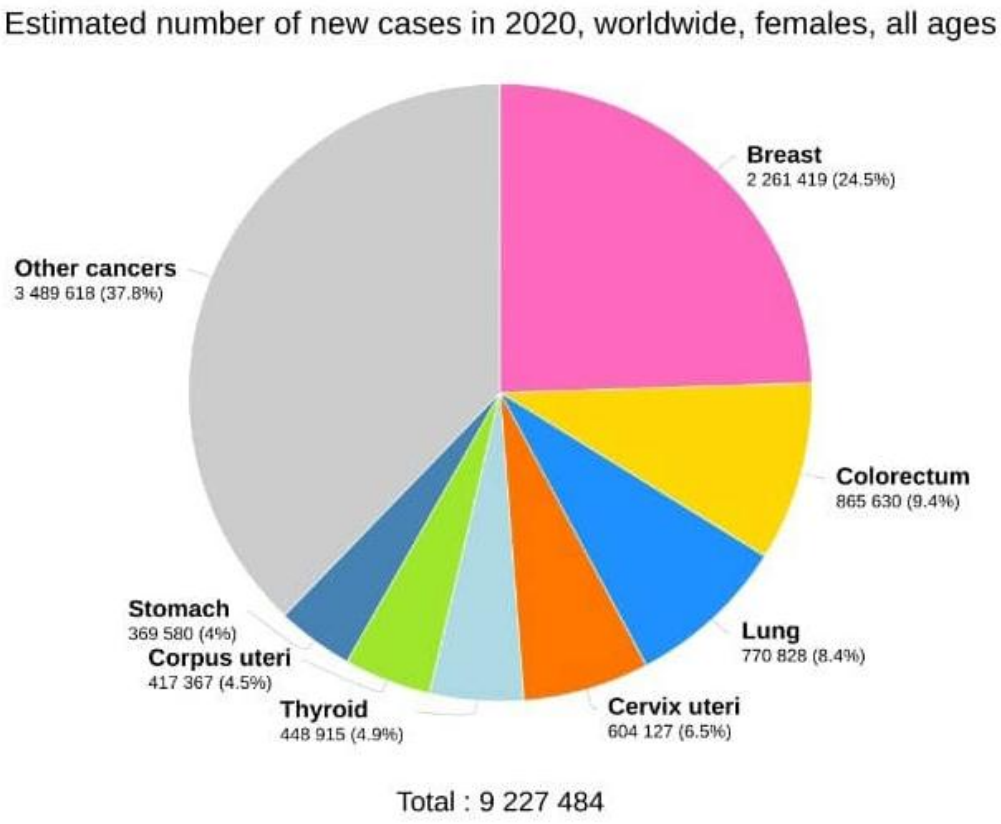

Figure 2.3: GLOBOCAN 2020 estimates of cancer incidence among females across all ages

Breast cancer is regarded as the most common cancer among American women, except for skin cancers with suggestions that about 1 in 8 (12%) women in America will develop invasive breast cancer during their lifetime. In 2020, estimates for breast cancer by the American Cancer Society reported new cancer cases and deaths to be 1.8 million new cancer cases diagnosed and 606,520 cancer deaths in the United States.

American Cancer Society trends observation revealed that after increasing for more than 20 years, breast cancer incidence rates in American women began decreasing in 2000, and dropped by about 7% from 2002 to 2003. This large decrease was thought to be because fewer women used hormone therapy after menopause after the results of the Women's Health Initiative were published in 2002 which revealed a link between using hormone therapy to an increased risk of breast cancer and heart diseases. In recent years, incidence rates have been stable in white women, but have increased slightly in African American women. American Cancer Society also reported that breast cancer is the second leading cause of cancer death in women as only lung cancer kills more women each year in America. It estimated that the chance that a woman will die from breast cancer is about 1 in 36 (about 3%). It however noted that, death rates from breast cancer have been dropping since about 1989, with larger decreases in women younger than 50. These decreases are believed to be the result of finding breast cancer earlier through screening and increased awareness, as well as availability of better treatments (American Cancer Society, 2016). Though breast cancer has for long been recognized as a major public health burden in many high-income countries, the majority of cases actually occurs in low- and middle-income countries (LMICs), and it is expected that incidence rates will rise most rapidly in these LMICs.

The exact incidence and prevalence of breast cancer in Nigeria is not known to date as no absolutely reliable population-based study exists that focuses on breast cancer, but institution-based data exist (Afolayan *et al*, 2012). In recent times, most of the information on cancer incidence, prevalence and mortality in Nigeria has been based on estimates from case series, medical records, hospital-based cancer registries, mortality records and Ibadan population-based cancer registry (IBCR), the first cancer registry in Nigeria set up in 1962 (Parkin *et al*, 2003). This paucity of reliable and representative data and sparse literature review on the trends of breast cancer in Nigeria due to lack of an existing unified and comprehensive National Cancer Registry makes most of the functional cancer registries to be hospital-based or pathology-based instead of the preferred population-based cancer registries and has been the mainstay of research information ever since. An abridged population-based analysis of a burgeoning National Cancer

Registry data factoring in data from Ibadan and Abuja registries over a 2-year period, was done by Jedy-Agba *et al.* (2012). It revealed that breast and cervical cancers are the two most common cancers amongst Nigerian women, where they constitute about 64% of all female cancers.

The 2016 GLOBOCAN report also estimated that in Nigeria alone, some 100,000 new cases of cancer occur every year, with high case fatality ratio (ratio of death to number of new cases). Sylla & Wild, (2012) also reported that, Nigeria, which is home to about 20% of the entire population of Africa and slightly more than half the population of West Africa, contributed 15% to the estimated 681,000 new cases of cancer that occurred in Africa in 2008 possibly because of similar reasons as the rest of the developing world, such as increasing life expectancy, reduced risk of death from infectious diseases, increasing prevalence of smoking, physical inactivity, obesity as well as changing dietary and lifestyle patterns to those of the western world.

Similar findings on breast cancer incidence figures in Nigerian literature. Adebamowo and Adekunle (1999), Umeh (2006) and Jedy-Agba *et al* (2012) all reported that in Nigeria, like in many developing countries, there appeared to be an increase in the incidence of breast cancer with a progressive year-on-year increase in its incidence. According to Parkin *et al.* (2014), the age-standardized incidence rates for breast cancer in Africa, in the period 1960–1969 were 13.7 per 100 000, rising to 15.3 per 100 000 in 1976, and nearly doubling to roughly 24.7 per 100 000 by 1998–1999, a 25 percent increase in incidence each decade.

Oluwatosin (2006) reported that a 75% increase in cancer incidence has also been projected in developing countries between 2000 and 2020 and with submissions by Adebamowo *et al*. (2000)about characteristics of breast cancer in Nigeria (which include poor health care structure especially at the primary and secondary health care levels, its affliction of the relatively young, as emphasised above; its aggressive course in the Nigerian population, late presentation and absence of a well-coordinated and comprehensive National Cancer programme), it can be concluded that in the near future, the burden of breast cancer as a disease in Nigeria will indeed be enormous and requires ongoing pro-active, well planned and thoroughly researched measures to prevent it from overwhelming the healthcare system.

Jedy-Agba *et al.* (2012) estimated the incidence in 2009 to 2010 at 54.3 per 100 000, a 100 percent rise over the previous decade and higher than the GLOBOCAN 2008 estimate of 38.7

per 100 000, despite the fact that the GLOBOCAN estimate was for the entire nation and assessed a different time period. Jedy-Agba *et al.* (2012) further mentioned that the observed rising incidence could be both apparent and real. They cited a 2011 study by Forouzanfar et al. to argue that some of the increase was due to better diagnosis, case finding, and access to care, but that some of the increase was real, likely due to rising prevalence of risk factors for this cancer in previously low-incidence populations, such as tendencies toward westernization in developing countries.

2.4 Risk factors for Breast Cancer (Including Modifiable and Non-Modifiable Factors)

The World Health Organisation defines a risk factor as any attribute, characteristic or exposure of an individual that increases the likelihood of developing a disease or injury (WHO, 2017). Azubuike *et al.* (2018) classify risk factors broadly into two types: modifiable factors (i.e. risk factors that can be altered or that are adjustable for the purpose of altering or lowering the risk of acquiring the disease); or non-modifiable factors (those that cannot be altered or adjustable to reduce or eliminate the chances of the person from acquiring the disease). Like every other cancer, breast cancer also has both modifiable and non-modifiable risk factors (Singletary, 2002).

Among the non-modifiable risk factors, for development of breast cancer is belonging to the female gender. Breast cancer is one hundred times more common among women than men. This is probably because men have less breast tissue, as well as less of the female hormones (oestrogen and progesterone) which can promote breast cancer cell growth (American Cancer Society, 2016; Azubuike *et al.,* 2018). Also, advancing age has been proven to be predisposing factor to breast cancer. The incidence of breast cancer is low before the agsinglee 30 (incidence of 25 new reports per 100,000), then rises in a linear fashion until the age of 80, when it reaches a plateau of slightly less than 500 cases per 100,000 (Ries *et al.,* 2000; SEER Cancer Statistics Review, 2000). In a comparison of all women under the age of 65 against those older, the relative risk of breast cancer associated with age increase is 5.8 (Singletary, 2002; Oladimeji *et al.* 2013).

Age is a critical factor in the development of breast cancer. It tends to develop in women after the age of 20, levelling up to a plateau at the age of 45–55 years, and thereafter increasing to a peak at 50–60 years (Bassey *et al.,* 2011). In developed countries, Umeh (2006) asserted that the age-specific incidence of breast cancer appears to increase with age with women in their fifties

the most commonly affected. The author also suggested that about 50% of breast cancers occur in-between the ages of 50 and 65 years and 30% occur in women 70 years and above. Hospital-based data suggest that the peak age incidence of breast cancer appears to be lower amongst Nigerian
women (45–50 years) compared to European and American women with higher figures (Sule, 2011). Breast cancer has been found to be the leading cancer affecting young premenopausal and peri-menopausal Nigerian women (Nwagbo & Akpala, 1996). Some studies concluded that generally, breast cancer in Nigerian women presents a decade earlier than their counterparts in developed countries (Umeh, 2006; Oladimeji *et al*., 2013).

Studies have proven that the genetic traits of an individual could predispose to breast cancer development. This is evident in the approximately 20% of breast cancer patients who have a positive family history of breast cancer, as well as the 5% of breast cancer patients who have a particular germline mutation discovered (Oladimeji *et al.*, 2013; Easton *et al*, 2007).
Positive family history: The report of Siegel et al (2020), on the genetics of breast cancer, reported breast cancer to be considered hereditary in about 5% to 10% of cases, with faulty genes transferred from parents to offspring from generation to generation. It was also revealed that factors for genetic predisposition to breast cancer included having blood relatives (grandmothers, mothers, sisters, aunts) who have been diagnosed with breast cancer before the age of 50 either paternally or maternally. The Triple-negative breast cancer has been diagnosed among any family members. Having a history of prostate, melanoma, pancreatic, stomach, uterine, thyroid, colon, and/or sarcoma, in addition to breast cancer is also a factor.in a family. If two women (family nembers) have been diagnosed with breast cancer or female descendant of Ashkenazi (Eastern European) Jews.

Reproductive factors have been reported to be predisposing to Breast cancer is an important aspect of the reproductive health that constitutes a significant health problem for women worldwide. Reproductive health is defined as a state of physical and social well-being, and not merely the absence of infirmity, in all matters relating to the reproductive system and to its functions and processes. (Ogunbode *et al*., 2013; Oladimeji *et al.*, 2013).

Reproductive factors have been known for decades to be major predisposing factors to developing breast cancer. Brinton *et al*. (1983) conducted a multicentre breast cancer screening study including over 280,000 women from 29 centers who were matched for ethnicity and age found that the most relevant reproductive factors are the age of menarche and menopause, as

well as the number and timing of pregnancies. It indicated that women who begin menstruating before the age of 12 have a relative risk of 1.3 for breast cancer as against those who begin after the age of 15. Also attaining menopause later in life is a disadvantage; women that reach menopause later (55 or beyond) in life are at higher risk of developing breast cancer with relative risk of 1.22 than those who reach menopause earlier (before the age of 45).

As far back as four decades ago, Brinton *et al.* (1983) explain that a woman's risk of breast cancer rose if she was nulliparous (had never been pregnant before) or had her first live birth at or after the age of 30, and that an early pregnancy had no protective effect if it was not brought to full term. This might be due to cell differentiation in the breast during the last weeks of a woman's first full-term pregnancy and subsequent lactation, which makes nursing a protective factor if done for 1.5 to 2 years. The explanation given for this possible protective effect may be that breastfeeding reduces a woman’s total number of lifetime menstrual cycles (in a similar way to starting menstrual periods at a later age or going through early menopause as explained earlier (Sule, 2011).

Birth control methods which include oral contraceptives and injectables like Depot-medroxyprogesterone acetate (DMPA). Beaber *et al.* (2012) found that women using oral contraceptives (birth control pills) have a slightly higher risk of breast cancer than women who have never used them (OR, 1.5; 95% CI, 1.3–1.9) and there seems to be reversal of this risk over time once the pills are stopped and with no increased risk for women who had discontinued oral contraceptives use more than 10 years before (Beaber *et al*. 2014). Also, a number of studies have looked at the effect of DMPA, an injectable form of progesterone that is administered once every 3 months, on breast cancer risk. Some studies found out that women currently using DMPA seem to have an increase in risk with a 2.2-fold (95% CI: 1.2–4.2) increased risk of invasive breast cancer and the risk did not increase if this drug was used more than 5 years ago (Kelechi *et al.,* 2013; Li *et al*. 2013).

It has been known for over four decades that some lifestyle patterns are predisposing to developing breast cancer. In a study by Pathak and Whittemore (1989), breast cancer risk assessment models also identified other modifiable risk factors that play less important roles especially in developing countries like obesity (being overweight), alcohol consumption, cigarette smoking, exposure to irradiation, intake of high fat diet, use of hormone replacement therapy after menopause etc.

In a study carried out by Oladimeji *et al.* (2013) on risk factors associated with breast cancer among women in Warri and Ibadan, Nigeria, which assessed a number of established and suspected risk factors for breast cancer, dietary pattern (69.2%) was mentioned to be the major risk factor associated with development of breast cancer while lack of good physical exercise accounted for 17.9%. Being limited to Warri and Ibadan, Oladimeji's study may be deficient and limited in scope. However, the study speaks to a number of issues about aggregate risk factor for breast cancer among Nigerian women. There was a finding of high rate of premenopausal breast cancer (56.7%) and high parity in Nigerian women compared to Caucasian women in whom parity is much lower and breast cancer is predominantly a postmenopausal disease (Pathak and Whittemore 1992). Corroborating other empirical evidences, the young population of women affected in Nigeria suggests a frightening narrative of the reality (Banjo, 2004; Adebamowo and Ajayi 2000).

Table 2.1: IARC and WCRF/AICR evaluations of 'modifiable' risk factors for breast cancer in women (IARC, 2014 & WCRF/AICR, 2010)

Sufficient/convincing evidence	**Insufficient/weak evidence**	**No conclusive evidence**
Increase risk	***Increase risk***	Meat
Alcohol consumption	Total dietary fat	Fish
Body fatness (post-menopausal)	Greater birth-weight (pre-menopausal)	Folate
Adult height (post-menopausal)	Tobacco smoking	Vitamin D
Any use of oral contraceptive pills (OCP)	Hormone replacement therapy	Calcium
Age at first child birth		Selenium
		Dietary fibre
		Glycemic index
		Soya-based foods
		Total energy intake
		Milk and dairy products
Decrease risk	***Decrease risk***	
Lactation	Fruits and vegetables	
Body fatness (pre-menopausal)	Physical activity	

According to Oluwatosin (2012), the youngest age of incidence of breast cancer in Nigeria has been reported to be 16 years while the peak age of incidence was 42.6 years. Twelve percent (12%) of cases occurred before 30 years while postmenopausal women accounted for 20% of cases, meaning, women within the child bearing age who are already at risk of morbidity and mortality from reproductive issues have additional cancer burden. (Oluwatosin, 2012). This at-risk group constitute a critical component of the family structure in homes as well as work force for the country, hence the alarm. In many high-income countries, Women with a family history of breast cancer are frequently targeted for screening, however due to poor record keeping and errors in breast cancer reporting, this strategy does not appear viable in any low- or middle-class nation (Wadler *et al.,* 2011).

2.5 Detection of Breast Cancer through early Breast Cancer Screening

According to the American Cancer Society: Breast Cancer Prevention and Early Detection (2014), breast cancer screening refers to, examinations and tests that are employed to detect or find the disease in asymptomatic women (i.e. "essentially referring to those women at risk of the disease but who have not developed any symptom of it"). On the other hand, the society defined breast cancer early detection to mean, "all the methods of finding and diagnosing a breast cancer earlier than it might have developed in a client waiting for the symptoms to start before taking action."

If discovered early, like in the first stage, breast cancer has the best chance of cure but generally speaking, early detection through cancer screening is the only way to reduce cancer morbidity and mortality in the general population that is at risk of the disease (Bastani *et al.*, 1994). Myers, et al (2015) in a systematic review, indicated a reduction of about 20% in mortality among women who had screen-detected breast cancer.

Perry *et al.* (2006), Heywang*et al.* (2011) and American Cancer Society: Breast Cancer Prevention and Early Detection (2014) all suggested the features of an ideal breast cancer screening method. These include: it's simpllicity to diagnose breast cancer early; it's acceptable side effects for the screened population (safety); it's capacity to yield reproducible results (reproducibility) and it's potential to be administered to the population at regular periods at a cost that is acceptable to the society (affordability).

In the last fifteen years, the same American Cancer Society (ACS), which is one of the world's leading research organisations and repository of breast cancer knowledge, has recommended breast cancer screening for all at-risk women employing essentially three major methods of screening imaging modality (like mammography, breast ultrasound and Magnetic Resonance Imaging (MRI) of the breast), Clinical Breast Examination (CBE) and Breast Self-Examination (BSE) (Smith *et al.,* 2005).

2.6 The Role of Breast Cancer Screening in the Reduction of Cancer-related Morbidity and Mortality

Breast cancer is a non-communicable disease with a high morbidity and mortality when detected late or when it is already advanced. According to a review article by Heywang-Köbrunner *et al.* (2011), on the average, the death rate from breast cancer increases by 1.3% per millimetre increase in size of the detected breast lump or mass with a gradual progression towards more advanced disease as the tumour becomes more prominent indicating that early detection has a significant impact on outcome of any intervention and, is directly related to the stage of the disease.

According to Park, (2007), in every health system, there should exist three levels of prevention. These include primary prevention, secondary prevention and tertiary prevention.

Primary prevention is aimed at improving the overall health of the population. It targets the healthy population at the family and community level, in disease prevention. This focuses on achieving prevention through health education about lifestyle modification issues and creating legislation in that regard. Secondary prevention is aimed at detecting disease conditions like cancers through screening and treatment of early disease. It is commonly population-based and Tertiary prevention is aimed at limiting disability of already established disease and carrying out rehabilitative measures to improve human functionality. This is often hospital- based and much more expensive.

Though, each of the three approaches has an important role to play in disease prevention, it is important to emphasise the greater importance of an upstream population-based approach of primary and secondary prevention, which tend to be cheaper, and more efficient with additional benefit of lower morbidity and mortality rates. Health promotion models targeting populations and communities tend to inextricably become intertwined with disease prevention strategies for effectiveness. According to Caplan (2014), in many parts of the world, the primary prevention of

breast cancer is an uncommon practice and it is still largely unavailable except by extreme measures such as prophylactic mastectomy (i.e. an anticipatory surgical removal of the breast tissues only) done for women who have proven high genetic risk of breast cancer. Therefore, commonly, community, national and international efforts are geared towards promoting early detection of breast cancer with a view to diagnosing and treating breast cancer patients at an early stage of the disease when they have the best chance of long-term survival.

The attempt at reducing breast cancer mortality and to improve survival has been a public health priority in many parts of the world since the mid-1980s (Engstrom, 1986). In earlier studies, like the meta-analysis of 87 studies by Richards *et al.* (1999), there was a poorer chance of survival as a result of delayed diagnosis with breast cancer presenting at a more advanced stage with strong suggestions that women who begin treatment 3 to 6 months after the appearance of breast cancer-related symptoms have significantly worse survival than women who presented with symptoms of less than 3 months. Smith *et al.* (2013) carried out a retrospective case-based study of 8,860 adolescent and young adult breast cancer cases diagnosed over a 10-year period from 1997 to 2006, obtaining data from the California Cancer Registry database in which they discovered that the 5-year survival was 80% in women who were treated by surgery after a treatment delay of more than 6 weeks as compared to 90% ($p = 0.005$) in those with treatment delay of less than 2 weeks. Treatment delay was defined as the time (in weeks or months or years) between the date of clinical diagnosis of the cancer and the date of definitive treatment. The study also discovered after multivariate analysis, that longer treatment delay was a significant risk factor for shorter survival and that it had more adverse effect in African-American women, particularly those with public or no insurance, or those in the low socioeconomic status (Smith *et al.,* 2013).

Other studies by Brazda *et al.* (2010) and McLaughlin *et al.* (2012) also corroborated the poor survival that attends late stages of breast cancer. Misaonu *et al.* (2011) indicated that breast cancer is characterised by late presentation and poor outcome in many developing countries due to severe lack of the resources and public health facility for early detection of breast cancer. Ogunbode *et al*. (2013) revealed that this high morbidity and mortality attributed to this late presentation can be significantly reduced by early detection and prompt treatment.

As indicated previously, with sufficient data suggesting breast cancer mortality is generally higher in low- and middle-income countries (LMICs) as compared to developed countries, it is important to identify the possible causal factors in order to design a reliable, efficient, effective

and enduring model of improving breast cancer screening in the general population. Coughlin and Ekwueme (2009) and Akinyemiju (2012) explained that the reasons for these disparate outcomes of breast cancer between the two societies are multi-factorial and that they include, but are not limited to, lack of breast cancer awareness and early detection in LMICs, poverty, peculiar and inimical cultural and religious beliefs, social misconceptions about the disease amongst women and even men, cultural restriction of the autonomy of decision making by women and the morbid fear of possible breast removal (mastectomy) if medical attention is sought. All these, according to Yip *et al.* (2008), and Coughlin and Ekwueme (2009) may be why more than 90% of women with newly diagnosed breast cancer in the United States are in the early disease, whereas more than half of women with newly diagnosed breast cancers in LMICs have advanced stage of breast cancer at time of first presentation to a health facility. According to an analysis from the 2003 World Health Survey, only 2.2% of women aged 40 to 69 in LMICs had received any breast cancer screening (Akinyemiju, 2012).

According to American Cancer Society (ACS, 2016), the screening guideline recommendations include screening women without symptoms and with no unusual risk factors for breast cancer, if aged 20 to 39 years; BSE should be done monthly. Clinical Breast Exam (CBE), on the other hand should be done by a trained health professional every one to three years. However, if aged 40 years and above, BSE should also be done monthly. CBE done yearly by a trained health professional and mammogram starting at age 40.

Women with higher or increased risk of breast cancer from family history or other reasons will require early appointment with health care provider to determine when to begin screening mammograms or commence frequent clinical breast examination. It could be concluded from the foregoing that breast cancer detection at the community level can best be achieved in a resource-limited setting by ensuring women are breast aware (Oluwatosin *et al.*, 2006; Ogunbode *et al.*, 2013). Breast awareness improves the tendencies and practice of breast screening generally among all populations of women (Crooks and Jones, 1989). Being 'breast aware' means a woman is able to easily identify symptoms of breast cancer by showing commitment to regular breast examination practice. This generally improves her consciousness and tendencies towards seeking solutions to the problem early (i.e., improves her health-seeking behaviour) as well as improving her disease survival attributable to early detection and treatment of the breast cancer (Oluwatosin & Oladepo, 2006; Smigal *et al.*, 2006).

2.6.1 Screening Imaging Modality (Especially Mammography)

Mammography involves using soft tissue x-rays to examine the breast in order to identify abnormalities that may be suggestive of a breast disease or abnormal growth. It is often recommended for women with less dense or lax breast tissues especially those above 40 years of age (Misauno *et al.* 2011; Ogunbode *et al.* 2013). On the other hand, breast ultrasound scan involves using an ultrasound equipment item to examine the breast and this is best applied to the examination of a dense breast like for women 35 years and younger essentially for the same reason as mammographic evaluation.

Though with varying benefits and outcomes from randomized control trials and meta-analysis, the World Health Organisation (WHO) and several other national cancer control programmes including, but not limited to, those of United kingdom (Independent UK Panel Review, 2012), Canada (Miller *et al.*, 2014), United States (Pace & Keating, 2014) and Sweden (Tabar *et al.*, 2011), have all recommended population-based screening mammography for detection of early-stage breast cancer in high-income countries, the applicability in screening the general population or cohorts of the population in a resource-challenged setting is still few and far in between (Chen *et al*., 2017).

Taking United States of America as an example of a developed and resource-sufficient setting, Smith *et al.* (2016) inferred from the most recent recommendations of the American Cancer Society (ACS), that women with an average risk of breast cancer should undergo annual mammographic screening from the age of 45 and continue it till the age of 54, after which they can transit to annual or 2-yearly screening. Also, women between 40 and 44 years have the opportunity to begin annual screening mammography depending on their estimated aggregate risk. Unlike the USA, Nigeria currently has no national breast cancer screening programme or established protocol for breast cancer screening at the national and sub-national levels. There is no current programme for population-based screening either and because of the challenges of poor infrastructure, poverty, and inadequate manpower, mammography is a long-reach for many women at risk of the disease (Olaseinde *et al.*, 2016). Since waiting for the development of such capabilities will certainly lead to continued loss of life as a result of late presentation, it is pertinent to develop a home-grown solution to address the challenge.

Advantages of mammography in breast cancer screening for the general population

Mamogram reduces in breast cancer mortality. Population-based mammographic screening guarantees as high as 35-40 % reduction in breast cancer-related deaths as seen in several publications like those from Swedish Organized Screening Evaluation Group (2006) and Jonsson *et al*. (2007) from Sweden; Roder *et al* (2008) from Australia and Schopper *et al.,* (2009). Furthermore, it improves treatment outcomes and improves chances of survival. Mammography also has huge potential to facilitate early diseases diagnosis hence prompt referal to secondary or tertiary care facility where they can be treated early.

documented in large population-based screening series from European countries like that of the Health Council of the Netherlands (2002).

Mamography is highly reproducible and reliable. It is highly sensitive and specific especially where it is deployed for routine national screening programmes leading to increased quality assurance of the diagnostic chain (Heywang-Köbrunner *et al.*, 2011).

Disadvantages of mammography for general screening

It employs radiation energy to acquire images of the breast which is a potential risk. Studies have shown that at an average dose of 4mGy delivered to each breast during digital mammographic screening, the life time risk of annual mammographic screening for a woman between the ages of 45 and 70 years matches or is actually lower than the cumulative risk of death from undetected breast cancer that becomes advanced prior to intervention (Yaffe & Mainprize, 2011).

Mammographic screening for breast cancer, like any other medical test that uses technology, has the potential to discover anomalies that require additional investigation but may not ultimately turn out to be breast cancer. (could possibly be benign). This is referred to as false alarm. According Perry *et al.* (2006). This false alarm may happen to 30 to 40 mammographically-screened women out of 1000. This may lead to unnecessary apprehension, undue referral for further invasive (surgical) procedures and increased risk of exposure to complications of such, erosion of confidence in screening and presentation for subsequent follow-up screening, among target populations and or other female relatives, resource waste and challenges of quality assurance (Brewer *et al.*, 2007).

This issue is very important, particularly in deployment of such an expensive technology-based screening tool for national breast screening programme in a low to middle socio-economic society where the general level of education and health service structure is less developed to cope with these challenges when they occur and as such may significantly lead to poor compliance with screening appointments by the target population and failure of such programmes.

Overdiagnosis by a breast cancer screening programme refers to the possibility of more breast cancer diagnoses in a community of screened women than in a comparable unscreened group of women of the age range and features (Heywang-Köbrunner *et al*., 2011). Initial reports confirmed the fact that screen-detected cancers may include some cancers that have a favourable long-term outcome because they may be slow growing and some of them might not have developed into invasive cancer (rapidly debilitating type of cancer) if left alone without treatment (Feig and Ductal, 2000). It is assumed that these additional cancers detected in the screened population would not have been detected without screening, and that diagnosing them or not may not necessarily contribute to reducing the chances of the patient's death from it because the 'over diagnosed' cancer (which is indeed a cancer) does not pose a threat to her life because she will have died of a different cause.

This assumes that the unique life duration of each woman is unknown prior to the screening, making it impossible to precisely identify which discovered breast cancer constitutes an overdiagnosis and which one poses a potential threat to the patient's life if kept undiagnosed and therefore untreated. Unfortunately, because it deals with an extreme type of length time bias in screening, the notion of overdiagnosis is frequently statistically computed, and its computation may be complex and contentious, as demonstrated by the study of Zahl *et al.* (2008) overdiagnosis which was rejected by another article from Paci e*t al*. (2009) and a similar one by Jørgensen and Gøtzsche (2009) which gave high figures and was rejected immediately by a response of Pisani and Foreman. (2009).

Any mammography screening practice for early detection of breast cancer conducted outside of a national screening programme on a woman with no symptoms and no elevated risk is referred to as 'opportunistic screening. Though, unacceptable in some regulations, opportunistic screening can be a disadvantage of mammography as well as overdiagnosis and a few reports suggest one is not more important than the other (Zackrisson, 2006). Despite these concerns, mammographic

screening for women aged 40–69 years has substantially contributed to a significant reduction in breast cancer-related deaths particularly in organized screening programmes perhaps because it has led to a shift from late-stage diagnosis to early-stage detection. Also, the recent development of tomosynthesis, which creates high-resolution, three-dimensional images, has increased breast cancer detection while reducing false recalls (Houssami, 2015). Because the greatest harm of overdiagnosis is overtreatment, the key goal should not be less diagnosis but better treatment decision tools (Lynge *et al.*, 2018).

Perhaps in a resource-challenged environment, the most important disadvantage of mammographic screening is the fact that screening is available only in the private sector in most developing countries with many of such facilities existing without clearly defined eligibility guidelines (which should clearly elucidate the appropriate age, consider any associated comorbidities or projected life expectancy), no quality control measures, and no follow-up procedures for those at-risk women with screen-undetected disease (Galukande & Kiguli-Malwadde, 2010). These challenges are further over-stretched by severe prohibitive cost implications of carrying out mammography which is, more often than not, paid for out-of-pocket, by the screened women. According to a report of the experience of women from Malawi, a low-income country in Africa, Gutnik *et al.* (2016) reported that intending women who seek mammographic screening from private outlets pay average of US$90 per session of the test in a country with an annual gross domestic product per capita of US$253. This is certainly prohibitive and unsustainable in a low to middle income society and has negative implications for breast cancer screening as well as to health seeking behaviour.In addition, limited evidence is available on the role of mammography in reducing breast cancer mortality among women between 40 and 50 years of age, which is the age group within which most cancers in low- and middle-income countries are diagnosed (Knaul *et al.*, 2012; Lauby-Secretan *et al.*, 2015).The same challenges exist for other imaging modalities of breast screening like ultrasound and magnetic resonant imaging as population-based screening tools in a low resource environment (Corbex *et al*., 2012).

2.6.2 Clinical Breast Examination (CBE)

According to Oluwatosin (2012), Ogunbode *et al*. (2013) and American Cancer Society (ACS): Breast Cancer Prevention and Early Detection (2014), the physical examination of the breasts performed by a skilled health care worker like a doctor, nurse or other trained health worker is

called Clinical Breast Examination or CBE. CBE as a screening method requires the screened woman to present herself at a health facility and the trained examiner to use his or her fingers (referred to as Palpation) to examine the breast of the woman for presence of any sign or warning sign of breast cancer in the breast. International guidelines recommend CBE as a preferred approach to screening in settings where mammography is not readily available or affordable especially amongst asymptomatic women over the age of 20 (Yip *et al.* 2008; World Health Organization (WHO), WHO Position paper on Mammography screening, 2014). Miller *et al*. (2014), like in a previous study by Jatoi (2003), actually concluded that CBE as a screening tool is as effective as mammography in high-resource settings in relation to reducing mortality by breast cancer early detection.

In the conclusion of Gutnik *et al.* (2016), though mammography has proven screening efficacy (especially in an organised population-based screening system of a resource-rich setting) and it is typically accessed in settings where follow-up diagnostic services are readily available and travel distances for follow-up are short; CBE still has a relevance in screening because of its lower cost, lower technical requirements, wider implementability in a large population and the fact that it can be easily packaged with other health services in a local community.

A properly performed CBE includes a comprehensive breast-related medical history to help establish possible risk factors like personal and family history of breast disease and breast cancer, which is followed by a detailed breast examination, both conducted by the attending health worker. According Veitch *et al.* (2019), the examiner starts by inspecting for skin abnormalities with the woman seated or standing, firstly with her arms relaxed and hanging, then with her arms above the head, and finally with arms akimbo and hands pressing into the waist. The area of examination should extend from the collarbone (clavicle) towards the mid-sternum (the central chest bone in front), then towards the middle of the armpit line (mid-axillary line), and to the lower part of the breast. It is also pertinent to examine the armpit (axilla) to search for possible lymph nodes.

Conducting a CBE with the fingers (Palpation) is best performed with the woman in different positions like sitting up or upright (except for women with large breast), lying on her back (Supine), and lying oblique (tilted position) on the examination bed (McDonald *et al.,* 2004; Ogunbode *et al.,* 2013). Such examination involves spending upward of 2 minutes on each breast to improve the sensitivity of detection of small lesions, using the pads of the second, third and

fourth fingers of the examining hand, held together and searching in a pattern as described above, all in a bid to ensure its accuracy (Campbell *et al.*, 1991).

World over, CBE appears to be the most practiced form of screening even in the resource-sufficient parts of the world (Ogunbode *et al.,* 2013). Available information from Egypt confirmed that CBE deployment in breast cancer screening is both cost-effective and efficacious in urban, semi-urban and rural settings for a low-middle-income country (Denewer *et al*., 2010). In a pilot study, trained rural nurses in Malaysia were able to use CBE to detect early breast cancer in 77% of screened women over a four-year period thereby halving the late presentation of breast cancer over the same period (Devi *et al*., 2007) whilst a cluster randomized trial in India reported a preliminary result suggesting CBE conducted by female community health workers detected early disease (18.8 per 100,000 examined women in their intervention) versus control villages (8.1 per 100,000 presenting women) (Sankaranarayanan *et al.*, 2011). In Nigeria, a questionnaire-based study which enrolled 63 family physicians (total number of 82) from 4 out of the 6 political regions of Nigeria including the Federal Capital Territory in Abuja found that monthly CBE was carried out by 48.9% of them on the female patients that they followed-up regularly (Ajayi &Adewole, 2002).

Abuidris *et al.* (2013) reported that the utilization of even trained lay voluntary workers to conduct CBE in rural Sudan on approximately 10,000 women that were 18 years and above detected seventeen cases of early-stage breast cancer in one rural community as against four cases of self-referred women who were diagnosed with advanced breast cancer at another rural area used as control. Similar findings were noted in another study in Tanzania by Ngoma *et al.* (2015) which implies that lay persons without even formal health worker training for local community can have adequate short informal training for deployment to conduct breast cancer screening as part of a broader community or population-based screening programme and still achieve similar results to those obtained from formally trained and engaged community health workers particularly in a resource-challenged setting.

Several reports have indicated that CBE and Breast Self-examination (BSE) as separate or collective screening tools have supplementary as well as inter-dependent effect on breast awareness as well as health-seeking behaviour and attitude as it relates to early detection of breast cancer. Okobia *et al.* (2006), Chioma and Asuzu (2007) and Ogunbode *et al.,* (2013) all explained that when the breast is examined using CBE, if the techniques and findings of the examination are also explained in details to the client. The women are provided with needed

health education and feedback to understand what the health care worker or examiner is evaluating and the important things to emphasise during screening examination of the breast. This knowledge is very important to the design of a broad-based community breast cancer screening programme because, the most common reasons which women cite for failure to perform regular BSE is their lack of ability to interpret changes or abnormalities in the breast even when those early warning signs are present. Therefore, health worker conduct of patient education and client teaching during the CBE has been shown to improve breast awareness as well as adoption and adherence to the regular BSE performance (Freund, 2000). The conduct of regular BSE has also been shown to improve a woman's health seeking attitude as it relates to presentation to a health facility for CBE (Nik-Farid *et al.*, 2014).

2.7 Breast Self-Examination (BSE) as a tool for Breast Cancer Screening in a resource-poor setting

It is known that 90% of the women who develop breast cancer discover the tumour themselves (Epstein *et al*., 2001). Breast self-examination (BSE) is a check-up that a woman does by herself at home by examining her own breasts regularly to look for changes or problems affecting the breast tissue or to detect any abnormal swelling or lump in order to seek prompt medical attention (Oladimeji, 2015). Though an earlier Cochrane review of two large population-based studies of 388,535 women from Russia and Shanghai by Kösters and Gøtkozsche (2003) as well as another by Jones (2008) reported no statistically significant difference in breast cancer mortality with groups screened with BSE as against controls, BSE is still recommended by the American Cancer Society (2014) as a general approach and the starting point to increasing women's breast health awareness and thus potentially allow for early detection of any anomalies, particularly in resource-challenged communities, mainly because unlike CBE and mammography which require hospital visits, expertise and specialised equipment, it is free, inexpensive, painless and easy to practice (can be carried out by the women themselves) (Oztürk *et al.*, 1999; Ginseng *et al*, 2012).

The American Cancer Society (ACS, 2014) also recommends that all women, starting from the age of 20 should have an education on the merits and demerits of performing monthly BSE. One of the key solutions to improving early presentation to hospital for breast complaints is improving women's breast awareness; meaning, their ability to recognize symptoms and signs of breast cancer (Ogunbode *et al.*, 2013). According to Oluwatosin and Oladepo (2006) and Hadi *et al.* (2010), the factors relating to the knowledge and beliefs of women about breast cancer and its

treatment may contribute significantly to their health-seeking behaviour because if they lack the understanding of the risk factors associated with breast cancer, they would be discouraged from seeking early intervention. They may also find it difficult to admit that the symptoms they may be experiencing are related to breast cancer. Also, according to Seif and Aziz (2000), adequate education and training increases reported breast self-examination frequency, the confidence of the women in the conduct and result of BSE, and the number of small tumours found. There is therefore a strong consensus of opinion that for BSE adoption to be strong and effective, training and education plays a major role.

The technique of BSE involves the woman palpating each of her breasts, one after the other, by using the tips or pads of the fingers instead of the flat of the hand. She could carry out the examination whilst sitting down, whilst standing or whilst lying down. The first time the BSE is done, the woman learns the shape, form and texture of her breast so that she can easily notice changes in future when breast masses or lumps develop so as to facilitate easy detection. Once commenced and adopted, BSE has to be done frequently and commonly but this may follow one of three categories of frequency (Pool, 1992; Ogunbode *et al.*, 2013) viz:

- Infrequent self-examination (in which the woman hardly ever performs it after, or if at all, once a year, or 3 to 4 times per year);
- Appropriate self-examination (in which the woman performs it monthly or at least, fortnightly); and
- Excessive self-examination (in which she performs it weekly, daily, or more than once per day).

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Fig.2.3 Step- by- StepGuide for Conducting Breast Self Examination (Retrieved from Sister Network Chapter, Chicago website) (www.sistersnetworkchicagochapter.org%2Fselfexams.html)

Fig 2.4: Pictorial illustration of red-flag signs during Breast Self-Examination

Based on a review by Allen (2010), during BSE, the possible findings that could be regarded as red flags or warning signs of a possible early breast cancer and that should prompt seeking further clinical evaluation include: (1) The presence of a lump that had not been discovered prior to the BSE or if previously detected, that has suddenly become painful. (2) A rapid or sudden increase in size of a previously detected breast lump. (3) Red, swollen, or flaky skin on any area of the breast. (4) Painful nipple or inversion (turning inwards) of the nipple. (5) Any fluid leaking from the nipples when it is pressed particularly for a woman not breastfeeding. (6) Dimpling of the breast skin. (7) Presence of lump or changes in skin under the arm.

According Figures 2.3 and 2.4, the American Cancer Society (ACS 2014) recommends that the BSE should be performed in several positions to improve its detection potential. These should be natural day-to-day positions assumed during normal daily activities of a woman like when lying in bed to sleep at night, while bathing in the shower as well as when she is dressing up in front of a mirror. Relying on American NCCN (National Comprehensive Cancer Network) guidelines 2019, it is recommended that BSE be carried out once every month, preferably between the 7th and 10th day of the menstrual cycle of the woman. It is proven that it is the phase of the cycle when the breasts become naturally less lumpy and tender thereby improving its sensitivity and accuracy of detecting breast lumps or changes.

The once-a-month BSE recommendation was premised on the fact that more frequent BSE often leads to anxiety and ultimately, poor compliance whereas, inadequate BSE frequency increases risk of delayed detection of early warning signs of breast cancer (NCCN, 2019). The BSE guideline of NCCN further recommends that BSE be performed at any time during pregnancy or in case a woman has irregular and unpredictable menstrual cycle or pattern, but advises that such times should be consistent and fixed in each month to improve its lump detection potential. The guidelines also recommend that BSE be performed same time each month for a breastfeeding woman and such should be conducted after feeding the baby and not prior to the breastfeeding. Women should understand that the time of the day that the BSE is performed has no basis on the sensitivity of it detecting any lumps.

Controversies still rage on about the efficacy and applicability of BSE for routine screening for breast cancer (Kösters & Gøtzsche, 2003 and Allen *et al*, 2010). Even amongst the active international breast cancer study and advocacy organisations, there exists controversies with some recommending it and others failing to. Elmore *et al.* (2003) suggested that the

organisations that recommend BSE for routine cancer screening, like American College of Obstetrics and Gynaecology, American Medical Association and Susan G. Komen Foundation, do so because of some benefits. Such benefits itemize its selling points: being non-invasive; easy to acquire of required skills to conduct it; and ease of performance by anybody including non-medical or lay women, especially if they are properly trained; and sense of control its performance generally gives women over their health. It also makes them gradually become more comfortable with breast handling and breast care (improves breast awareness) and as such they are able to easily detect lumps or any other change as they perform it appropriately on a regular basis.

However, some organisations do not recommend BSE for routine breast cancer screening. The organizations include Canadian Task Force for Preventive Healthcare, United States Preventive Services Task Force and the American Academy of Family Physicians. The reasons they adduce to, as potential harms for BSE routine use include: (1)Increased number of what may turn out to be unnecessary healthcare visits if what is detected is not significant with CBE (Kösters & Gøtzsche, 2003). (2) Up to two times the number of biopsies of lumps that turn out to be benign after previous BSE had detected them with the assumption that they may be cancer and this often translates to increased healthcare costs. (Kösters & Gøtzsche, 2003). (3) There is also the emotional issue of increased levels of cancer-related anxiety that may require counselling or treatment especially if they turn out to be negative suspicions. Some also believe that one false alarm of BSE may discourage further practice of BSE (Brain et al, 1999). (4) Controversy and doubts still exist about the overall change in mortality from breast cancer with detection using BSE (Allen *et al*, 2010)

According to Anderson *et al.* (2008), the Breast Health Global Initiative (BHGI) was formed and co-sponsored by the Fred Hutchinson Cancer Research Centre and the Susan G. Komen Foundation to develop evidence-based, economically feasible and culturally appropriate guidelines that can be used in nations with limited healthcare resources to improve breast cancer outcomes. The BHGI uniquely classifies countries healthcare resources, using a 4-tiered system designed by them at a global summit in 2005. To improve breast health outcomes and access to breast cancer screening, detection, and treatment for women in low- and middle-income countries (LMICs), BHGI develops, implements and studies evidence-based, economically feasible, and culturally appropriate Guidelines for International Breast Health and Cancer Control.

This system, instead of the commonly known low, middle and high income countries, talks about basic level, limited level, enhanced leveland maximal level. Basic level has only core resources or fundamental services that are absolutely necessary for any breast healthcare system to function; basic level services typically are applied in a single clinical interaction. The second-tier resources (services), termed limited level, are intended to produce major improvements in outcome such as increased survival, and are attainable with limited financial means and modest infrastructure. Limited-level services may involve single or multiple clinical interactions. Enhanced level, third-tier resources or services are optional but important; enhanced-level resources should produce further improvements in outcome and increase the number and quality of therapeutic options and patient choice. Maximal level, high-level resources or services, may be used in some high-resource countries and/or may be recommended by breast care guidelines that do not adapt to resource constraints but that nonetheless should be considered a lower priority than those resources or services listed in the basic, limited, or enhanced categories on the basis of extreme cost and/or impracticality for broad use in a resource-limited environment.To be useful, maximal-level resources typically depend on the existence and functionality of all lower level resources (BHGI 2018).

The health resources of Nigeria belong largely to the basic level of this 4-tiered system especially in the rural or sub-urban communities and based on Anderson *et al.* (2008), BHGI in its 2018 summit recommends health resource allocation at the population level, towards early detection of breast cancer, improving public education and awareness should be the goal. The guideline suggested developing a culturally-sensitive, linguistically-appropriate education programme targeting specific female populations in the teaching of the value of early detection of breast cancer, breast cancer risk factors and breast health awareness especially breast self-examination (BSE) practices.

Though, mammography remains the only breast screening procedure for which empirical evidence exists to have significantly reduced breast cancer mortality by about 63% (Ojewusi & Arulogun *et al.*, 2016), there still remains a poor uptake of mammography for screening amongst women in Nigeria despite adequate awareness of the screening method. This uptake rates are significantly lower than many resource-available settings. For example, a 72% uptake was recorded in Canada among the target population over a 2-year period (Statistics Canada, 2009).

As a result of this limited application of mammography in Nigeria and the widespread lack of facilities and expertise for it, several studies have affirmed that breast self-examination, if properly carried out, would appear to be the most cost-effective method for the early detection of breast cancer in this environment (Chioma & Asuzu, 2007; Saludeen *et al.*, 2009; Onyije *et al.*, 2010). Teaching and education on methods of early detection has therefore been suggested to be included as part of an overall health promotion concept (BHGI 2018 summit).

2.8 BSE Awareness in Nigeria

Many studies have shown varied levels of awareness on BSE among the different cross-sections of women population in Nigeria. Some studies across various geopolitical zones of the country recorded very high level of awareness (Agboola *et al.*, 2009; Akpo *et al.*, 2010; Ibrahim and Odusanya 2009; Bello *et al.*, 2011; Okolie, 2012; Eguvbe *et al.*, 2014; Yakubu *et al.*, 2014). However, another report differs instead, suggesting the BSE awareness level was low (Oluwatosin & Oladepo, 2006). As regards the stratification into the occupation of the respondents, among traders, Balogun and Owoaje (2005) reported BSE awareness of 31.7%, Obaji *et al*. (2013) reported 38.9% awareness while Olajide *et al.* (2014) reported 71.6%. Studies involving female teachers revealed BSE awareness of 95.6% (Kayode *et al.,* 2005) and 90.8% (Aniebue & Aniebue, 2008). For female undergraduates, studies revealed 81.9% had BSE awareness (Saludeen *et al.*, 2009) while another study by Bassey *et al.* (2011) indicated awareness of 97.3%. In the studies of female secondary school students, only 38.7% were aware of BSE as a screening method (Omotara *et al.*, 2012) and about 56.4% had heard of BSE in another study by Isara and Ojedokun (2011). Reports of studies on BSE awareness among female non-health professionals revealed 69% awareness (Bello *et al.*, 2011) and among sub urban population of women, 52.8% were aware of BSE as a screening tool for breast cancer (Olowokere *et al.*, 2012).

2.9 Community Knowledge of Breast Cancer and Breast Self-Examination

Despite the cost-effectiveness and practicability of BSE as discussed in section 2.6, several studies from different parts of Nigeria have shown an unfavourable pattern of poor knowledge and practice of BSE as a simple tool for breast cancer screening among womenof various age groups, levels of education and occupation. Though, majority of these reports are institution-based cross-sectional studies and it may be inappropriate to generalise the conclusions, the consistent finding of the same end-point conclusions suggests that these negative findings could be extrapolated to the larger society of women as shown in tables 2.2, 2.3, 2.4 and 2.5.

Table 2.2: Studies from South-East Nigeria on BSE knowledge and practice in women

Author/Year	Research Design	Location of study	Respondents/ Study Population	Age group of women studied	Broad Objectives of the study
Obaji *et al.* /2007	Cross-sectional	Abakaliki, Ebonyi State	98 nurses	20-55 years	Knowledge, attitude and practice of breast self-examination among nurses
Aniebue & Aniebue/ 2008	Cross-sectional	Enugu State	428 teachers in government owned secondary schools	20-55 years	Awareness of Breast Cancer and Breast Self-Examination among female secondary school teachers in Enugu metropolis, South Eastern Nigeria
Onwere *et al.* / 2009	Cross-sectional	Abia State	100 women attending antenatal clinic	18-49 years	Awareness and practice of breast screening and its impact on early detection and presentation among breast cancer patients attending a clinic in Lagos, Nigeria.
Okolie 2012	Cross-sectional	Enugu State	200 female undergraduates	21-25 years	Breast self-examination among female undergraduates in Enugu, Southeast, Nigeria.
Obaji *et al.*/ 2013	Cross-sectional	Ebonyi State	238 market women	20-65 years	Awareness and practice of Breast-Self Examination

Table 2.3: Studies from the South-West Nigeria on BSE Knowledge and Practice

Author/Year	Research Design	Location of study	Respondents/ Study Population	Age group of women studied	Broad Objectives of the study
Balogun & Owoaje /2005	Cross-sectional	Ibadan, Oyo state	281 female traders	16-80 years	Knowledge and practice of breast self-examination among female traders in Ibadan, Nigeria.
Oluwole / 2008	Cross-sectional	Ondo State	Female Health Workers	23-50 years	Knowledge and practice of Breast-Self Examination amongst Female Health Workers in a Nigerian Community
Agboola *et al.* / 2009	Cross-sectional	Sagamu, Ogun State	115 female health workers	20-41 years	Knowledge, Attitude and Practice of Breast Self-Examination in Female Health Workers in Olabisi Onabanjo University Teaching Hospital, Sagamu, Nigeria.
Bassey *et al* / 2011	Cross-sectional	Lagos State	135 nursing students	15-26 years	Knowledge, attitude and practice of breast self-examination among nursing students in Lagos University Teaching Hospital, Nigeria

Table 2.4: Studies from the South-South Nigeria on BSE knowledge and practice in women

Author/Year	Research Design	Location of study	Respondents/ Study Population	Age group of women studied	Broad Objectives of the study
Bellgam & Bouwari/ 2012	Cross-sectional	Rivers State	691 members of medical Women Association of Nigeria	21-85 years	Knowledge, Attitude and Practice of Breast Self-Examination among Women in Rivers State, Nigeria
Tobin & Okeowo / 2014	Cross-sectional	Edo State	300 secondary school teachers	20–69 years	Breast self-examination among secondary school teachers in South-South, Nigeria: A survey of perception and practice.

Table 2.5: Studies from North-Central Nigeria on BSE knowledge and practice in women

Author/Year	Research Design	Location of study	Respondents/ Study Population	Age group of women studied	Broad Objectives of the study
Gwarzo *et al.* / 2009	Cross-sectional	Zaria, Kaduna state	221 female undergraduate students of Ahmadu Bello University	16 – 28 years	Knowledge and practice of breast self-examination among female undergraduate students of Ahmadu Bello University
Salaudeen *et al.* / 2009	Cross-sectional	Ilorin, Kwara State	682 female undergraduates Kwara State Polytechnic	16 - 28 years	Knowledge and Attitudes to Breast Cancer and Breast Self-Examination Among Female Undergraduates in a State in Nigeria
Isara & Ojedokun / 2011	Cross-sectional	Abuja, FCT	Female senior Secondary school students	13– 22 years	Knowledge of breast cancer and practice of breast self-examination among female senior secondary school students in Abuja, Nigeria
Yakubu et al./ 2014	Cross-sectional	Kano State	Female nurses	20-59 years	Knowledge, attitude, and practice of breast self-examination among female nurses in Aminu Kano teaching hospital, Kano, Nigeria

A systematic review by Ojewusi & Obembe (2016) examined 40 different cross-sectional studies across the country on breast cancer awareness, attitude and practice among Nigerian women covering a 10-year period from 2005 to 2014. The study discovered that breast self-examination (BSE) was the most common breast cancer screening practice among all respondents (across all studies), ahead of clinical breast examination (CBE) and mammography.

2.10 Community Practice of Breast Self- Examination (Global and Nigeria)

There are several studies on BSE practice in Nigeria. A report by Akpo *et al.* (2010) revealed that though all the respondents practiced breast self-examination, only half of them knew the correct way to perform it. Of note however is the low and variable statistics about BSE performance among female health workers. Oche *et al.* (2012) reported a practice rate of 54% among nurses. It was 55.6% among nurses studied by Bello *et al.* (2011) though earlier report by Obaji *et al.* (2007) reported a practice rate of 13% among nurses. In the reports of BSE conduct among practicing female doctors, only 68% had ever performed BSE (Agboola *et al.*, 2009) and it was an even lower figure of 41.2% in another study (Yakubu *et al.,* 2014).

Among the non-health professionals, Bello *et al.* (2011) found that 34.6% practiced BSE while among strata of market women, only 18.1% had ever personally examined their breast in one report (Balogun & Owoaje, 2005) and it was only 21.8% in another report (Obaji *et al*., 2013). In the rural communities, a study revealed only 34.9% had practiced BSE (Olowokere *et al.*, 2012) while other studies on women dwellers of the urban community reported that BSE practice varied from 6.4 to 51.6% (Oluwatosin & Oladepo, 2006). Separate reports on female secondary school teachers' practice of screening BSE from Kayode *et al.* (2005) and Aniebue and Aniebue (2008) confirmed rates of 54.8% and 47.9% respectively. Another study on female secondary school students confirmed a very low rate of 10.1% BSE practice among that population (Isara & Ojedokun, 2011).

According to the review by Ojewusi & Arulogun (2016), BSE practice is still low and below par amongst women 20 years and above, and that finding corroborates previous findings from other low resource countries by Sadler *et al.* (2001) {Korea}, and Ahuja and Chakkrabarti (2010) {India}. Some of the reasons given for low BSE practice in Nigeria despite adequate level of awareness include: (1) Absence of a family history of breast cancer (Isara & Ojedokun, 2011), (2) Anxiety and fear of the consequences of detecting a lump (Aniebue & Aniebue, 2008; Bassey *et al.*, 2011; Okolie, 2012). (3) Forgetfulness (Aniebue & Aniebue, 2008). (4) Lack of

knowledge of the technique of conducting BSE (Aniebue & Aniebue, 2008). (5) Low consideration of its relevance (Bassey *et al*., 2011; Okolie, 2012). (6) Discomfort felt while touching the breast (Aniebue & Aniebue, 2008).

This general poor BSE practice in Nigeria also has a negative impact on presentation of women for clinical breast examination range (CBE) which in the review, ranged from 1 to 51%, as the main reason advanced for low CBE patronage was absence of a breast problem apart from being unaware of the need for CBE (Okobia *et al.*, 2006b).

2.11 CHEWS' Role in Client Teaching of Breast Self-Examination (BSE) in the community

A Community Health Worker (CHW) or in some other context referred to as Community Health Extension Workers (Kuti *et al.*, 1991) can be defined as a health worker who receives standardized training outside of the formal nursing or medical curricula to deliver a range of basic health, promotional, educational and mobilization services, and has a defined role within the community system and larger health system (USAID Health Communication Capacity Collaborative, 2015). World Health Organisation (WHO) equally defines Community Health Workers as members of the communities where they work. In other words, they should be selected by the communities, should be answerable to the communities for their activities, should be supported by the health system but not necessarily a part of it (World Health Organisation, 1989). Reports by Lehmann & Sanders (2007) for WHO adduce to the fact that because they live and work in the community, CHWs are likely to have a shared life experience of the community, and they are more likely to grasp the complex socio-cultural environment in which health services are delivered and health behaviours occur in that society.

In Nigeria, Ordinioha and Onyenaporo (2010) reported that in the rural, sub-urban and semi-urban communities, there exists mal-distribution of formally-trained health workers due to quest for better living standards that are usually present only in the urban settings, lower income, poor social recognition and generally lower job satisfaction associated with working in such settings. This is further compounded by dereliction of duty by the few who opt to work there. It paints a gloomy picture when compared to the situation around the world, as indicated by the World Health Organisation (WHO. The World Health Report 2006),

Though there is a dearth of studies on the practice and client teaching of BSE by CHEWs in Nigeria, the conclusions of two of those few previous reports by Jebbin and Adotey (2004) and

Oluwatosin and Oladepo (2006) indicate clearly the importance of health care workers as the leading source of information about BSE in the communities. This client teaching and training is often done during clinic visits or health talks at the primary health care centre or posts (Oluwatosin, 2012). This usually involves use of posters or picture boards and rarely one-to-one demonstrations. In other societies, the use of silicone breast models for public and less personalized demonstration of breast examination is often adopted, to good effect (Saslow *et al*., 2004).

In the low and middle income countries, even with deployment of community health workers at the rural areas, where majority of the population are domicile, there is still a wide gap in health worker to client ratio due to shortage of the workers and so, developing a competency-based training programme for primary health care workers and staff focusing on breast health care and targeting improvement of their technical knowledge, skills and behaviour has been proposed to circumvent that challenge (Harford *et al.*,2008). This was expected to enable one health worker to appropriately disseminate a large quantum of knowledge over a short time to a large catchment of people in what is referred to as 'Communication and Teaching Efficiency'. Interim report by Mittra *et al.* (2010) from a cluster-randomised controlled trial conducted in India indicated that training primary health workers for a specific duration of time on conduct of breast examination using the modified Canadian Breast Screening protocol, and ultimately implementing the content of the CBE training programme when the trained healthcare personnel conduct proper CBE on their clients, resulted in the down-staging of breast cancer presentation. In addition, Miller (2008) also indicated that training community nurses to implement a combination of breast self-examination (BSE) and CBE can actually fast-track down-staging of breast cancer presentation as seen in the Cairo Breast Screening Trial. All these findings strongly suggest that health workers who have direct contact with women at the community level on a regular basis should be encouraged with more theoretical background about breast screening techniques in order to improve their teaching efficiency. However, this expectation is hardly met and many women in Nigerian communities are large underserved by available CHEWs at health centres as regards knowledge and practice of breast cancer screening. The reasons for this include: (1) Low staff strength of doctors and nurses at primary health care centres: This implies redeployment of available CHEWs to clinical activities like consultation, prescribing and performance of minor procedures under supervision, in order to mop-up clients on a long waiting queue. (2) Under-funding and under-training: These include those related to continuous and in-service training of CHEWs to effectively perform their statutory roles of community health

extension. (3) Poor remuneration and incentives to encourage community interventions by CHEWs (Ordinioha & Onyenaporo, 2010).

A study by Erdem and Toktaş (2016) from Turkey indicated that primary healthcare workers (PHW) are role models for other people in the society and they play an important role in establishing healthy behaviour. They are therefore in a position to educate people about risks of breast cancer as well as the types of screening practices available in that community. They also influence behaviors that will reduce the risk of future breast cancer morbidity and mortality. They also ensure health education and promotion by assisting people to develop a healthy behaviour including that of adoption of BSE.

In Nigeria, only one recent cross-sectional survey by Utoo & Chirdan. (2012) exists that reports about client teaching of BSE by CHEWs. The study population was all female health workers in the selected Primary Health Centres in Plateau State who gave informed consent to participate in the study. Using a multistage sampling technique, 182 recruited female health workers from 17 local governments were served semi-structured self-administered questionnaire. The analysis showed that 80 (44.0%) of the respondents were Community Health Extension Workers (CHEWs) of which 44 (55%) were junior CHEWs. Nine percent (9%) (n=4) of these junior CHEWs were unaware of breast cancer and none of the senior CHEWs reported such. Of the total population of health workers, 92.9% were aware of BSE and 91% admitted it improves breast cancer outcome. The proportion of those that knew how to perform BSE and those that taught their clients dropped to 87.2% and 75% respectively. More alarming is the fact that only a meagre 30.8 % knew how frequently BSE should be performed.
This poor level of practice of BSE among the health workers was adduced in that study to have a negative influence on their clients' teaching and behaviour change through education and it was recommended that training and re-training of these health workers as well inculcation of the breast cancer screening into the training curriculum of health workers should be facilitated.

2.12 Role Model Mothers as Informal Community Health Workers for Breast Cancer screening

Role model mothers referred to as '*female lay workers*' or in some other context referred to as '*mother mentors*' (Islam & Patel. 2018) can equally serve as patient navigators through the health system like the continuum of breast cancer screening, diagnosis, and treatment, assisting clients in the community to maximize their access to existing systems, thereby reducing potential

delays in health care created by common barriers in such settings such as poor access to health centres, lack of affordable services, and cultural challenges with seeking care (Dye et al, 2010). An example cited by the report of Dye *et al.* (2010) is the inefficient multistep health care process in Ethiopian rural area for women with breast cancer which gives impetus to the arguments for establishment of a better streamlined patient navigation within the health system in order to save resources and better manage time in resource-challenged settings.

Role model mothers (RMMs) are an example of women who exist in the community to serve as lay health workers in an informal set up. They are respected women in the society who for their social, educational, religious or financial standing, command the respect of other women, have the requisite popularity, have sufficient influence and charisma to lead and influence other women with their positive health promoting attitude and behaviour and have passion for improving the general health status of women in that community (National Malaria Control Programme, 2008). According to Adeneye *et al.* (2013), these RMMs are lay health workers selected in rural areas where access to primary health care is difficult, trained specifically for target extension programmes and extensively incorporated into mass diagnosis and treatment programme for Roll Back Malaria in the last decade. They have mainly improved domestic care of malaria by embarking on health extension services, teaching fellow mothers in the community how to diagnose malaria early in under-5s, how to initiate treatment, what drugs to use, how to recognise failed treatment and how to prevent malaria; with considerable success recorded with reduction in malaria-associated morbidity and mortality in this largely underserved communities. Also in malaria treatment-related research conducted by Ajayi & Kale. (2008), 33 lay women were recruited from different communities in Ona-Ara Local Government Area in Oyo State and trained in 3 stages as "mother trainers" for the purpose of instituting a community-based malaria education programme to enhance the capacity of the local dwellers to easily make diagnosis of uncomplicated malaria and to institute appropriate treatment as well as recognise need for early help-seeking when home treatment fails and acquire adequate prevention knowledge. The mother trainers were selected and recommended by the village heads with 57.6% of them aged between 23 and 35; 91% of them being either peasant farmers or traders; 97% of them were married but only 9.1% had post-secondary education (majority had only primary education, n=17). Despite the challenges of initial non-acceptance by some communities (partly because they were not involved in the selection process of the women but also because they were resistant to change their ways), a 24.2% drop-out rate of mother trainers for one reason or the other and sundry misunderstandings like religious differences; the intervention was still largely

successful in achieving its set out goal though sustainability was not tested. These role-model mothers or mother trainers have not been employed or tested in any capacity in Nigeria in any other form of cancer screening intervention.

In the community-based approach to cancer screening to enhance early diagnosis and initiate early treatment, the cancer control continuum is a widely used public health paradigm that explains the several phases at which prospective programmes or treatments may be created to improve cancer outcomes for a broad population or target groups (Wadler *et al.*, 2011). A report by two researchers from Partners in Health, Jerome and Ivers (2010), found out that lay health workers were useful in strengthening the health system in Haiti by providing services to otherwise un-reachable and grossly underserved rural communities. On the Africa continent, several studies like that of Clarke *et al*. (2008) and Lehmann and Sanders (2007) noted the significant shortage of formal health workers particularly in sub-Saharan Africa and suggested these gaps in services could be filled by lay health workers. They claimed that this kind of health workers is required to increase health services on the African continent. In a systematic review of eighty-two randomized controlled trials (RCTs) on the benefits of lay health workers in the health system (one-third of which was conducted in low- and middle-income countries), Lewin *et al.* (2010) found that lay health workers' interventions improved health behaviours as well as health outcomes.

One innovation that has been proven to improve efficiency in health education among lay health workers in a resource-limited setting is the use of role play as a method of health skills acquisition and re-training. In a study, lay health workers are taught breast self-exam (BSE) by a professional or formal health staff and then acquire CBE skills by practicing on one another in a form of "train the trainer" method (Ahsen *et al.*, 2010).

Packaging services and bundling health programmes of common concern (e.g. cancer screening programme interwoven into existing Maternal and Child health programme, in a joint vehicle) may help to expand the possibilities of reaching populations in rural setting at a reduced cost (Kim *et al.*, 2006; Simon *et al.*, 2009; Knaul *et al.*, 2009). However, the acceptance, success and long-term sustainability of any community-based programme, particularly those involving use of informal or lay health workers requires community integration and investment. To guarantee community acceptability and ownership, it must adapt to local socioeconomic and cultural norms as well as customs (Lehmann & Sanders, 2007). An example is the Communities in South Africa

with a strong interest in lay health worker initiatives that reaped the most advantages from such programmes by participating in identifying their needs and potential solutions and nominating candidates to become community health workers (Partners in Health, 2010). This ensured that selected and chosen lay health workers command significant respect from members of the community and as such will be chosen purely on the merit of their abilities to effectively communicate, possession of requisite skills and know-how to be an effective and efficient health educator and has the necessary social network to be a good service provider and navigator.

Friedman *et al.* (2007) posited that the length of survival of a community-based health worker programme is directly linked to its acceptance and success in addressing the peculiar targeted problems it had set out to achieve. The community will play a significant role in this survival by providing ongoing resources and ensuring on-going training to maintain standards. Other methods of improving efficiency include training up and task shifting (Harford *et al.*, 2008).

Due to a lack of certified persons who can deliver breast health care in Africa, one effective area of enrollment of lay and informal health workers is especially Breast Cancer Screening (Harford *et al.*, 2008). Therefore, with these lay workers trained and supervised closely, they would be able to perform routine screenings thereby freeing formal medical staff for more skilled tasks (Wadler *et al.*, 2011); and if any woman detects any abnormal breast findings during BSE, they would easily give in to the same health workers, confirming with a CBE and ensuring client navigation by directing them to post-screening care. In the process, they also guide the women to understand their diagnoses and courses of treatment. A report by Dohan and Schrag (2005) indicated that because of this role of lay health workers, their clients in that community are more likely to follow-up on prescribed treatment because they have a better understanding of the health system and their treatment course, which saves clinical time and resources while also increasing the likelihood of a better outcome.

2.13 Community–based Models for Promoting Breast Awareness and Breast Self Examination in Resource-constrained Communities

Educational model-based interventions encourage self-care and lay the groundwork for improving women's breast cancer screening habits, as well as raising researchers and policymakers' knowledge and efforts to improve breast cancer screening habits. In a systematic review by Saei Ghare Naz *et al.* (2018) on the Effects of Model-Based Interventions on Breast Cancer Screening Behaviour of Women, 36 papers were reviewed with a total of 17,770 female

participants. The result of the systematic review showed that model-based educational interventions are more effective for BSE screening behaviour of women compare to no model-based intervention. This review discovered 5 models that have been used in promoting BSE at community-based levels viz: (1) Health Belief Model. (2) The Trans Theoretical Model. (3) Theory of Planned Behaviour.Social Cognitive Theory. (4) Systematic Comprehensive Health Education and Promotion Model.

Majority of the studies reviewed in the literature used the Health Belief Model as the foundation for intervention. Health Belief Model was the most popular model for promoting breast cancer screening behaviour followed by the Trans Theoretical Model, and Theory of Planned behaviour. Some of the reviewed papers used a combination of the Health Belief Model and the Trans Theoretical Model (Saei Ghare Naz *et al.* 2018). In the evaluation and conduct of community-based health interventions, there is often need to involve a comparison community as a control to the study community though this can be resource-consuming, laborious and difficult. Nonetheless, such approaches are necessary to obtain valid and scientifically-proven essential information that will guide future health policy makers and key stakeholders.

It is a general knowledge that the first step in an educational programme planning is to choose an appropriate, practicable and effective health training model. The plan must take into consideration, previous strategies and theories that have worked effectively in the past and decision must be taken on the best possible fit-for-purpose model amongst the lot (Oyekale & Oyekale, 2010). For the screening of breast cancer, such models will certainly find wide application in many settings. The Health Belief Model (HBM) seems to be the most widely used health education model for improving breast cancer awareness and uptake rate of breast cancer screening methods amongst many populations and communities of women (Ceber *et al.,* 2009). The model involves assessing perceived sensitivity, severity, benefits and barriers, and cues to action. The concept is based on the notion that a person must be convinced that a disease exists even if there are no symptoms, and that they are at risk of developing such an illness (perceived susceptibility), and that the person also knows that the sickness may have potentially significant consequences (perceived seriousness), believes that taking measures to prevent the disease guarantees positive results (perceived benefits), believes that any gained benefits can outweigh any possible barriers, and also believes that she is capable of successfully performing and following-through all these health behaviours (self-efficacy), then such a person is likely to perform such behaviour (Assari, 2011).

An interventional study by Eskandari-Torbaghan *et al.* (2014) was designed using HBM to improve breast cancer preventive behaviours in the population of women employed in and in the age range at risk of breast cancer at Zahedan University of Medical Sciences, Tehran, Iran (LMIC). A pilot study was conducted on a sample of 20 female individuals to determine the mean behavioural scores (the main variable of interest) between the two groups by comparing two separate samples with continuing results to arrive at the parameters required for the equation to determine this. With an estimated 95% confidence interval and an 80 percent power, a sample size of 63 was determined, after which, using a simple sampling technique, a sample size of 65 was considered for each group in the research, bringing the total sample size of recruited female employees of Zahedan University of Medical Sciences (ZUMS) for the study to 130. They were randomly divided into either intervention (n = 65) or control groups (n = 65).

The review of the methodology of the study as documented by the researchers (Eskandari-Torbaghan *et al.*, 2014) revealed that all data were collected through a questionnaire, which had been validated and whose reliability had been determined previously by the main investigators. All question items had indices of content validity ratio of > 0.62 and content validity indices > 0.79 were accepted giving rise to a Cronbach's alpha for reliability of 0.76. The data collection instrument was also reviewed for approval by 10 experts in the field. The questionnaire was said to contain 53 questions, 3 of which requested demographic details (age, marital status and education level), 16 of which tested awareness, 6 perceived susceptibilities, 5 perceived seriousness, 5 perceived advantages, 5 each on perceived barriers and self-efficacy, 6 items for cues to action, and 5 items on behaviour. For the calculation of each participant's awareness, 2 was assigned to each correct answer, 1 for nonresponse, and zero (0) for incorrect responses. A 5-option Likert scale was used to evaluate attitude variables such as perceived susceptibility, perceived seriousness, perceived advantages and obstacles, and self-efficacy, with scores for each item ranging from totally agree (4) to agree (3), no comment (2), disagree (1), and totally disagree (0). In the section relating to preventive behaviour items, scoring ranged from 3 (always) to 2 (sometimes), 1 (often) and 0 (never). Scoring for the cues to action- construct was in percentages. Eskandari-Torbaghan *et al* 2014.

The researchers pointed out that for the purpose of data collection, adequate explanation about objectives of the study was presented first. Information confidentiality was strictly ensured and participants' informed consent was obtained. Using the results obtained from the pilot study, an

educational intervention was designed. The intervention group had educational programmes which were undertaken by two of the researchers/authors as consistent educators and this included three sessions of 60- to 90-minute lectures for same participants, spanning over a month with each session also including questions and answers segments. The educational materials employed for the training sessions included PowerPoint presentations, videos, educational booklet and a compact disc (CD) containing all mentioned materials. The training manual emphasized the use of the template of HBM to raise women's awareness of symptoms of cancer of the breast and information. regarding right time for mammography and to improve their practice on preventive behaviours of breast cancer (Eskandari-Torbaghan *et al*., 2014).

The major thrust of the intervention was to give specific instruction aimed at increasing perceived sensitivity and perceived seriousness of women about the threat of breast cancer and their understanding to the barriers in performing breast cancer preventive behaviours.
The expected effect was that the women would be strengthened in their ability and positive beliefs towards preventive behaviours including Breast Self-examination behaviour, Clinical Breast Examination and mammography. All these interventions were not introduced to the control group. After a month, the effects on breast cancer preventive behaviours were measured in the intervention group and compared with that of the control group and the data were encoded and analysed using the SPSS software (Version 18). To investigate the frequency and distribution of qualitative data, the researchers employed descriptive statistics, as well as central and dispersion factors for quantitative data. The chi-square test was used to compare categorical data, the student's t-test to compare the mean values of continuous variables for the two groups, and Pearson's correlation coefficient was used to determine whether the continuous variables were associated. Finally, they utilized a step-wise regression model with a significance threshold of 0.05 to clarify the determinants of behaviour change (Eskandari-Torbaghan *et al*, 2014).

In the final analysis, it was discovered that there were significant changes in the experimental group, in the awareness of breast cancer construct and in other tenets of the HBM; including perceived susceptibility, perceived gains, and perceived barriers, practice of preventive behaviours against breast cancer like screening, when compared to the non-intervention group ($P< 0.05$). However, perceived barriers remained the only predictor in the HBM, such that for every slightest increase in this variable, the behaviour score increased by 18% (Eskandari-Torbaghan *et al*, 2014).

Apart from the above study, the Health Belief Model (HBM) has been used in series of other studies on other female communities in the past, to explain the relationships that exist between the tenets of HBM variables in respect to Breast Self-examination specifically as well as breast awareness. Some of these studies are listed in the Table 2.6.

Table 2.6: Studies on Breast Self-examination employing the Health Belief Model

AUTHOR/ YEAR OF PUBLICATION	TITLE	LOCATION OF STUDY	STUDY DESIGN/ STUDY POPULATION	SUMMARY OF RESULT	RECOMMENDATION
Masoudiyek-ta et *al* (2018)	Applying the Health Belief Model in Predicting Breast Cancer Screening Behavior of Women	Health centers in Dezful, Iran,	Descriptive-analytical study	The knowledge and performance of women were poor, and there was a significant relationship between women's performance and variables of knowledge, perceived sensitivity, perceived benefits, perceived barriers, self-efficacy, and cues to action. In addition, variables of knowledge (P = 0.001), perceived sensitivity (P = 0.022), and self-efficacy (P = 0.001) were predictors of performance in women participating in this study.	Poor knowledge and performance of women indicates a crucial need for formal educational programmes to sensitize women regarding the importance of breast cancer screening. These educational programmes should consider factors affecting breast cancer screening behaviours.
Park *et al* (2011)	Community-based intervention to promote breast cancer awareness and screening: The Korean	Gupo and Gwang Myeongo areas of Korea	Cross sectional study	This study showed a 20.4-percentage-point decrease in myths about the link between cancer and breast size, a 19.2-percentage-point decrease in myths concerning mammography	These findings recommend that the combination of community outreach and clinic and pharmacy-based in-reach strategies could effectively correct myths related to breast cancer and screening

Table 2.6: Studies on Breast Self-examination employing the Health Belief Model "Contd"

	experience			costs, and a 14.1-percentage-point increase in intention to undergo screening mammography. We also saw a 23.4-percentage-point increase in the proportion of women at the action stage of the Trans-Theoretical Model in the intervention city. In the comparison city, smaller decreases and increases were observed.	mammography. They could also improve intention toward screening mammography and the stage of adoption for screening mammography for women living in urban Asian communities. Even though evaluation of community-based health interventions involving a comparison city as a control region can be laborious and difficult, such approaches are necessary to garner future support from policymakers and other key stakeholders.
Shahrbabaki *et al.* (2012)	The evaluation of the educational plan of breast self-examination of women referring to health centers	Iran	Experimental study	There was no significant difference between case and control group (p=0.08) About the correct way of performing BSE, the majority of subjects in each group, case and the control, were weak and statistically no significant difference was found between the groups (p=0.7). After the final test women of case group had the highest percentage of subjects with good knowledge	The study recommended integration of individual elements and social context in the design of BSE programmes. Humans do such activities specifically for survival, healthy performance, continuous development and feeling good. The authors hoped that the findings result in educational programmes for women and help reduce breast cancer mortality. They also suggested that future research

Table 2.6: Studies on Breast Self-examination employing the Health Belief Model "Contd"

				score while the good points in the control group were only 5% and the difference between the two groups was significant (p <0.001)	should focus more on the understanding of how women weigh the risks and benefits concerning the personal and social factors, before they deny the efficacy of practicing BSE.
Rezaeian *et al.* (2014)	The effects of breast cancer educational intervention on knowledge and health beliefs of women 40 years and older, Isfahan, Iran	Isfahan, Iran	Cross sectional study	After educational intervention, mean ratings of perceived susceptibility, perceived severity, perceived advantages, obstacles, and self-efficacy of mammography and health motivation in the experimental group were significantly different from the control group (P <0.001).	Implementing suitable training programmes with an emphasis on the advantages of mammography in the early identification of breast cancer and instilling positive health motivation in women can improve their mammography screening practices.
Abolfotouh *et al*. (2015)	Using the Health Belief Model to predict breast self-examination among Saudi women	Saudi Arabia	Cross section study on female employees of king Abdelaziz medical city. Saudi Arabia	They gave low ratings for perceived susceptibility, seriousness, confidence, and hurdles (PMS: 44.8 percent, 55.6 percent, 56.5 percent, and 41.7 percent, respectively), but high ratings for perceived benefits and motivation (PMS: 73 percent	The study suggests that continuing education programmes are needed to improve understanding, shift attitudes, confidence, and conduct regarding BSE. In undergraduate and postgraduate studies, a strong emphasis on BSE should be placed. It also suggested that specialized resource centers be established in various Saudi

Table 2.6: Studies on Breast Self-examination employing the Health Belief Model "Contd"

				and 73.2 percent, respectively). Levels of perceived hurdles (p = 0.046) and perceived confidence (p = 0.001) to BSE, general knowledge of BC (p 0.001), work position (p = 0.032), and family history of BC (p = 0.011) were all significant predictors of BSE performance.	Arabian locations to promote and integrate BSE training programmes for all working women. It was recommended that female employees and other women in various settings in the community be followed up on a regular basis to guarantee early detection of cases.
Davis *et al*, (2017)	Breast care screening for underserved African American women: Community -based participator y approach	African American communi ty women	Descriptive cross sectional study	The major findings of this study are as follows: 1) Participants knew how to perform, had performed BSE and felt confident to perform BSE. 2) Participants felt more confident to perform CBE than BSE 3) There is no relationship between the components of HBM and screening behaviours	Further research into the breast cancer screening behaviours of college students should focus on: 1. The need to adopt more complex, multivariate approaches in an effort to understand breast cancer screening behaviours of women of all ages. 2. The need to follow students throughout their years in college to determine how life changes result in behavioural changes with breast cancer screening behaviours.

2.14 The Conceptual Framework for the Study

Previous studies have revealed that perception of increased susceptibility or risk is linked to health promoting behaviour (Bakhtariaghdam *et al.*, 2012; Najar Kolai *et al.*, 2012). Social and behavioural theories and models abound to influence human health-promoting and disease-prevention behaviours (Holman & Borgstrom, 2016). Ecological Models, Health Belief Models, Stages of Change Models (Transtheoretical Models), Social Cognitive or Learning Theory, and Theory of Reasoned Action/Planned Behaviour are some of them. These theories and models are frequently used in health programme planning to comprehend and explain health behaviour, as well as to guide the identification, development, and implementation of health interventions. Such interventions are made to encourage a healthy lifestyle and to enhance health-seeking behaviour. In order to explain and predict health-related behaviour such as breast cancer preventive measure like Breast self-examination (BSE) and to guide development of a fool-proof approach to improving its adoption by women at-risk of breast cancer, several studies have espoused the use of the Health Belief Model (HBM) (Becker & Foxall, 2006; Bakhtariaghdam *et al.*, 2012; Najar Kolai *et al.*, 2012; Masoudiyekta *et al.*, 2018).

2.15 The Health Belief Model (HBM)

The Health Belief Model (HBM) is a psychological model based on perception and knowledge. It was developed in the 1950s by a team of social psychologists headed by Hochbam and Roznastak at the U.S. Public Health Service (Glanz *et al.*, 2008). The development followed their attempt to understand why people do not participate in prevention and screening programmes. The HBM is one of the most explicit and well-researched models used to explain health behaviours. It adapts theories from behavioural sciences like Stimulus Response Theory (SRT) and Cognitive Theory (CT) to examine health problems and to explain and predict health behaviour by focusing on individual attitudes and beliefs. Prior to the HBM, there had been previously applied theories with conflicting reports about their success with changing human behaviour to disease and health (Holman & Borgstrom, 2016). One of such is the Lewin's Field Theory (LFT) which introduced the concept of barriers to and facilitators of behavioural change. It was a predominant forerunner to the HBM design.

However, over several years, the HBM itself has undergone a number of evolutionary changes following its extensive use in field health promotion works and the publication of research findings of gaps identified from those efforts. What has not changed since the 1950s about the

HBM is the underlying concept which emphasizes that healthier behaviour and lifestyle could be predicted by the individuals' personal beliefs and perceptions about a disease or potential harm.

2.16 Relationship between the Value-Expectant Theory (VET) and the Health Belief Model (HBM)

The major theoretic background that underpins HBM is the Value-Expectant Theory (VET). The VET has three major theoretical assumptions which include Expectancy, Instrumentality and Outcome (Wigfield & Cambria, 2010). While Expectancy refers to a person's belief that increased efforts will lead to improved performance, Instrumentality refers to a person's belief that improvement in performance is likely to lead to a certain favourable reward or outcome, and Outcome refers to the person valuing that reward earned. The HBM was modeled around the assumptions derived from VET which include:

- Every human being desires to avoid being ill or wants to get well; and
- Every human being believes that a specific health action that is available will help him or her avoid illness or get well;

Hochbam and Roznastak's group developed the HBM based on probability studies of 1200 adults to take up screening for Tuberculosis in the US, concluding that people who had the belief that they were susceptible to Tuberculosis and also had belief in the benefits of early detection were more likely to get screened (Glanz *et al.*, 2008).

The HBM has six basic constructs that explain health-related behaviour viz: (1) Perceived susceptibility; (2) Perceived severity; (3) Perceived benefit; (4) Perceived constraints; (5) Cues to action; (6) Self-efficacy - the conviction that one can successfully execute or perform the behaviour required to obtain positive outcome with the health problem or the disease.

Recent studies have highlighted the fact that self-efficacy has progressively assumed greater importance in the model as an independent construct or the predominant construct within the HBM. This is owing to the fact that the health concerns of many countries have shifted towards life-style related health conditions (Holman & Borgstrom, 2016). However, the intertwined effect and intricate interplay of the six major constructs has a predominant role in behavioural modification towards health more than any other thing (Figure 2.5).

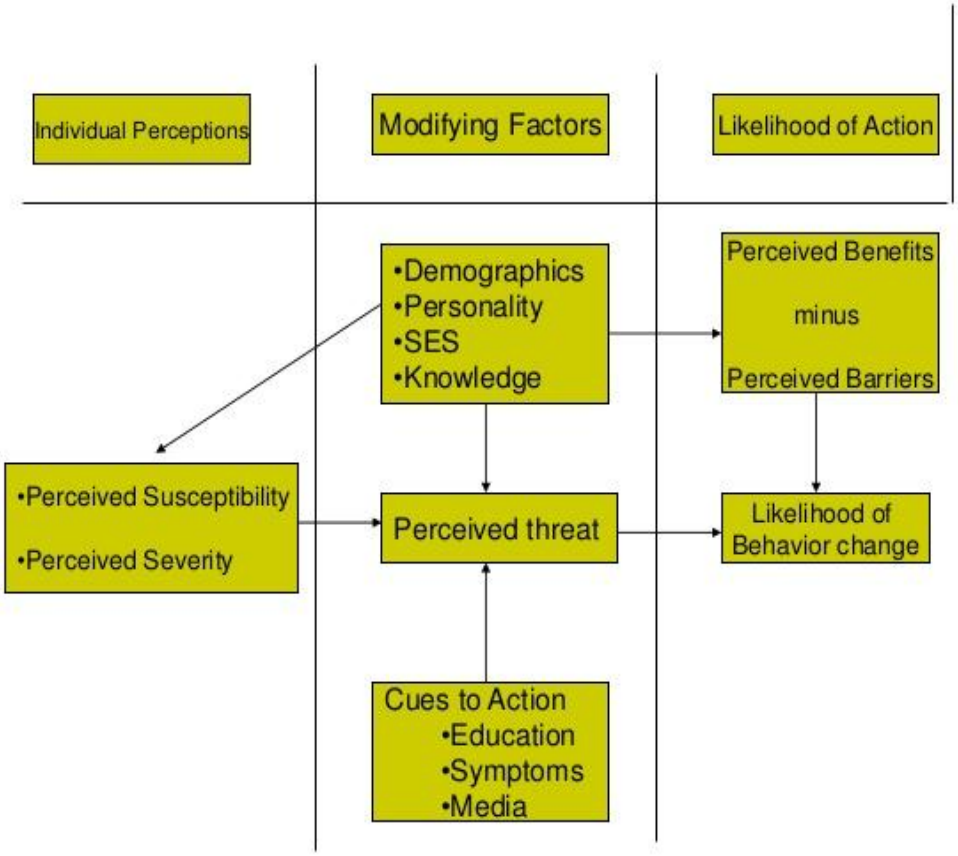

Figure 2.5: The inter-link of the six constructs in the Health Belief Model that ultimately leads to behavioural change towards healthy lifestyle

2.17 Application of Health Belief Model to Breast Cancer Screening with Breast Self-Examination (BSE)

Several reports and studies have been conducted using HBM to improve women's perception towards Breast cancer screening and to modify their behaviour positively towards adopting BSE for Breast cancer screening (Moodi *et al.*, 2011; Eskandari-Torbaghan *et al*., 2014 and Masoudiyekta *et al.*, 2018). The results have been consistent with overall improvement in women's knowledge and attitude to BSE practice to enhance early detection of Breast cancer. Furthermore, Dewi *et al.* (2019) brought to prominence the Self-efficacy improvement with BSE performance following a community-based intervention in Indonesia. The application of HBM for BSE adoption and practice through educational intervention involved the intricate application of the six constructs with clear recognition of the benefit of each as defined below:

Perceived Susceptibility: ***How likely do you think you are to come down with this disease?***

"Perceived susceptibility refers to a person's subjective assessment of the likelihood of experiencing a potentially harmful condition" like Breast cancer. In this study, it will be assessed as a subjective perception of the risk of contracting Breast cancer. Individuals with low perceived susceptibility may deny that they are at risk of developing Breast cancer. In relation to the practice of BSE, an individual may have a high perception that she is susceptible to developing breast cancer as a woman and within the age group at-risk depending on her internalization of available information on Breast cancer. Equally, a woman may deny that she is at risk of developing breast cancer, hence may not be interested in a routine screening with BSE. (Jones, *et al* 2015).

Perceived severity: ***How serious a health problem doyou think this disease is?***

Perceived severity is an individuals' subjective assessment of how threatening a condition is or potential consequences of a condition. This includes the individual's evaluation of the medical consequences (disabilities or pain) and the social consequences. Jones, *et al* 2015. In relation to Breast cancer, perceived severity considers the belief of the women about the seriousness of breast cancer, its complications and the negative outcome of trivializing it. This would be guided by framing questions relating to individual's perception about the seriousness of breast cancer in the study instrument. (Masoudiyekta et *al* 2018).

Perceived benefits: ***How well does the recommended behaviour reduce the risks associated with this disease or health problem?***

This refers to the individuals' subjective assessment of the value or efficacy of engaging in a health promoting behaviour to reduce the risk of a disease. (Masoudiyekta et *al* 2018).In respect to the role and importance of BSE in screening for Breast cancer, perceived benefits would include the individual's perception that BSE would be helpful in the early detection of breast cancer. It will establish that the woman understands that if Breast cancer is detected early with BSE, the survival and outcome will be better and more reassuring than ignoring BSE practice with possible late-stage disease and poor outcomes as the consequence. (Jones, *et al* 2015).

Perceived Constraints: ***What are the potential negative aspects of doing this recommended behaviour?***

This refers to an individual's assessment of the obstacles to a behavioural change or barriers to a health promoting practice. (Jones, *et al* 2015). Barriers may be financial, physical, or psychological. In the case of BSE practice, perceived barriers would include issues like fear of detection of a lump. The practice of BSE comes with no cost, is easy to conduct, convenient and the breast is readily accessible. Hence, specific questions would be framed in the study instrument relating to the fear of anxiety of detecting an abnormality in the breast during BSE.

Cues to action***: What are the factors that may cause you to change your behaviour to this health problem?***

This considers the factors that prompt or trigger a health promoting action. (Jones, *et al* 2015). Cues to action may be internal or external factors. In the case of BSE, cues to action would include information from the media and other sources on BSE, myths, beliefs, personal experiences or experiences of significant others.

Self-efficacy: ***The conviction that one can successfully execute or perform the behaviour to overcome disease***

This refers to the individual's overall perception of his/her confidence to perform a health promoting behaviour. (Jones, *et al* 2015).In the case of BSE, self-efficacy would refer to the confidence to appropriately perform BSE at the right frequency and following the right steps. However, this would be dependent on other factors mentioned above. An individual that has a high perception of susceptibility and severity to breast cancer, and equally has a low perceived constraint is likely to confidently engage in a routine practice of BSE. Figure 2.5 shows the constructs in the HBM to be adopted for study while Figure 2.6 shows the intricate relationship between the application of the six constructs and how to assess them using a study instrument.

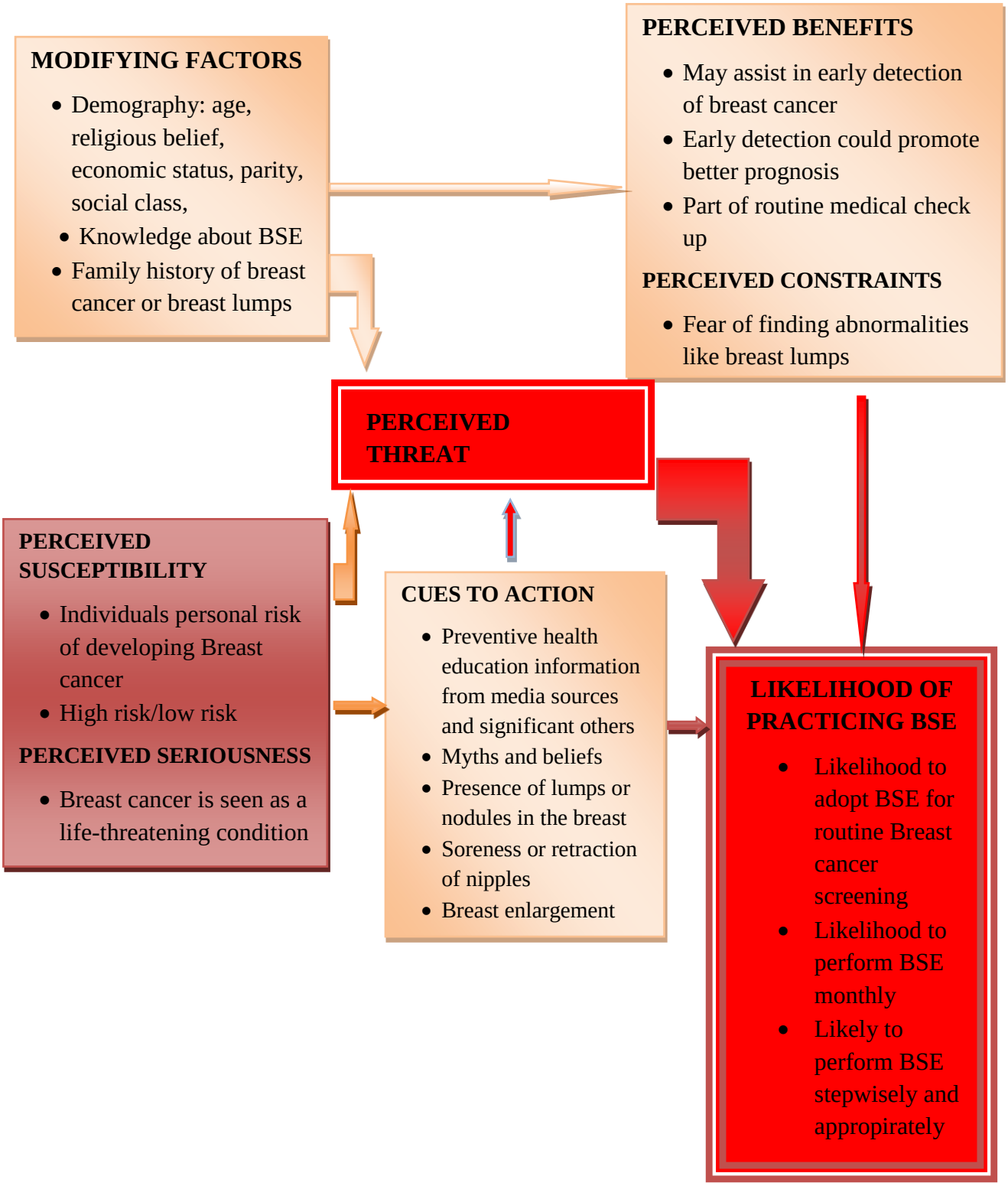

Figure 2.6: Application of Health Belief Model for the study

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter describes the issues relating to the research design, the scope, study population, study location, sampling technique, sample size calculations, instruments for data collection and ethical considerations.

3.2 Study Design

This was a quasi-experimental study that involved the use of local educational facilitators/stepdown trainers, Role Model Mothers (RMMs), and Community Health Extension Workers (CHEWs), as agents for improving knowledge of, attitude toward, and practice of appropriate and regular Breast Self-examination (BSE) among community women in three semi-urban Local Government Areas (LGAs) in Oyo State. Two of the LGAs (Ido and Akinyele LGAs) were chosen at random as the experimental groups (with intervention provided by the RMMs and CHEWs, respectively), while the third, Egbeda LGA, acted as the control group, receiving no BSE intervention. Mixed methods of Qualitative and Quantitative data collection was used to collect data from the study participants across the three local Government Areas. The design is depicted graphically in Table 3.1.

Table 3.1: Schematic Summary of the research design for the study

STUDY LOCAL GOVERNMENT AREA	Baseline Data Collection	Intervention	Endline Collection
Experimental LGA I (EG I): IDO LGA	O1	Intervention anchored by RMM	O2
Experimental LGA II(EG II): AKINYELE LGA	O3	Intervention anchored by CHEWs	O4
CONTROL LGA (CG): EGBEDA LGA	O5	No Intervention	O6

DIAGRAM KEY:

O_1=*Baseline data collection from group of community women in Experimental LGA I* (EG I)

O_2=*Follow-up data collection from group of community women in Experimental LGA I* (EG I)

O_3=*Baseline data collection from group of community women in Experimental LGA II* (EG II)

O_4= *Follow-up data collection from group of community women in Experimental LGA II* (EG II)

O_5=*Baseline data collection from group of community women in Control LGA* (CG)

O_6=*Follow-up data collection from group of community women in Control LGA* (CG)

3.3 Study Population

This study involved only females (community women) that had attained menarche (above 19 years old) irrespective of whether they had child(ren) or not.

3.3.1 Inclusion Criteria

The inclusion criteria considered for this study were:

- Women (19 years and above) who had attained menarche; up to the age of 60 years (as recommended by ACS 2014);
- Permanently resident in the study LGA;
- Desired to stay within the study community throughout the study period; and
- If married, had the permission of her husband to take part in the study.

3.3.2 Exclusion Criteria

This study excluded

- Women with a history of a breast lump, history of any breast disease or previous breast surgery;
- All pregnant or breastfeeding women;
- Any un-consenting woman; and
- All health workers (orthodox or traditional).

3.4 Description of the Three Selected Study LGAs

The three semi-urban local government areas (LGAs) viz Akinyele LGA, Ido LGA and Egbeda LGA in Oyo state, were randomly selected by balloting among the semi-urban LGAs in Ibadan **(Section 3.6)**. Incidentally, based on previous documentations and recent history, these three LGAs appear to share similar features in terms of demography and other socio-economic characteristics (ICLEI, 2021). The background details of these LGAs are discussed next, in alphabetical order.

3.4.1 History of Akinyele Local Government Area

The Akinyele LGA was created in 1976. It was named after the Late Olubadan of Ibadan land, Oba Isaac Akinyele. To the north of Akinyele LGA is Afijio LGA. Ibadan North LGA is to the south, while Lagelu and Ido LGAs are to the east and west respectively. Its central administrative office is located at Moniya community. It occupies a land area of 464.892 square kilometers with

a population density of 516 persons per square kilometer. Using 3.2% growth rate from 2006 census figures, the 2010 estimated population for the Local Government is 239,745. (NPC, 2006) Akinyele Local Government Area is divided into 12 political wards namely: Ikereku, Olanla/Oboda/Labode, Arulogun/Eniosa/Aroro, Olode/Amosun/Onidundu, Ojo-Emo/Moniya, Akinyele/Isabiyi/Irepodun, Iwokoto/Talonta/Idi-oro, Ojoo/Ajibode/Laniba, Ijaye/Ojedeji, Ajibade/Alabata/Elekuru, Olorisa-Oko/Okegbemi/Mele, and Iroko. The local government is governed by an elected chairman and 12 councillors, with one elected from each ward. The prominent traditional rulers in the local government area are Oniroko ofIroko, Onijaiye of Ijaiye and Onikereku of Ikereku. (ICLEI. 2021)

A wind shield survey of the LGA revealed a heterogeneous community (inhabitants have different beliefs, values and cultures). It is dominated by the Yoruba, as well as other local tribes like as the Hausa and Fulani. Some parts of the LGA host foreigners from Togo, Republic of Benin and other West African countries. The major occupations of residents in the area is trading and farming. Their major sources of water are wells and bore-holes. (Falola,1985)

There is a radio station, Amuludun FM, in the LGA. Signals from other radio stations such as Splash FM, Diamond FM and Osun radio can also be received in the LGA. The television signals received by the community are Nigerian Television Authority (NTA) Ibadan and Broadcasting Cooperation of Oyo State (BCOS) Ibadan. There are telecommunication masts owned by Mobile Telecommunication Network (MTN), Globacom Nigeria PLC (GLO) and Etisalat service providers. There are several government-owned and privately-owned primary and secondary schools in the LGA. However, patronage is higher in the government-owned schools. There is no tertiary institution within the LGA. (ICLEI, 2021)

There are several commercial centers within the LGA, but the most prominent is the famous Akinyele Cattle Market. The Akinyele Cattle Market in Southwest Nigeria is the first stop for livestock carriers. As a result, it is the primary receiver of cattle transported from various regions of northern Nigeria. The major food markets in Oyo State and the Ibadan metropolis, largely depend on the Akinyele cattle market for red meat. (Britannica, 2021).

3.4.2 History of Egbeda Local Government Area

The LGA came into existence in 1989. It has an area of 191 km² and a population of 281,573 at the 2006 census. Egbeda LGA is semi-urban and located in the rainforest agro-ecological zone.

It lies between latitudes 70 21´ and 80 N of the equator and longitudes 40 02´ and 40 28´E of the meridians, and bounded in the North by Lagelu LGA, in the West by Ibadan North-East, in the East by Osun State and in the South by Ona-Ara LGA in Oyo State (Fig. 3.1). Egbeda Local Government Area is subdivided into 11 wards: Erunmu, Ayede/Alugbo/Koloko, OwoBaale/Kasumu, Olodan/Ajiwogbo, Olodo/Kumapayi I, Olodo II, Olodo III, Osegere/Awaye, Egbeda, Olode/Alakia, and Olubadan Estate (ICLEI, 2021).

A wind shield survey of the LGA revealed a heterogeneous community (inhabitants have different beliefs, values and cultures). It is dominated by the Yoruba among other resident tribes like the Hausa, Igbo and Fulani. Some parts of the LGA hosted foreigners from Togo, Republic of Benin and other West African countries. Their major sources of water are wells and bore-holes. There is adequate road network and the major languages for communication in the area are Yoruba and English. The presence of several telecommunication masts indicates the presence of mobile telecommunication services in the LGA (Britanicca, 2021).

There are several commercial activities in the LGA. Some of the most prominent are the popular Gbagi Market (formally known as Bola Ige International Market), Monatan and Egbeda markets. The major occupations of residents in the area is trading and farming. The LGA also hosts a couple of companies and organizations such as the Coca-Cola Bottling Company, the Nigerian Breweries, the Ibadan Airport among others. (ICLEI, 2021)

3.4.3 History of Ido Local Government Area

The Ido LGA was created in May 1989. The Local Government has its headquarters along Eleyele-Eruwa Road, in Oyo-South Senatorial District. It was carved out of the former Akinyele Local Government area. The LGA was formerly called Akinleye West Local Government (1981-1983) during the second Republic but was later merged again with Akinyele LGA in 1984. The Ido LGA is bordered by Akinyele Local Government, Ibadan-North Local Government, Ibadan North-West Local Government, Ibadan South-West Local Government, Oluyole Local Government, Ibarapa-East Local Government, all in Oyo State as well as Odeda Local Government Area in Ogun State (Fig. 3.1). It has a land mass of approximately 986 km² and a population of 103,261, as at the 2006 census. It lies between latitude 6^0451 and 9^0451 north of the equator and longitude 2^o301 and 9^o451 East of Greenwich Meridian. (Britannica, 2021)

Among the major towns within the local government area are Ijokodo, Omi-Adio, Apata, Apete and Bakatari. The LGA hosts over 600 villages amongst which include: Ogunweide, Dada, Olowofela, Apooyin, Oderemi and Odetola. The LGA is rapidly becoming industrialized with the presence of industries such as the Nigerian Wire and Cable Ltd., Nigerian Mining Corporation and the NNPC among others. The people are predominantly Yoruba and the area is blessed with fertile land. The main occupation of the people is farming mainly in food and cash crops such as cassava, maize, yam, vegetable, cocoa, oil palm and kolanut. (ICLEI, 2021)

The LGA gained its major popularity with the presence of the notable industries mentioned previously. There are several government and privately-owned primary and secondary schools in the LGA. However, patronage is higher in the government-owned schools. There are common locations where people gather to relax and share information. These places include restaurants, viewing centers, drinking spots, stalls, etc. (Falola, 1985; Britannica, 2021)

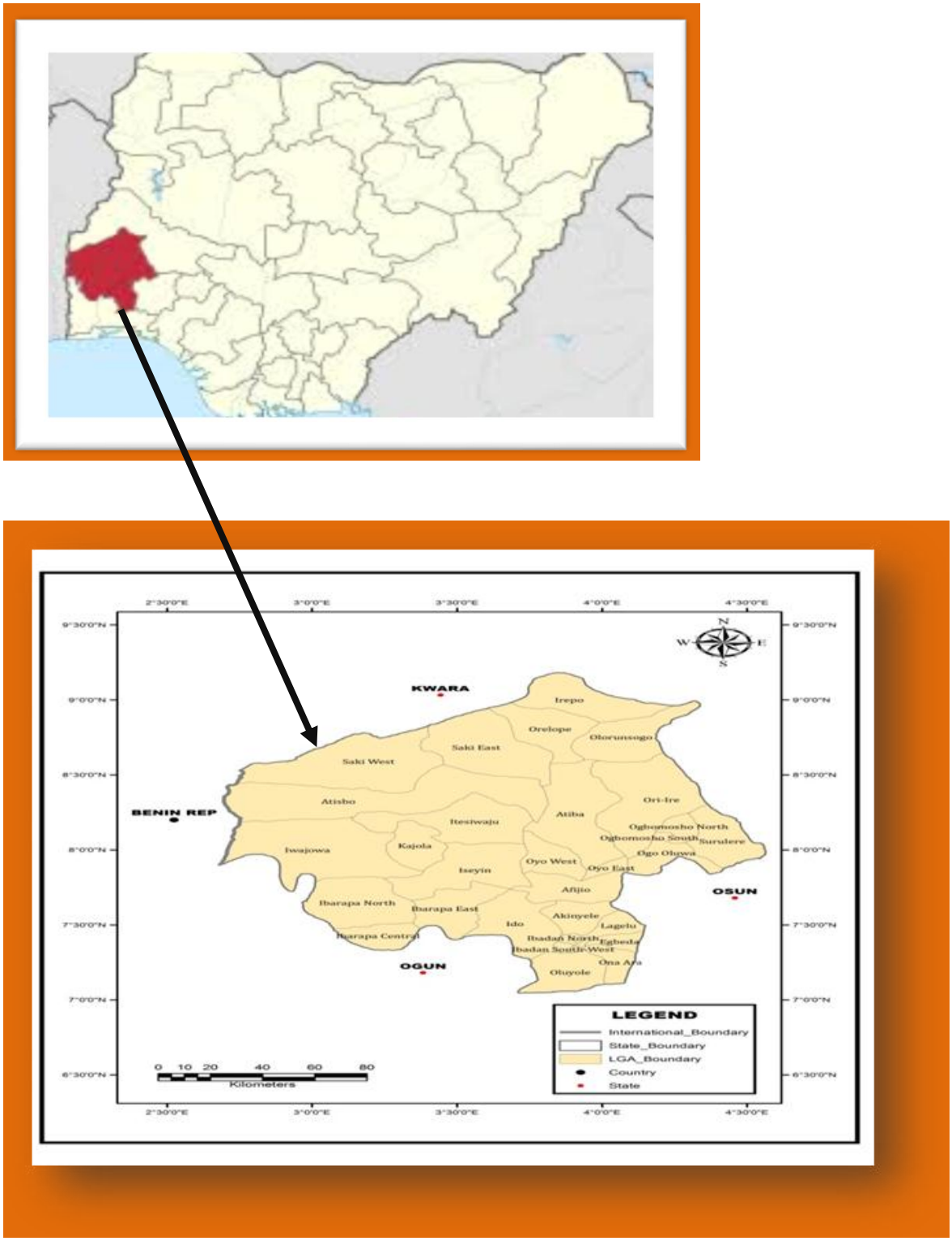

Figure 3.1: Map of Oyo State, Nigeria

3.5 Sample Size Determination

The minimal sample size needed to meet the study goals and test the hypotheses was calculated based on the simplified form of comparison (regression discontinuity design) between proportions stated as:

$$\eta = \frac{(Z_\alpha+Z_\beta)^2\ [P_1(1-P_1)+P_2(1-P_2)}{(P_1-P_2)^2}$$ (Cochran, 1953)

Where η =minimum sample size required

Z_α=1.96 (95% confidence interval)

Z_β=0.8 (at 80 %power)

P_1=0.5 (at 0.5 %baseline prevalence)

P_2=0.75 (at 50%anticipated response)

$$\eta=\frac{(1.96+0.80)^2\ [0.5(1-0.5)+0.75(1-0.75]}{(0.5-0.75)^2}$$

$$\eta=\frac{(2.76)^2[(0.25)+(0.1875)]}{(-0.25)^2}$$

$$\eta=\frac{(7.16176)(0.4375)}{0.06275}$$

η=49.93

n= Ω 50

From the calculated sample size above, a minimum of 50 community women were required for this study in each of the study LGAs. However, the sample size was increased to 100 per LGA to factor incomplete responses from respondents and possible attritions that could occur during the course of the study. These 100 women were selected randomly by balloting (after confirmation of their eligibility using the inclusion criteria listed above) from the selected houses in the randomly selected five communities in each LGA. In summary, at baseline, a total of 300 community women were recruited for the study across the three LGAs.

3.6 Sampling Procedure and Techniques

A multi-stage (five-stage) sampling technique employing probability sampling method, was used to obtain the representative sample from the three study LGAs, by selecting communities, households and finally, individual community women who took part in this study.

(i) **First Stage**: A sampling frame was constructed (Appendix 1) that listed out all the 11 local government areas (LGAs) in Ibadan, the capital of Oyo state. They were subsequently stratified into 5 Urban and 6 Semi-urban LGAs based on a schema of the Oyo State Ministry of Local Governement and Chieftaincy Affairs as described by Wahab and Popoola (2018). The 6 semi-urban LGAs in Ibadan were listed out from which three (3) LGAs were randomly selected by balloting viz Ido LGA, Egbeda LGA and Akinyele LGA. Amongst the three selected LGAs, another simple random selection by balloting was conducted to allocate the selected LGAs into intervention and control LGAs as shown in the schematic diagram in Table 3.2.

Table 3.2: Random allocation of study sites and intervention

LOCAL GOVERNMENT AREAS	INTERVENTION
IDO LGA	Role Model Mothers (RMMs)
AKINYELE LGA	Community Health Extension Workers
EGBEDA	Control group (No intervention)

- Ido LGA was selected randomly by simple random balloting for recruiting community women into Experimental Group I (EG I) to be trained by Role Model Mothers (RMMs).
- Akinyele LGA was selected randomly for recruiting community women into Experimental Group II (EG II) to be trained by Community Health Extension Workers (CHEWs).
- Egbeda LGA was selected randomly for recruiting community women into the Control Group (CG).

(ii) **Second stage**: Utilising the sampling frame, all the districts in each study LGA were listed out afterwhich all the communities under each of the districts were also listed out and coded with serial numbers. From this list, five (5) communities per study LGA were selected randomly by balloting.

(iii) **Third stage**: For each selected community, a Primary Health Care Enumeration Area (PHCEA) and estimates of housing density for that PHCEA was obtained from the Medical Officer of Health (MOH) for that LGA to determine the number of houses in that community based on the previous sampling frame utilized for the 2018 Demographic and Health Survey (DHS, 2018) in that LGA. A sampling fraction was calculated for each community using a simple formula as clearly described by Munk Ravnborg *et al (2012):*

Sampling fraction = $\frac{D}{S}$

D = Housing density for PHCEA as obtained from the MOH of that LGA
S = Sample of community women (i.e. total number of community women to be recruited from that community, which is 20 community women to make a total 100 women recruited from that LGA)

Based on the sampling fraction so obtained for that community, the house to recruit from was determined using systematic sampling to obtain a total of 20 houses in that community e.g. With a sampling fraction of 50, recruitment was done from every fiftieth house in that community starting from the boundary with the next community.

If any selected house had no eligible or non-consenting community women, the consecutive house in the sampling sequence is approached till a suitable house is selected. In the end, 100 houses were selected from each LGA (i.e. 20 per community).

(iv) Fourth stage: In the selected houses, where there was more than one household or family, balloting was adopted to randomly select households to be recruited from.

(v) Fifth stage: In the selected household/family, one (1) eligible and consenting woman was selected randomly by balloting and recruited for the study.

3.7 Study Variables

3.7.1 Independent variables

The independent variables were the socio-demographic factors such as Marital status, Age, Religion, Level of education, Occupation, Income, etc. Other independent variables included:

- Exposure to Role Model Mothers' BSE stepdown training, and
- Exposure to Community Health Extension Workers' BSE stepdown training

3.7.2 Dependent variables

These variables were derived from the conceptual framework of the Health Belief Model. The values of these variables are liable to change depending on status of the independent variables.

- Knowledge of breast cancer and breast self-examination;
- Attitude to breast cancer and adoption of self-breast examination;
- Perception about breast cancer and breast self-examination; and
- Practice of regular and appropriate stepwise breast self-examination.

3.8 Methods of Data Collection

A mixed method of data collection (both qualitative and quantitative methods) was adopted.

3.8.1 Qualitative Data Collection Instruments

(i) Focus Group Discussion (FGD) Guide:

A Focus Group Discussion (FGD) guide was developed to explore opinions, perceptions, myths and rumours about Breast cancer and Breast self-examination through interactive sessions. The content of the instrument further sought opinions on best ways to promote breast self-

examination in the community and limiting factors to adoption of BSE by community women. The FGD guide contained 10 questions and had Yoruba and English versions. (Appendix II).

The community women involved in the FGD sessions were randomly selected with the support of the women leaders present in the each of the communities. (See 3.12.3 for more details)

(ii) Key Informant Interviews (KII) GUIDE: A KII guide was developed to gain in-depth (one-on-one) information about BC and BSE from selected trainers (RMMs and CHEWs).

3.8.2 Quantitative Data Collection Instrument

An interviewer-administered semi structured questionnaire was developed consisting of 57 closed- and open-ended items. It had 5 sections labeled A to E.

Section A: This section gathered information on the socio-demographic variables of rspondents such as age, level of education, religion, marital status and so on.

Section B: The section assessed knowledge on BC and BSE, sources of information about BSE, risk factors to developing BC. It also asked questions on frequency of performance of BSE.

Section C: This section assessed the attitude and perception towards Breast cancer and BSE, limiting factors to adoption of BSE.

Section D: This section explored questions on the perception of the study participants towards BSE and breast cancer.

Section E: The section explored respondents' ability to competently demonstrate stepwise BSE using plastic breast models.

The final quantitative data instrument (Questionnaire) used for the study is as attached in Appendix III (English version) and IIIb (Yoruba version).

3.9 Validity and Reliability of Instrument

In order to ensure that the instrument was a true reflection of its purpose, series of measures were taken at various stages of its design. Experts in various fields such as Language, Sociology, Ocology and Statistics were also consulted at different stages of developing the instrument.

3.9.1 Validity of the Instrument

The following processes were ensured to achieve validity of the study instrument:

(i) Extensive literature review was done to develop the pool of questions to ensure content validity.

(ii) The questions were drafted in English, and then given to Yoruba Language experts to translate to Yoruba after which they were back-translated to English by another expert to ensure interpretations were not altered.

(iii) The draft questionnaire was subjected to review and critical analysis by the project supervisor and other faculty at the Department of Health Promotion and Education, Faculty of Public Health, College of Medicine, University of Ibadan and approved for the study.

3.9.2 Reliability of the Instrument

The instrument was pre-tested by the research team on 10% of the entire sample size (30 randomly selected community women that fulfilled the inclusion criteria) at another semi-urban LGA in Ibadan other than any of the three study LGAs (Olorunda area of Lagelu LGA in Ibadan). After obtaining the findings from the pre-test, the instrument was further subjected to adjustments and restructuring by the research team. The adjustments included re-ordering of the sequence of some questions to avoid information pollution. The instrument was further pretested at the same LGA on another 30 randomly selected community women who fulfilled the inclusion criteria. Following this, the Cronbach's Alpha model was used to measure internal consistency of the instrument. This was determined based on the average inter-item correlation. The analysis demonstrated a good Alpha value of ≥ 0.5 across all sections of the instrument as shown in Table 3.3 in accordance with the prescription of Nunnally and Bernstein (1994).

Table 3.3: Summary of the reliability statistics of the study instrument at pre-test

	Cronbach's Alpha	No of items
Overall	0.927	112
Knowledge	0.962	39
Attitude	0.574	21
Practice	0.911	18
Correct performance of breast self-examination	0.917	17

3.10 Training of Research Assistants (RAs)

After the stage of instrument design and prior to instrument pre-testing, recruitment and capacity-building of the other members of the research team (Research Assistants) was conducted. Research Assistant (RA) recruitment was done through social networking. The criteria considered in the RA selection process included:

- Literacy (ability to read, write and communicate) in Yoruba and English languages;
- Willingness and passion to take part in the research for the entire duration of the field work (Approximately 7-8months);
- Willingness to receive a meagre monthly stipend throughout the duration of the project;
- Possession of socio-demographic characteristics similar to the Role Model Mothers (RMMs) (This was a strong consideration in the selection process.); and
- Possession of field research experience was also an added advantage in the selection of the RAs.

Fifteen (15) Research Assistants (RAs) were eventually selected and trained on the study protocols. A 2-day training of the selected Research Assistants took place at the Students' Lounge of the Faculty of Public Health, College of Medicine, University of Ibadan, on the 4th and 5th March, 2019. The training resource persons included the Supervisor and a designated representative from the department, the principal investigator and an Oncology nurse from University College Hospital, Ibadan. A cross-section picture of the training session is displayed in Appendix IVa.

The goal of this training was to ensure that the potential Research Assistants understood the content, concept and instruments of this study and the specific objectives of the training was to ensure that the Research Assistants were able to: (1) explain the concept of the study; (2) get acquainted with the data collection instrument; (3) properly interpret the study variables; (4) demonstrate the competency in obtaining voluntary informed consent from study participants; (5) understand the concept of confidentiality in data management; and (6) understand and be able to perform (demonstrate) in stepwise manners, breast self-examination, using a breast model.

The training started with an opening remark from the Project Supervisor followed by personal introduction by each of the potential RAs. The Principal Investigator gave a brief discussion on the rationale, goals and objectives of the study as well as the tools for data collection using the following format:

(1) the concept of the study and the objectives; (2) the potential locations of the study; (3) the duration of the study, study expectations and the Gantts' chart; (4) the details of the methodology of the study; (5) the ethical considerations in the study; (6) the details of the participants' consent process and the consent form; and (7) the details of the data instrument (the semi-structured interviewer-administered questionnaire) and how to properly administer it.
Each question item in the questionnaire was discussed extensively with each trainee alternating the reading of each question item and then indicating clarity of the item in relation to the study objectives, until the entire question items were clearly understood by all the trainees.

A step-by-step training on Breast Self-examination using a plastic breast model (see Appendix IVb) was conducted by the Oncology nurse and return demonstration was done by all the trainees till everyone satisfactorily demonstrated the skills to properly perform a BSE. Pictures of the stepwise BSE demonstration are displayed in Appendix IVc and IVd (Yoruba version).

After completing the training, a mock practical field session on how to administer the questionnaire to community women (with similar characteristics to the intended study participants) was carried out at a nearby community in Yemetu, Ibadan, with the involvement of all the 15 trainees. Ultimately, the best 10 trainees were selected and recruited as Research Assistants (RAs) for the study based on the observed level of commitment, willingness to immediately undertake the field work, knowledge of the study protocol and demonstration of competence with the administration of the study instrument and the stepwise performance of BSE. They were immediately mobilized to pre-test the study instrument within a week after the training to avoid information decay. Further details of the process of instrument pre-testing and validation are captured under section on Instruments for Data Collection.

3.11 Ethical Considerations

The following ethical considerations were ensured in the conduct of the study:

3.11.1 Risk

- There was minimal risk associated with the training and procedures in the study.
- Manikins and plastic breast models (not human subjects) were adopted for demonstration and training.

3.11.2 Informed Consent

The purpose of the study was adequately communicated to the participants and every individual participant gave both verbal and written consent prior to enrolment for the study. The English and Yoruba versions of the informed consent form are as attached in Appendix Va and Vb respectively.

3.11.3 Voluntariness

Verbal consent was obtained from each participant who was duly informed during the consent process that she reserved full rights to withdraw at any stage of the study.

3.11.4 Confidentiality

The data of all participants were de-identified with codes. All print data were kept safe in a secured office locker during and after the study, and electronic data were stored in a password-protected computer system.

3.11.5 Non-maleficence

Any participant who reported the presence of a breast lump or anomaly during or after intervention in any of the two Experimental Groups I and II, as well as in the Control Group was referred to a collaborating Consultant Oncological Surgeon, Dr A. O. Ayandipo, at the Oncology Surgical Outpatient Clinic of the University College Hospital, Ibadan, for further clinical evaluation using a pre-designed referral form (Appendix VI). At the end of the intervention period, a total of three participants were referred to the target Oncologist for further investigation and treatment. These participants were followed up on daily basis till it was ensured that they presented at the hospital and further evaluation was commenced.

3.11.6 Feedback

The final outcome of the study and recommendations was communicated to all stakeholders at the conclusion of the study.

3.11.7 Inducements

There was no financial inducement, to any of the study participants. It was emphasized to them that their participation was entirely voluntary and discretionary. However, at the end of the study, the participants were given souvenirs like detergent and training charts.

3.11.8 Post-Study Plan for the Control Group

At the conclusion of the study, accessible participants in the Control Group were equally trained on the stepwise demonstration of BSE by the members of the research team.

3.11.9 Ethical Approval

Ethical approval for the study was obtained from the Oyo State Research Ethical Review Committee (Approval number: AD13/479/2232) (Appendix VII). Thereafter, the community leaders and important stakeholders were visited and educated on the importance of the research to the community members (in the Section on Community Entry).

3.12 Pre-Intervention Phase Activities

3.12.1 Community Entry for the Three Selected LGAs

At inception of the field work, an advocacy visit was paid by the research team to the major stakeholders of the three different LGAs to solicit their support and cooperation to carry out the study in their locality. The role of the stakeholders and the advantages they stood to gain from the study were extensively highlighted in details (all the details of the benefits are listed in the section on Ethical considerations).

Generally, a similar method was adopted for the community entry across the three study LGAs. To ensure adequate community participation and mobilization, the research team's point of first contact was the Primary Health Care (PHC) office of each LGA to meet with the Primary Health Care (PHC) coordinator, the staff of the Health Education Unit of the PHC office in each LGA, and the ward focal persons. They were meticulously debriefed about the study objectives and concepts, shown the Ethical approval letter for the study from Oyo State Ministry of Health and had their cooperation obtained (e.g. Appendix VIIb) for the advocacy and mobilization required to successfully conduct the study in their respective LGAs. That included the mobilization of Role Model Mothers (RMMs) and community women in EGI at Ido LGA, the Community Health Extension Workers (CHEWs) and community women in EGII at Akinyele LGA and only community women (CW) in the CG at Egbeda LGA.

3.12.2 Collection of Baseline Data

One of the processes required to facilitate the Pre-intervention phase was the collection of Baseline data (Qualitative and Quantitative data) from community women at the three study

LGAs. The baseline quantitative data were important to identify the various themes of Breast Cancer and BSE knowledge, attitude and practice gaps amongst the study participants (EGI, EGII and CG) to enable the design of a veritable training programme for educational facilitators/trainers (CHEWs and RMMs) who will conduct the step-down training at the intervention phase.

This process was carried out between May and June 2019 simultaneously across the three LGAs. The process was facilitated by the LGA ward focal persons and the PHC Health Education Unit under the direct supervision of the PHC Coordinator.

The principal investigator and the 10 Research Assistants followed the method described in sections on Study population, Sample size determination and Sampling Procedure above, to recruit 100 community women in each of the three study LGAs (total of 300 community women). Informed consent (verbal and written) was obtained from each of the recruited community women. All the community women had their phone contacts (or that of their husband or any other available contact within the selected household) obtained and archived for follow-up during the study.

3.12.3 Qualitative Data Collection from Study Participants at Baseline

After recruitment of community women as enumerated above, Focus Group Discussion (FGD) was conducted among the community women in EGI, EGII and CG with the findings used to design a training guide for the local educational facilitators/stepdown trainers, RMMs and CHEWs at Ido and Akinyele LGAs respectively.

The FGD obtained qualitative data from the study participants on Breast Cancer and BSE. The questions explored knowledge of, attitude to and perception about Breast Cancer and BSE and the practice of BSE. With the support of the Ward Focal persons and the PHC coordinators, the women were mobilized for sessions of Focus Group Discussions (FGDs) in batches. The sessions were anchored by the Principal Investigator across the three LGAs, with two FGD sessions per each of the 5 selected communities in each LGA (Total of 10 FGD sessions per study LGA).

The discussion sessions took place at a central location. All discussions were conducted in Yoruba language and started with full introduction of all participants. The sessions were anchored by the Principal Investigator; notes were taken by an assigned Research Assistant. Permission to use a recorder was duly sought from the audience. The audience for each session

ranged between 8-10 community women and they sat in a semi-circle pattern. The women were given identification numbers and they were allowed to freely express their opinions about questions posed to them about Breast cancer and BSE. Appendix VIII shows a picture of a cross-section of women during one of the FGD sessions at Ido LGA.

During the discussions, they were asked if they would like to undergo training on BSE, the most suitable days of the week they wanted the training and other modalities for the training. Qualitative data collected from these sessions formed part the training manual for the RMM/CHEW training as depicted in Figure 3.2.

3.12.4 Quantitative Data Collection from Study Participants at Baseline

The research team moved into the three study LGAs to obtain baseline quantitative data from the 300 study participants. The drafted questionnaire was slightly modified with findings of the FGD and KII. Verbal consent was sought from each participant prior to the administration of the questionnaire. An interviewer-administered study instrument was used to obtain data on a one-on-one basis. Supervision was ensured by the principal investigator by conducting on-the-spot checking of the filled instrument.

All this information (findings from the analyses of the baseline qualitative and quantitative data) was put together to refine the design of this study as well as utilized in the design of the training curriculum of the educational facilitators/stepdown trainers (CHEWs and RMMs).

3.13 Intervention Protocol

The intervention had three phases which consisted of:

- Pre-intervention phase (participatory process);
- The intervention (implementation); and
- Post-intervention (follow-up activities).

3.13.1 Development of the Training Manual

The baseline findings (both qualitative and quantitative) guided the development of a veritable training curriculum for the RMMs and CHEWs.

Table 3.4: Highlights of Key Emerging Issues (Identified gaps) from the Analysis of Baseline Data

1	Poor knowledge of Breast Cancer and BSE
2	Myths and misconceptions about Breast Cancer
3	Negative attitude towards BSE
4	Negative perception on BSE
5	Poor practice of BSE

All the emergimg issues, myths and wrong beliefs in Table 3.4 were extensively and critically analyzes to design the training manual that was adapted for the CHEW and RMM training.

Using a mixed method system, an exploratory sequential approach (Wisdom & Creswell, 2013) was used to synthesize information from the qualitative data obtained at baseline to further develop the constructs in the quantitative data collection instrument. Analysis of the baseline data obtained with this instrument was done with identified gaps in BSE Knowledge, Attitude and Practice considered in the development and construction of the RMMs and CHEWs training manual as shown in Figure 3.2.

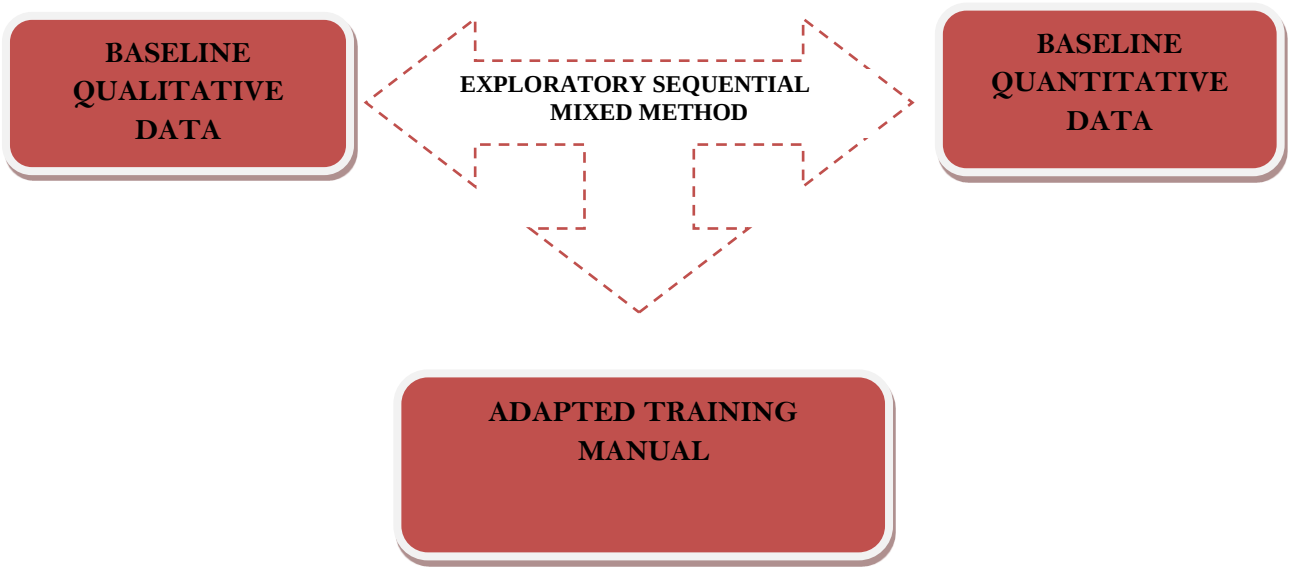

Figure 3.2: The schematic diagram of the Exploratory Sequential mixed method of data analysis at Baseline used to design training manual for RMMs and CHEWs

3.13.2 Recruitment and Training of Role Model Mothers (RMMs) at Ido LGA

Based on a previously adopted study protocol by Ajayi *et al*. (2008) on the training and deployment of mother trainers, one (1) mother trainer will be required to train 50 community women during an educational intervention. However, because of the need for multiple physical demonstrations with breast models and to ensure adequate exposure by study participants during the training, one (1) Role Model Mother (RMM) was planned to train and inspire ten community women to improve the adoption and appropriate stepwise practice of BSE for routine breast cancer screening. It was also envisaged that this ratio would enhance RMM dedication and prevent RMM drop-out from apathy, as training a larger number of women will require covering a larger distance within that LGA during the frequent follow-up visits. Therefore, for the 100 community women at Ido LGA, ten (10) Role Model Mothers were selected for the study; two each from the five (5) randomly selected communities within the LGA. The selection criteria were made available to the PHC Coordinator to assist with the selection of the appropriate women in the community for the training.

The selection criteria followed previously published criteria by Ajayi *et al*. (2008) which included:

a) That they were respectable women worthy of emulation within the community;

b) That they had the ability to read and write in Yoruba Language;

c) That they had resided in the community for at least a year and were committed to staying within the community throughout the period of the study;

d) That they were at-least 30 years of age;

e) That they had full and unconditional support from their husbands to participate; and

f) That they were willing to work for the community.

A convenient date and location (a serene location within the community with measures taken to ensure there were no distractions) were fixed (immediately after the RMMs had been recruited by consent into the study) for the research team to introduce and to educate them about the purpose of the study. During the meeting, the research team facilitated the conduct of a Key Informant Interview (KII) on the 12 RMMs that were initially selected, to determine their baseline level of knowledge about breast cancer and breast self-examination followed by training of the RMMs to prepare them for the field work.

3.13.3 Key Informant Interview (KII) with the RMMs

Before training the RMMs, a Key Informant Interview (KII) was conducted among them. This was a one-on-one interview that helped to give a better insight into the subject matter (Breast Cancer and screening with BSE).

Three of the Research Assistants who shared similar characteristics with the RMMs were actively involved in the KII in order to facilitate free flow of the discussion session. A verbal consent of participating RMMs was sought to conduct an audio recording of the discussion. The KII was conducted in Yoruba Language. The RMMs were briefed in details about the purpose of the discussion. Questions were explored around knowledge of breast cancer and BSE, willingness to adopt BSE, willingness to train others on BSE and possible factors that could mitigate the practice of BSE in the community. At the conclusion of the KII, another convenient date was selected for the RMM training.

3.13.4 Training of Role Model Mothers on Breast Cancer and BSE

The training was conducted for all the selected RMMs to empower them to be able to carry out stepdown training of the study participants during the intervention phase. The training was divided into three sessions. All the sessions took a participatory approach and involved training methods such as discussion, brainstorming, demonstration/return demonstration, video shows, didactic lectures and role plays. Also, posers/quizzes were given to trainee RMMs after each session. Charts, pictures and posters were also used as training aids. Motivational items such as free call cards were made available for commendable performances after each session.

Session 1

The research team explained the purpose of the workshop to the trainees and thereafter, made a presentation of the findings from the baseline data collection among the study participants. Questions/reactions were taken and the research team patiently gave answers/responses to the questions and clarifications sought by the RMMs. This session took a participatory approach and was conducted with a mixture of Yoruba and English Languages. Life experiences/encounters on BSE/Breast Cancer were shared by the RMMs.

A 14-minute Nigerian movie titled "*Living funeral*" produced by the '*Pink Pearl foundation*' (www.thepinkpearlfoundation.org) was shown to the trainees with the aid of a projector screen. The video is a real life portrayal of the benefits of early detection of breast cancer. Some famous celebrities in the Nigerian movie industry were cast in the movie. Basically, the movie discouraged living in denial and encouraged early detection of Breast Cancer. The video was

translated to Yoruba for better understanding by the trainees. At the end of this session, the trainees were asked to state the lessons learnt. This was followed by a 15-minute lecture, delivered by the Principal Investigator on "The importance of early detection of breast anomalies". Questions/clarifications were addressed after.

A realistic role play was performed by the trainee RMMs to depict and erase the traditional stigma associated with breast cancer and breast self-examination among them. Poser for first training session of RMMs: Trainees were told to brainstorm on possible reasons why victims live in denial of a breast anomaly. They were divided into groups of threes and every group was made to give a submission. Motivational items like call cards were gifted to the best performer from each group.

Session 2

A recap of activities of the first session was given by the trainees, one after the other. Then the Principal Investigator gave a summary of the points. This served as a revision of the activities in session one. A manual for this session was distributed to the trainees. Then, a nurse from the Department of Oncology, University College Hospital, Ibadan, delivered a lecture on 'the warning signs of a breast cancer'.

The training manual was adopted from the American Cancer Society Training Guide on Breast Cancer but modified to incorporate the findings from the KII, FGD and baseline qualitative data analysis. This was employed to guide discussions on the morphology of a normal breast and abnormalities that commonly occur in the breast. Pictures of '*know your* lemons' (Appendix IX) depicting twelve (12) different anomalies that could exist on the breast were read out one after the other by each of the trainees. Questions and clarifications were taken and responded to adequately by the nurse.

An interlude of a 3-minute music video titled '*I touch myself'* by Serena Williams (2013), a world famous female table tennis champion, was played. The music promoted breast self-examination. The facilitator (one of the Research Assistants) extracted and read out the following lyrics from the music and translated them to Yoruba for proper understanding by the trainees.

" I love myself and want you to love me
When I feel down, I want you above me
I forget myself, I want you to remind me…
When I think about it "I touch myself"
I don't want anybody else
I want myself"….

The trainees in turn read out together from their manuals to ensure every one participated in the process. Photographs were taken during and after this session as well (Appendix X).

Poser for second session of RMM training: This employed a crossword matching method. The trainees were given flash cards of the various breast anomalies extracted from the Worldwide Breast Cancer Illustration (2001) to match to the corresponding names of such anomaly (e.g. pictures of a refracted nipple, veins on breast etc) Motivational items such as free call cards were given to the fastest and most correct responses to the poser.

Session 3

The emotional music of the last session '*I touch myself'* helped to stimulate the interest of the trainees towards the next lecture titled '*How to Perform BSE'.*

The '2016 manual' of the American Cancer Society for Breast Self-examination was used as a guide for this session. The facilitator read out the guidelines of the step-wise demonstration of BSE using the content of the reference manuals. Trainees also read alongside with the trainer from their own copies of the manuals.

Breast models were made available to conduct hands-on practical demonstration of BSE steps. As each step was read out, the facilitator demonstrated with one of the breast models. The trainees then carried out return demonstration of the stepwise BSE performance using the breast models.

A ten-step BSE checklist by the American Cancer Society was used to assess the stepwise demonstration of each of the trainees. Grades were awarded in terms of performance and confidence. This session lasted up to two hours because it was ensured that all the trainees scored 10/10 of the steps in the correct sequence and with the right confidence. A short break was observed. The post-training evaluation was conducted and assessed.

Post-training Evaluation of RMMs: A post-training test was conducted and only the best 10 RMMs that performed excellently well (in terms of practical demonstration of the step-down training, competence in communication and the test questions) were mobilized for the step-down training of the community women in the intervention phase (see Appendix XI for pre/post-training test instrument).

3.13.5 Recruitment and Training of Community Health Extension Workers (CHEWs) at Akinyele LGA

The processes discussed above for RMMs at Ido LGA were equally followed in the recruitment, training and mobilization of Community Health Extension Workers (CHEWs) at Akinyele LGA. With the assistance of the PHC Coordinator for the LGA, 12 CHEWs were recruited after providing consent to partake in the study. Similar to the training of the RMMs, the same training materials and methods were adopted to train the recruited CHEWs (i.e., all the sessions were observed just like the RMM training).

Post-training Evaluation of CHEWs: A post-training evaluation was conducted and assessed. Only 10 CHEWs that performed excellently well were mobilized for the step-down training of the recruited community women at Akinyele LGA. Pictures from this training are displayed in Appendix XII (See Appendix XI for pre/post-training instrument).

3.14 Mobilization and Monitoring of Study Participants in the Intervention Groups

At the last session of the training of RMMs at Ido LGA and CHEWs at Akinyele LGA, the plans for mobilization of the community women in EGI at Ido LGA, and EGII at Akinyele LGA, were discussed in details by the Principal Investigator, with the recruited RMMs and CHEWs respectively. Questions and observations were well taken. Each of the CHEWs and RMMs was given a plastic breast model and the training guide (used for their own training) to aid their step-down training at their respective LGAs (Appendix XIII).

A monitoring information system (MIS) form, developed in Yoruba language, was given to each study participant in EGI and EGII to facilitate monitoring of commitment and frequency of the step-down training by the step-down trainers (CHEWs and RMMs). The monitoring form was a simple checklist for them to tick what had been learnt after each training session. The lists included question lines with multiple choice answers on the following:

1) What is breast cancer?
2) Severity of breast cancer.
3) Benefits of BSE and early detection
4) Predisposing factors to breast cancer
5) Anatomy of the breast/know your lemons
6) Guiding step-by-step practice of BSE
7) Frequency of BSE and appropriate periods for a BSE
8) Stop stigma against breast cancer victims.

3.15 Intervention implementation Phase

This was applicable to only Ido and Akinyele LGAs as represented in the Table 3.1. This was carried out for a 6-month period between July and December 2019.

3.15.1 Description of Intervention at IDO LGA

Between July and December 2019, the 10 selected RMMs were deployed to undertake step-down training of the 100 recruited and mobilized community women in this LGA, on Breast Cancer and BSE. One RMM trained and inspired 10 community women within her catchment area. They were introduced to the women in their training sub-group by the research team. They conducted weekly house-to-house training of the study participants in their training sub-group.

The weekly step-down training was guided by the training manual given to the RMMs and training methods included lecturing, demonstration and return demonstration, role play and storytelling all of which were held in Yoruba Language. Posters, charts and boards that were used for the RMM/CHEW training were also used as teaching aids for the community women. Plastic breast models were used by the RMMs to demonstrate the practice of breast self-examination and a return demonstration was ensured by allowing the community women to individually demonstrate their acquired skills and prowess while conducting stepwise BSE. A weekly visit was paid to the community women by assigned members of the research team, to inquire if the RMMs carried out the task as planned.

The MIS was checked on every visit to ensure the RMMs followed the scheme of the step-down training. Fig. 3.3 summarizes the intervention in Ido LGA.

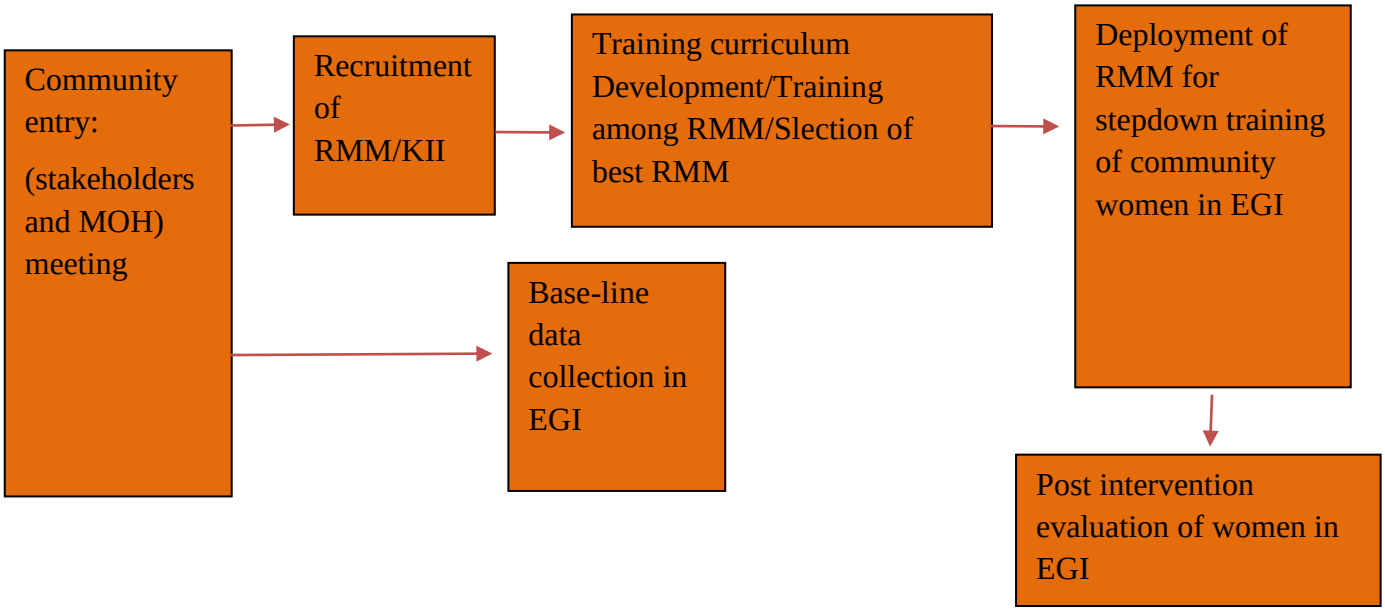

Figure 3.3: Schematic Summary of Intervention at Ido LGA (RMM stepdown training)

3.15.2 Description of Intervention at Akinyele LGA

The 10 CHEWs were deployed to undertake step-down training of the 100 recruited and mobilized community women in this LGA, on Breast Cancer and BSE, between July and December, 2019. One CHEW trained and inspired 10 community women within a catchment area. They were introduced to the women in their training sub-group by the research team. They conducted weekly house-to-house training of the study participants in their training sub-group. They were also allowed to gather all 10 study participants within their sub-group at a location that was convenient and comfortable for all participants, within that catchment area, for weekly group training while ensuring no participant was deliberately left out of such group training.

The weekly step-down training was guided by the training manual given to the CHEWs and training methods included lecturing, demonstration and return demonstration, role play and storytelling all of which were held in Yoruba Language. Posters, charts and boards that were used for the RMM/CHEW training were also used as teaching aids for the community women. Plastic breast models were used by the CHEWs to demonstrate the practice of breast self-examination and a return demonstration was ensured by allowing the community women to individually demonstrate their acquired skills and prowess while conducting stepwise BSE. A weekly visit was paid to the community women by assigned members of the research team, to inquire if the RMMs carried out the task as planned. The MIS was checked on every visit to ensure the CHEWs followed the scheme of the step-down training.

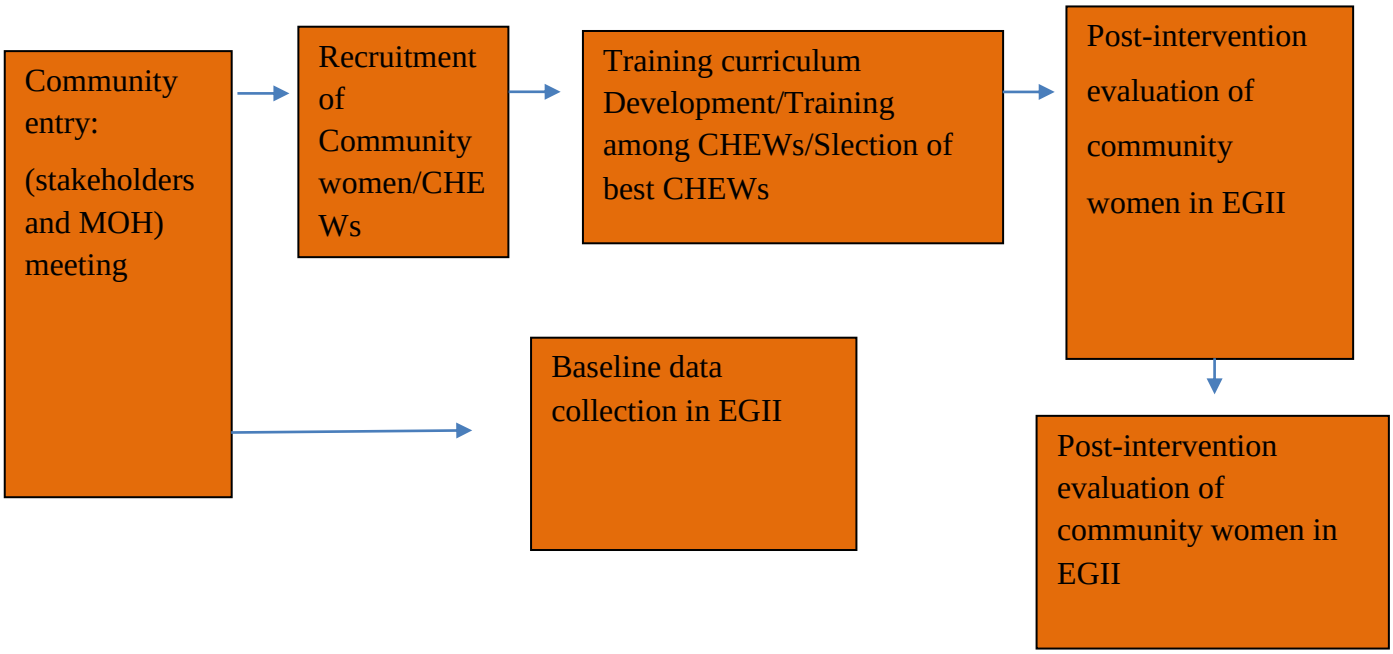

Figure 3.4: Schematic Summary of Intervention at Akinyele LGA (CHEW stepdown training)

3.16 Post-Intervention and Endline Data Collection

After completing the 6-month period of intervention, the same data collection instrument (with few modifications to that of the baseline) was used by the research team (with the aid of the PHC coordinator and ward focal persons) to collect endline data from the study participants in EGI, EGII and CG, across the three study LGAs, to determine the effect of the training interventions or non-intervention on their knowledge of Breast Cancer, and their knowledge, attitude and practice of stepwise BSE for breast cancer screening. This was carried out in January 2020 with the support of the same RAs that supported data collection at baseline.

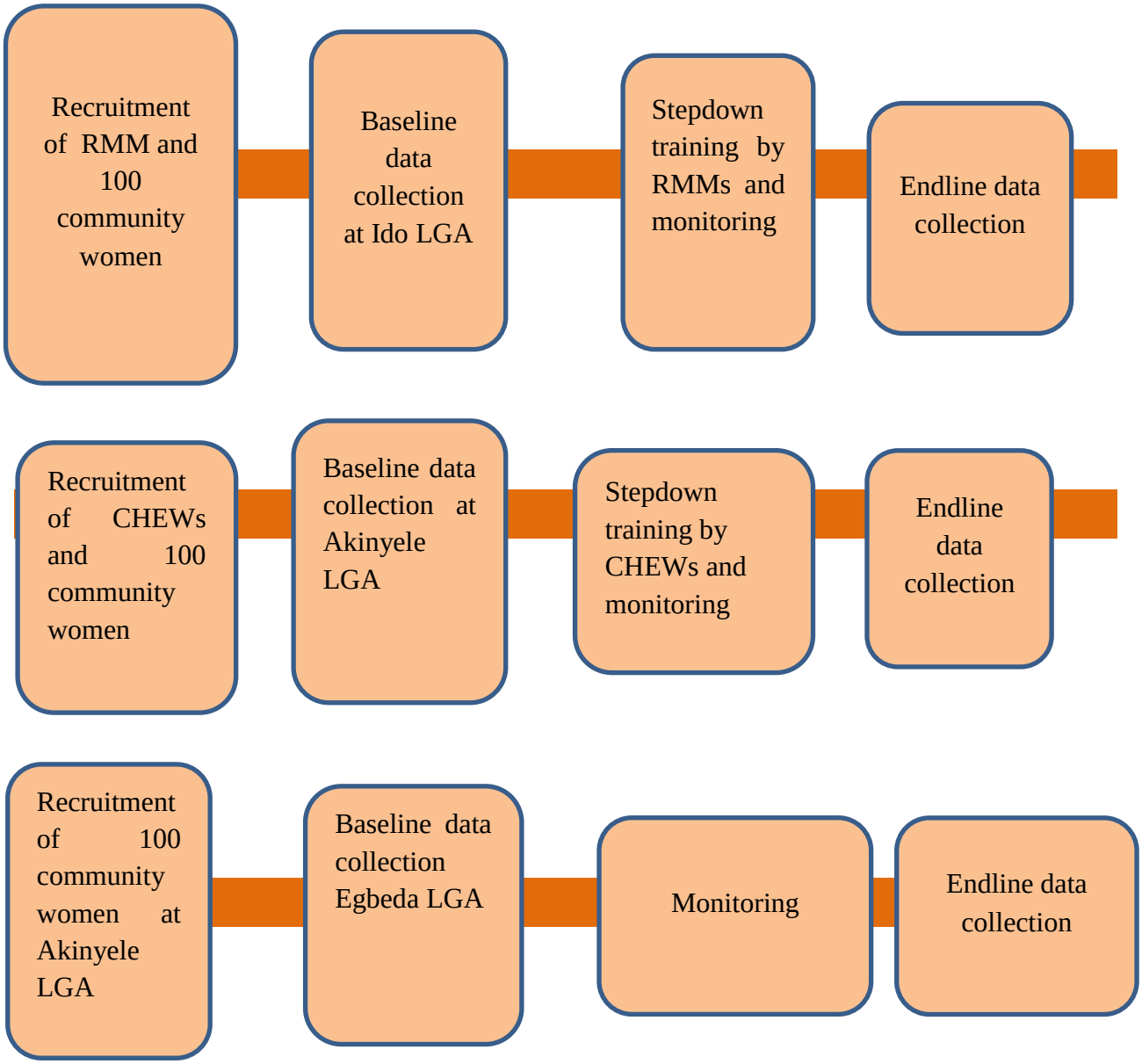

Figure 3.5: Summary of the overall study design across the 3 select LGAs

3.17 Data Management and Analysis

3.17.1 Qualitative Data Management and Analysis

The qualitative data was preceded by transcription of audio recordings of the Focus Group Discussions (FGDs) analyzed with a thematic approach using the Atlas-ti software version 8.1 (Scientific Software Development GmbH). This included recorded information from all FGD sessions that took place among the study participants in the three study LGAs.

The vital themes upon which discussions were based during the sessions were specifically sectioned into: (a) knowledge of community women towards Breast Cancer and BSE; (b) sources of information about Breast Cancer and BSE; (c) factors that could cause Breast Cancer; (d) willingness of the community to accept trainings on BSE; and (e) barriers to performance of BSE, in order to obtain information to guide the design of the educational facilitators/stepdown trainers' training manuals at the pre-intervention phase as well as study participants' step-down trainings during the intervention. All these are presented as themes and quotations under Baseline Qualitative Findings (Section 4.2 Chapter 4).

3.17.2 Quantitative Data Management and Analysis

All collected data were kept confidential and entered into IBM SPSS version 21.0. The general characteristics of the study participants were presented using descriptive statistics. Frequency and proportions were used to describe categorical variables. Mean and Standard Deviation were used to describe continuous variables.

(i) Inferential statistics such as One-way Analysis of variance (ANOVA) was used to compare the difference in outcome among the three study groups. Paired t-test was used to measure the difference in outcome variables from baseline to endline.

(ii) The hypotheses in this study were tested using the Independent Sample t-test

(iii) Study participants' knowledge of Breast Self-examination (BSE) was assessed with 29 items on the study instrument. Employing the Health Belief Model assessment layout as displayed in Figure 2.4, this section of the questionnaire contained a mixture of questions that were used to assess two (2) HBM constructs of *"Perceived susceptibility – How likely do you think you are to come down with this disease?*" and *"Perceived severity – How serious a health problem do you think this disease is?"* For each of the individual 29 questions that summed up these two (2) constructs, a correct response to each item was scored as "1" and incorrect response was scored as "0". The maximum attainable

knowledge score was 29. “Good” knowledge was graded as knowledge score of > 14 to 29 while “poor” knowledge was graded as knowledge score of ≤14.

(iv) Study participants’ attitude towards Breast Self-examination (BSE) was assessed with 14 items on the study instrument. Employing the Health Belief Model assessment layout as displayed in Figure 2.4, this section of the questionnaire contained a mixture of questions that were used to assess two (2) HBM constructs of *“Perceived benefit - How well does the recommended behaviour reduce the risks associated with this disease or health problem?”* and *“Perceived constraints - What are the potential negative aspects of doing this recommended behaviour?”*. For each of the individual 14 questions that summed up these two (2) constructs, appropriate response was scored as “1” and inappropriate response was scored as “0”. The maximum attainable attitude score was 14. “Positive” attitude was graded as attitude score of >7 to 14 while “negative” attitude was graded as attitude score of ≤7.

(v) Study participants’ practice of Breast Self-examination (BSE) was assessed with 12 items on the study instrument. This was recorded as the main outcome variable indicating positive or negative behavioural change to Breast Cancer and screening for Breast Cancer with BSE. Employing the Health Belief Model assessment layout as displayed in Figure 2.4, this section of the questionnaire contained a mixture of questions that were used to assess two (2) HBM constructs of “*Cues to action - What are the factors that may cause you to change your behaviour to this health problem or that may make you want to change behaviour positively?”* and “*Self-efficacy - The conviction that one can successfully execute or perform the behaviour required to obtain positive outcome with the health problem or the disease”*. For each of the individual 12 questions that summed up these (2) two constructs, appropriate practice was scored as “1” and inappropriate practice was scored as “0”. The maximum attainable score was 12. Overall “correct” practice was graded as practice score of > 6 to12 while “wrong” practice was graded as practice score of ≤6.

(vi) Analysis of Covariance (ANCOVA) was used to examine the independent effect (effect size) of the pre-intervention outcome measures on the post-interventional outcome measures while controlling for covariates (study groups, level of education and marital status). This effect size of the independent variables and covariates was measured. All statistical analyses were carried out at 5% level of significance. α0.05

3.18 Limitations to the Study

This study encountered a few limitations:

(i) Participants that were recruited at baseline were tracked through home visits and via phone calls for endline data collection. Nonetheless, about 28% of the study participants recruited at the pre-intervention phase into the study across the three LGAs were lost to follow-up. All efforts to reach out to them through phone calls, snowballing and contact tracing proved abortive. The higher percentage (14%) of drop-out was observed in the Control Group and the major reason was adduced to study apathy possibly from absence of active intervention.

(ii) Despite the quality and frequency of training received by the study participants in the Experimental Groups (EGI and II) during the intervention phase, a few respondents still held on firmly to their myths and traditional beliefs on causes of breast cancer. This was evident during the post-intervention (endline) data collection.

(iii) After two weeks of engagement in the study, the CHEWs demanded a huge remuneration for the period of their involvement in the study basing their arguments on various community projects that had rewarded them handsomely in the past. However, with the intervention of the Medical Officer of Health (MOH) and the Chief Matron at Akinyele LGA, their excesses were curbed and they settled for only reasonable incentives.

(iv) During the intervention at Akinyele LGA, the recruited CHEWs took a one-week break before continuing intervention due to their involvement in the Meningitis A conjugate vaccine campaign that took place in August 2019. However, there was a week extension before post intervention data collection at this LGA in order to cater for the missed week. Other statutory work demands and conflicting responsibilities occurred to a minor extent during the course of the study that may have distracted the CHEWs.

(v) The fact that breast models were used to conduct step-down training and to demonstrate BSE to the study participants, and a return demonstration was achieved with accuracy in the steps, may not automatically translate to study participants' ability to perform BSE on themselves particularly in a step-wise manner. It also does not guarantee their ability to be able to accurately palpate their breasts for abnormalities or to accurately detect an abnormality, if it exists. However, it helped to ensure that the participants had an idea of the steps required in the examination.

CHAPTER FOUR
RESULTS

4.1 Introduction

This chapter presents the findings of this study. It includes the data from the qualitative and quantitative surveys of study participants at the baseline (Pre-intervention) and endline (Post-intervention) phases of the study; on their knowledge about Breast Cancer and their knowledge, attitude, adoption and appropriate practice of Breast Self-examination in screening for Breast Cancer. It presents variations in findings from the experimental groups as a result of exposure to the interventions administered in comparison to the control group who had not been exposed to any intervention. The findings are presented in form of a narrative prose supported with tables, charts, graphs and figures. The three null hypotheses on comparing the effectiveness of the two interventions were tested for significance.

4.2 Baseline Qualitative Findings

4.2.1 Respondents' Knowledge about Breast Cancer

This section highlights the Focus Group Discussion (FGD) findings on the study participants' knowledge across the three LGAs at baseline. Few participants across the three LGAs were able to give correct responses about Breast Cancer. However, various misconceptions were also recorded. Generally, they all agreed that Breast Cancer is a deadly disease that is responsible for deaths of many women across the world. Some of the notable responses reflecting the theme include:

- *"Breast cancer is a deadly disease caused by spiritual attack"* (a participant from the EGI at Ido LGA)
- *"Breast cancer is a killer disease and it has no cure"* (a participant from the EGII at Akinyele LGA*)*
- *"Breast cancer claims the lives of uncountable women every year. In fact, it is a very deadly disease and has no cure" (*a participant from the CG at Egbeda LGA*)*

The discussants attributed many reasons as being responsible as the cause of Breast Cancer. Some were correct but majority were wrong. A few generated streams of discussion about the causes of Breast Cancer during the FGDs (most of which were incorrect) include:

- *"Breast cancer is serious and it is caused by wearing fairly used braziers, poor hygiene"* (a participant from the EGII at Akinyele LGA)

- *"Breast cancer is caused by infectious organisms due to poor weaning practices but could also be hereditary* (a participant from the CG at Egbeda LGA)"
- *"Breast cancer is caused by poor breastfeeding and weaning practices. For example, at weaning stage of a child, the breast milk has to be squeezed into the local iron pots. If not, the mother may develop breast cancer".* (a participant from the EGII at Akinyele LGA)
- *Breast cancer could be hereditary and passed from generation to another* (a participant from the EGI at Ido LGA)
- *Breast cancer is caused by keeping money in braziers and not washing braziers regularly, wearing tight braziers, keeping phones in braziers. Although there may be other factors responsible.* (a participant from the EGI at Ido LGA)
- *Breast cancer is caused by the kind of food we eat these days and practices we engage in, such as family planning"* (a participant from the CG at Egbeda LGA)
- *"In the olden days, there was no Breast Cancer because there were no deodorants and anti-perspirants. Breast cancer is caused by deodorants and anti-perspirants"* (a participant from the EGII at Akinyele LGA)

4.2.2 Sources of Information about Breast Cancer

During the FGD sessions, the discussants were asked to mention sources from which they got or could get information on Breast Cancer. They mentioned several sources of information on Breast Cancer. Many of them had heard about Breast Cancer via radio/ television and others, from health facilities and religious centres. Some of the responses of the participants include:

- *"Breast cancer is an issue that is sometimes mentioned on radio"* (a participant from the EGI at Ido LGA)
- *"I first heard about BC from a friend but later heard about it at the health center during antenatal clinic"* (a participant from the EGII at Akinyele LGA)
- *"Breast cancer is a topic often discussed at my church* (a participant from the CG at Egbeda LGA)

Some participants mentioned that they got to know about Breast Cancer from other members of their family and friends. Some others stated that they knew one or more persons that had been victims to Breast Cancer.

- *"For me, my neighbour died and her death was said to have been caused by Breast Cancer* (a participant from the CG at Egbeda LGA)
- *"A friend, during my secondary school days had a breast lump. She further told me that all her sisters developed breast lump during their teenage years, and in fact, her mother died of breast cancer. While growing as a lady, this piece of information really got me worried and since then, I have always wanted to know more about Breast Cancer at every opportunity".* (a participant from the CG at Egbeda LGA)
- *"Breast cancer killed my sister-in-law. I was told that Breast Cancer is a disease that grows like a tree with fibrous roots and quickly spreads all around the entire body* (a participant from the EGI at Ido LGA)
- *"Recently a female tax collector in my neighborhood disappeared suddenly for months because her sister had Breast cancer and, on her return, narrated her nasty experience she had as a patient's relative in the Oncology ward of the University College Hospital, Ibadan, where Breast Cancer patients had amputated breasts and were groaning in pains as a result of the Breast Cancer".* (a participant from the EGI at Akinyele LGA)

During the FGD session, participants were asked if they knew any way in which Breast Cancer could be detected very early. A few of them had no idea at all while majority of them had ideas of various ways of detection. They shared their opinions on ways of detecting an anomaly, although not using the right words, they however had an idea that (1) it could either be done by oneself; or (2) by a trained health personnel; or (3) by breast scans. Some highlights of some of their statements are below:

- *"Breast cancer could start as a lump which could be felt by palpating the breast by oneself" (*a participant from the EGI at Ido LGA)
- *"Breast cancer can never be detected by oneself except one goes to the hospital to see a doctor." (a participant from the EGI at Ido LGA)*

- *"Breast cancer can be detected either by oneself, by one's spouse or by going to the hospital for check-up*" (a participant from the CG at Egbeda LGA)

- *"Machines have been made available that help to detect a breast cancer and it can also be detected by blood tests*". (a participant from the EGII at Akinyele LGA)

- *"Breast cancer can be detected through squeezing of the breast and observing a discharge. If a discharge appears while not breastfeeding, it is likely to be breast cancer"* (a participant from the EGII at Akinyele LGA)

4.2.3 Factors that Can Possibly Motivate Breast Self-examination Practice

The discussants freely shared their opinions on factors that could motivate their practice of Breast Self-examination (BSE). Some mentioned that it costs them nothing because it does not involve any financial implication, any formal preparation. It is not an invasive procedure like injections. They largely agreed that it is quite simple and readily available. Here are their responses:

- "*I would not mind doing Breast Self-examination regularly because it doesn't involve payment of cash to anyone, neither does it involve queuing anywhere, or taking transportation somewhere to have it done.* (a participant from the EGII at Akinyele LGA)

- "*Breast Self-Examination is something I will really love to do because it doesn't require me opening my body to anyone to be examined and it does not incur any cost tool*" (a participant from the EGI at Ido LGA)

Some others were of the opinion that BSE promotes consciousness about one's health, because early detection improves chances of survival.

- *"I will like to practice BSE regularly because it is about my health. I was told that if breast cancer is detected early and treated, the victim may survive perfectly and live a normal life.*" (a participant from the EGI at Ido LGA)

4.2.4 Possible Barriers to Breast Self-Examination Practice

During the FGD session, respondents were asked to discuss possible factors that could hinder their practice of BSE. Majority of them agreed that it is necessary to practice BSE to screen for early signs of Breast Cancer with some of them buttressing the point that there could never be a barrier to practicing BSE apart from lack of knowledge about the steps. Among this smaller group, five major barriers were highlighted to account for non-practice of BSE:

1) Anticipated fear of detecting something strange;
(2) Forgetting to practice it on the appropriate dates or days of the menstrual cycle;
(3) Time constraint to conducting a BSE;
(4) Lack of the knowledge of the technique and steps of BSE; and
(5) Hoping on and keeping faith in God for protection against any ill health.

The following are some of their typical statements:

- *"For me, even if I have adequate knowledge, I do not believe in practicingBSE because what you do not know cannot kill you. The fact is that finding out too much about oneself is not a good habit"* (a participant from the EGII at Akinyele LGA)
- "*BSE is good to practice, but majority of people will find it difficult to keep to regularity and dates because our economy is bad and people are always busy.*" (a participant from the EGII at Akinyele LGA)
- *I eat good food. I don't keep phones in my brazier, neither do I use fairly used braziers. I wash my breast and nipple twice daily (every morning and night). By the grace of God I will not have Breast cancer"* (a participant from the EGI at Ido LGA)
- *"Everything God created is in His image and it is always good. Therefore, something should not be investigated.*" (a participant from the CG at Egbeda LGA)
- "*In my opinion, once you pray hard, you leave all your affairs to the Almighty God. The hands of the enemies can never overcome you. Therefore you will be immune to breast cancer. So you may or may not need to practice BSE*" (a participant from EGI at Ido LGA)

Many of them adduced reasons for non-performance of regular and appropriate BSE to lack of knowledge of the technique and steps. Some of their responses are:

- "I *do not even know how to do it. So I can't say anything for now."* (a participant from the CG at EgbedaLGA)
- *I do not know how long it will take. I am always in a hurry to go out to work every day except for Sundays when I clean the house and wash cloths as well as go to church. I am always too busy."* (a participant from the EGII at Akinyele LGA)
- "*It is only something you know about you can comment on*" (a participant from the EGI atAkinyele LGA)
- *"I don't have any idea about BSE at all*" (a participant from the EGI at Ido LGA)

4.2.5 Willingness to be Trained on Breast Self-Examination

Respondents were further asked if they were willing to be trained on BSE. Majority of them were interested in knowing the technique and claimed that once they received adequate training, it would be a motivation for them to practice it regularly and even teach others. Some of their comments include:

- *"If I am able to know how to practice BSE correctly, I will do it regularly.*" (a participant from the CG at Egbeda LGA)
- *"I am glad to be here today and I wish to be part of the trainees on BSE*." (a participant from the EGI at Akinyele LGA)
- *"I have five daughters and eight sisters. I am eager to know how to practice BSE so I can also teach them and maybe others."* (a participant from the EGII at Akinyele LGA)
- *"Breast cancer kills women. Therefore, I will like to know more about how to control it with BSE.*" (a participant from the EGI at Ido LGA)

4.2.6 Ideas on Steps, Timing and Frequency of BSE Conduct

Participants were asked if they had an idea on steps, timing and frequency of BSE. Majority of them mentioned that the steps basically involved palpating or massaging the breast. Some of them had an idea of positions and frequency in which BSE is done. Some of their comments include:

- *"BSE is done weekly at either lying or standing positions and it is done by palpating round the breast and squeezing the nipple."* (a participant from the CG at Egbeda LGA)
- *"BSE is done weekly by standing in front of the mirror and checking if the breasts are same sizes and shapes. Then squeezing the nipples."* (a participant from the EGII at Akinyele LGA)
- *"BSE is done monthly by using left hand to squeeze the right breast and vice versa to check out for lumps or contours."* (a participant from the EGI at Ido LGA)
- *"BSE is done by oneself every five days by massaging the breast in a lying position on the bed. One checks for lumps and discharge. The lump is always different from the regular breast tissue."* (a participant from the EGI at Ido LGA)

4.3 Quantitative Findings at Baseline

4.3.1 Respondents' Socio-demographic Characteristics at Baseline (Pre-intervention)

In total, 300 respondents between the ages of 19 and 60 participated in this study, with 100 respondents from each of the three study local government areas. The Control Group (CG) had the largest proportion of younger respondents that was less than 30 years (33.0%) as well as respondents between the ages 30 to 35 years (27.0%), while the Experimental Group I (EGI) (trained by Role Model Mothers (RMMs) accounted for the highest proportion of older respondents (i.e.,>45 years (22.0%)). The least proportion was recorded in Experimental Group II (EGII trained by CHEWs). The overall mean age and standard deviation of respondents was 36.7±10.0 years. The predominant age group of respondents across the EG(s) and CG was 30-35 years.

Nearly all the respondents in both EG(s) and CG (92.0%) were Yoruba; but then, the CG accounted for the highest proportion of respondents from the Yoruba tribes (97.0%) (higher than each of the EGI and II). Slightly above half of the overall respondents (53.3%) were Christians. EG I (trained by RMMs) however had a higher proportion of Christians (62.0%) ($p<0.05$). More than half of the participants in the EGII (trained by CHEWs) were Muslims (57.0%). Of all the respondents, 47.7% had secondary school education while nearly one-third (30.7%) ($p<0.05$) had

tertiary education. Overall, 18 (6%) respondents had no formal education with the highest proportion belonging to EGIwhich had 9% of its 100 participants without formal education.

Majority of the respondents (79.3%) ($p<0.05$) were married with a relatively higher proportion (21.4%) having spent 16–20 years in marriage. The CG had the highest proportion per group of single respondents (28.0%), while EGII (trained by the CHEWs) had the highest proportion per group of married respondents (86.0%). Twelve (16.7%) out of 100 respondents in CG accounted for women with the least years in marriage (< 5 years) per group while the respondents in EGI (trained by RMMs) accounted for the highest proportion per group of respondents with the longest duration in marriage (>25 years) (22.1%) per group.

Furthermore, majority of the respondents (49.0%) were traders while 25.0%, 6.0% and 14.0% were artisans, employees and farmers respectively. Most of the respondents (53.5%) ($p<0.05$) earned between ₦10,000 and ₦20,000 on monthly basis. About 39.3% of the respondents had daughters who had attained puberty, while 83.7% of the respondents had sister(s) who had attained puberty.

There were more respondents with single or no pregnancy in the CG (16.7%) followed by respondents in EGII (trained by CHEWs) (14.4%), while EGI (trained by RMMs) had respondents accounting for the highest proportion per group of >5 (five or more) pregnancies (19.5%). However, based on parity (number of children delivered), the CG accounted majorly for those with ≤1 child (16.4%), followed by EGI (trained by RMMs) (11.5%) while EGII (trained by CHEWs) accounted for the largest proportion per group of >5 children (11.1%), followed by EGI (trained by RMMs) (4.6%).

Further details of Respondents' Socio-demographic Characteristics at Baseline are presented in Table 4.1.

Table 4.1: Respondents' Socio-demographic Characteristics at Baseline

Variables	Total (n=300)		EGI (n= 100)		EGII (n=100)		Control(n=100		p-value
	N	%	n	%	n	%	n	%	
Age (years)									
< 30	73	24.3	19	19.0	21	21.0	33	33.0	
30-35	74	24.7	22	22.0	25	25.0	27	27.0	
36-40	57	19.0	21	21.0	23	23.0	13	13.0	0.142
41-45	45	15.0	16	16.0	13	13.0	16	16.0	
>45	51	17.0	22	22.0	18	18.0	11	11.0	
Mean±SD	36.7±10.0		38.1±10.1		37.5±10.4		34.6±9.4		
Ethnic group									
Yoruba	276	92.0	88	88.0	91	91.0	97	97.0	0.058
Non-yoruba	24	8.0	12	12.0	9	9.0	3	3.0	
Religion									
Islam	140	46.7	38	38.0	57	57.0	45	45.0	0.024*
Christianity	160	53.3	62	62.0	43	43.0	55	55.0	
Education									
None	18	6.0	9	9.0	6	6.0	3	3.0	
Primary	47	15.7	17	17.0	24	24.0	6	6.0	
Secondary	143	47.7	40	40.0	58	58.0	45	45.0	<0.001*
Tertiary	92	30.7	34	34.0	12	12.0	46	46.0	
Marital status									
Single	52	17.3	14	14.0	10	10.0	28	28.0	
Married	238	79.3	82	82.0	86	86.0	70	70.0	0.012*
Widowed	10	3.3	4	4.0	4	4.0	2	2.0	

**= Statistically Significant at p<0.05; SD=Standard Deviation. EG I (Experimental group I at Ido Local Government Area trained by RMMs); EGII (Experimental group II at Akinyele Local Government Area trained by CHEWs); Control Group (Egbeda Local Government Area)*

Table 4.1: Respondents' Socio-demographic Characteristics at Baseline (cont'd)

Variables	Total (n=300)		EG I (n=100)		EGII (n=100)		Control(n=100)		p-value
	N	%	n	%	n	%	n	%	
Duration in Marriage (years)									
<5	34	13.7	9	10.5	13	14.4	12	16.7	
6-10	49	19.8	11	12.8	18	20.0	20	27.8	
11-15	41	16.5	16	18.6	9	10.0	16	22.2	0.055
16-20	53	21.4	21	24.4	24	26.7	8	11.1	
21-25	30	12.1	10	11.6	13	14.4	7	9.7	
>25	41	16.5	19	22.1	13	14.4	9	12.5	
Mean±SD	16.4±9.4		18.1±9.6		16.6±9.6		14.2±8.5		
Number of Pregnancies									
1	24	9.7	6	7.1	8	8.9	10	13.7	
2	42	16.9	11	12.9	14	15.6	17	23.3	
3	58	23.4	23	27.1	17	18.9	18	24.7	0.059
4	52	21.0	20	23.5	18	20.0	14	19.2	
5	36	14.5	8	9.4	22	24.4	6	8.2	
>5	36	14.5	17	20.0	11	12.2	8	11.0	
Mean±SD	3.7±1.9		3.9±1.9		3.9±1.9		3.3±1.9		
Number of children ≤1									
	30	12.0	10	11.5	8	8.9	12	16.4	
2	52	20.8	16	18.4	16	17.8	20	27.4	
3	63	25.2	25	28.7	20	22.2	18	24.7	0.256
4	52	20.8	19	21.8	19	21.1	14	19.2	
5	37	14.8	13	14.9	17	18.9	7	9.6	
>5	16	6.4	4	4.6	10	11.1	2	2.7	
Mean±SD	3.3±1.6		3.3±1.4		3.6±1.6		2.9±1.6		
Occupation									
Trader	147	49.0	50	50.0	55	55.0	42	45.0	
Artisan	77	25.0	24	24.0	23	23.0	30	30.0	
Employees	19	6.0	5	5.0	3	3.0	11	11.0	0.005*
Farmers	43	14.0	17	17.0	14	14.0	12	12.0	
Unemployed	6	2.0	2	2.0	2	2.0	2	2.0	
Student	8	2.0	2	2.0	3	3.0	3	3.0	

**= Statistically Significant at p<0.05; SD=Standard Deviation. EG I (Experimental group I at Ido Local Government Area trained by RMMs); EGII (Experimental group II at Akinyele Local Government Area trained by CHEWs); Control Group (Egbeda Local Government Area)*

Table 4.1: Respondents' Socio-demographic Characteristics at Baseline (cont'd)

Variables	Total (n=300)		EGI (n=100)		EGII (n=100)		Control (n=100)		p-value
	N	%	N	%	N	%	N	%	
Average monthly income (₦)									
<10,000	27	9.8	13	13.7	3	3.2	11	12.9	
10,000 – 20,000	147	53.5	50	52.6	54	56.8	43	50.6	0.158
21,000 – 30,000	61	22.2	22	23.2	23	24.2	16	18.8	
>30,000	40	14.5	10	10.5	15	15.8	15	17.6	
Had any daughter that attained puberty									
Yes	118	47.2	39	44.8	45	50.0	34	46.6	0.782
No	*132*	*52.8*	*48*	*55.2*	*45*	*50.0*	*39*	*53.4*	
Number of daughters that attained puberty (n = 66)									
1	57	48.3	20	51.3	23	51.1	14	41.2	
2	40	33.9	10	25.6	17	37.8	13	38.2	0.468
≥3	21	17.8	9	23.1	5	11.1	7	20.6	
Mean±SD	1.8±0.9		1.8±1.0		1.6±0.8		1.8±0.8		
Had any sister that attained puberty									
Yes	251	83.7	87	87.0	79	79.0	85	85.0	
No	49	16.3	13	13.0	21	21.0	15	15.0	0.281
Number of sisters that attained puberty (n = 143)									
1	78	31.1	28	32.2	23	29.1	27	31.8	
2	86	34.3	28	32.2	31	39.2	27	31.8	
3	41	16.3	12	13.8	11	13.9	18	21.2	0.773
4	34	13.5	15	17.2	9	11.4	10	11.8	
≥5	12	4.8	4	4.6	5	6.3	3	3.5	
Mean±SD	2.3±1.4		2.4±1.5		2.3±1.5		2.3±1.2		

**= Statistically Significant at p<0.05; SD=Standard Deviation. EG I (Experimental group I at Ido Local Government Area trained by RMMs); EGII (Experimental group II at Akinyele Local Government Area trained by CHEWs); Control Group (Egbeda Local GovernmentArea)*

4.3.2 Respondents' Source of Information on Breast Cancer at Baseline (Pre-intervention)

The EG I (trained by RMMs) accounted for the highest proportion of respondents that got their information about breast cancer via the radio/TV (68.1%); followed by respondents in EGII (trained by CHEWs) (62.5%). Only thirty (10.5 %) of the total respondents got their information about breast cancer from religious centers (i.e. Churches/Mosques), with CG accounting for the highest proportion (12.4%) of respondents per group in this category. A lesser number of the total respondents, 85 (29.6%), got their information about breast cancer from friends/relatives of which respondents in EGI and CG accounted for equal proportion (30.9%) per group. With regard to the role of social media in the awareness of breast cancer, only 56 (19.5%) of the total respondents got their information from this channel, with CG accounting for the highest proportion (33.0%) of respondents per group in this category and EGII (trained by CHEWs) having the lowest proportion (11.5%) per group ($p<0.05$).

Equally at baseline majority, 116 (40.0%), of the total number of respondents in this study, got their information about breast cancer from health workers with respondents in the EGII (trained by CHEWs) accounting for the highest proportion (45.8%) per group of respondents in this category, while EG I (trained by RMMs) respondents accounted for the least proportion (37.2%) per group. Only 23 (8.0%) of the total respondents got awareness about breast cancer from schools with CG accounting for the largest proportion (13.4%) of concerned respondents per group in this category, followed by respondents in EG I (trained by RMMs) with 5.3%.

Other details of respondents' source of breast cancer information at baseline are highlighted in Table 4.2.

Table 4.2: Respondents' Source of Information on Breast Cancer at Baseline

Variable	Total (n=300)		EGI(n=100)		EGII(n=100)		Control (n=100)		p-value
	N	%	N	%	N	%	N	%	
Radio/tv									
Yes	180	62.7	64	68.1	60	62.5	56	57.7	0.334
No	107	37.3	30	31.9	36	37.5	41	42.3	
Church/mosque									
Yes	30	10.5	11	11.7	7	7.3	12	12.4	0.458
No	257	89.5	83	88.3	89	92.7	85	87.6	
Relative/friends									
Yes	85	29.6	29	30.9	26	27.1	30	30.9	0.801
No	202	70.4	65	69.1	70	72.9	67	69.1	
Social media/internet									
Yes	56	19.5	13	13.8	11	11.5	32	33.0	<0.001*
No	231	80.5	81	86.2	85	88.5	65	67.0	
Health worker									
Yes	116	40.4	35	37.2	44	45.8	37	38.1	0.412
No	171	59.6	59	62.8	52	54.2	60	61.9	
School									
Yes	23	8.0	5	5.3	5	5.2	13	13.4	0.056
No	264	92.0	89	94.7	91	94.8	84	86.6	

**= Statistically Significant at p<0.05; SD=Standard Deviation. EG I (Experimental group I at Ido Local Government Area trained by RMMs); EGII (Experimental group II at Akinyele Local Government Area trained by CHEWs); Control Group (Egbeda Local Government Area)*

4.3.3 Respondents' Knowledge about Breast Cancer and Breast Self-examination at Baseline (Pre-intervention)

Across the three groups, 61.7% of the total respondents linked putting money in the brassiere with development of breast cancer with the highest proportion (67.0%) of such wrong response coming from community women in EGII (trained by CHEWs) and the lowest proportion (57%) of wrong response coming from the Control Group. More than three-quarters (71.0%) of the total respondents knew that breast cancer is a major cause of death in women worldwide; with the highest proportion of 82.0% equally distributed in EGII and CG},$p<0.05$). Of the total respondents, 91.7% correctly stated that discharge from the breast was a sign of breast cancer accounting for the most correctly known information about breast cancer. Of the total respondents, about 92.0% were unaware that bearing first child after age 30 years increases the risk of breast cancer. Only 14.5% of the total respondents understood that physical inactivity can lead to breast cancer. Similarly, 12.0% of the total respondents knew that obesity increases the risk of developing breast cancer. Of the total respondents, only 4.7% knew that early menarche is associated with the risk of breast cancer.

Less than one-fifth (88.3%) of the total respondents did not know that advanced age is a predisposing factor to development of breast cancer. About 90.0% of the respondents did not believe that they were at a risk of developing cancer.

The EGI had the highest proportion per group (14.0%) of the respondents who knew that they were at the risk of developing breast cancer. However, the highest proportion of correct response (43.0%) per group on "the putting of money in the breast" was observed among those in the CG. Similarly, the CG had a highest proportion (6.0%) per group of respondents that knew early onset of menses (before the age of 12 years) is positively associated with breast cancer. Furthermore, they had the higher correct response per group about the associated risk of physical inactivity (21.0%) and obese/overweight (18.0%) with breast cancer.

Majority of the respondents (270 (71%) ($p<0.05$)) agreed to the item 'Breast cancer is a major cause of death in women worldwide'. Both EGIIand CG had equal number (82%) of correct responses. Furthermore, almost all the respondents (95%) in EGIIagreed that advancing age can cause breast cancer, followed by EGI and CG with equal figures (85%) ($p<0.05$) each. Majority of respondents (88%) in EGII (trained by CHEWs) knew that

physical inactivity could predispose to developing breast cancer while far fewer women knew this in the CG and EG I (47% and 52%) respectively ($p<0.05$). Similarly, a higher number (88%) of respondents in EGII correctly answered the question, 'family history of breast cancer can predispose one to have breast cancer'.

(Further details on knowledge items in the three groups at baseline are highlighted in table 4.3).

Table 4.3: Respondents' Knowledge about Breast Cancer and Breast Self-examination at Baseline

Variable	Total (n=300)		EGI (n=100)		EGII (n=100)		Control(n=100)		p-value
	N	%	N	%	N	%	N	%	
Breast cancer is caused by spiritual forces									
Wrong	26	8.7	10	10.0	7	7.0	9	9.0	0.745
Correct	274	91.3	90	90.0	93	93.0	91	91.0	
Putting of money in the brassiere causes breast cancer									
Wrong	185	61.7	61	61.0	67	67.0	57	57.0	0.342
Correct	115	38.3	39	39.0	33	33.0	43	43.0	
Every woman is at risk of developing breast cancer									
Wrong	221	73.7	78	78.0	72	72.0	71	71.0	0.478
Correct	79	26.3	22	22.0	28	28.0	29	29.0	
I know I am at risk of developing breast cancer									
Wrong	270	90.0	86	86.0	93	93.0	91	91.0	0.236
Correct	30	10.0	14	14.0	7	7.0	9	9.0	
Breast cancer is a major cause of death in women worldwide									
Wrong	*87*	*29.0*	*31*	*31.0*	*18*	*18.0*	*18*	*18.0*	*0.007**
Correct	213	71.0	69	69.0	82	82.0	82	82.0	
Advancing age can cause breast cancer									
Wrong	265	88.3	85	85.0	95	95.0	85	85.0	0.039*
Correct	35	11.7	15	15.0	5	5.0	15	15.0	

**= Statistically Significant at p<0.05; SD=Standard Deviation. EG I (Experimental group I at Ido Local Government Area trained by RMMs); EGII (Experimental group II at Akinyele Local Government Area trained by CHEWs); Control Group (Egbeda Local Government Area)*

Table 4.3: Respondents' Knowledge about Breast Cancer and Breast Self-examination at Baseline (cont'd)

Variable	Total (n=300)		EG I (n=100)		EGII (n=100)		Control(n=100)		p-value
	N	%	N	%	N	%	N	%	
Genetic predisposition can cause breast cancer									
Wrong	206	68.7	58	58.0	88	88.0	60	60.0	<0.001*
Correct	94	31.3	42	42.0	12	12.0	40	40.0	
Family history of breast cancer can cause one to have breast cancer									
Wrong	181	60.3	52	52.0	82	82.0	47	47.0	<0.001*
Correct	119	39.7	48	48.0	18	18.0	53	53.0	
Early onset of menses (before the age of 12 years) can cause breast cancer									
Wrong	286	95.3	95	95.0	97	97.0	94	94.0	0.592
Correct	14	4.7	5	5.0	3	3.0	6	6.0	
Dimpling of the breast skin is a sign of breast cancer									
Wrong	109	36.3	56	56.0	21	21.0	32	32.0	<0.001*
Correct	191	63.7	44	44.0	79	79.0	68	68.0	
Breast pain on palpation is a sign of breast cancer									
Wrong	65	21.7	38	38.0	12	12.0	15	15.0	<0.001*
Correct	235	78.3	62	62.0	88	88.0	85	85.0	
Enlargement of lymph node (around armpit) is a sign of breast cancer									
Wrong	93	31.0	46	46.0	24	24.0	23	23.0	<0.001*
Correct	207	69.0	54	54.0	76	76.0	77	77.0	

**= Statistically Significant at p<0.05; SD=Standard Deviation. EG I (Experimental group I at Ido Local Government Area trained by RMMs); EGII (Experimental group II at Akinyele Local Government Area trained by CHEWs); Control Group (Egbeda Local Government Area)*

Table 4.3: Respondents' Knowledge about Breast cancer and Breast Self-examination at Baseline (cont'd)

Variable	Total (n=300)		EG I(n=100)		EGII (n=100)		Control(n=100)		p-value
	N	%	N	%	N	%	N	%	
Nipple retraction is a sign of breast cancer									
Wrong	107	35.7	50	50.0	23	23.0	34	34.0	<0.001*
Correct	193	64.3	50	50.0	77	77.0	66	66.0	
Asymmetric sagging of the breast is a sign of breast cancer									
Wrong	105	35.0	57	57.0	17	17.0	31	31.0	<0.001*
Correct	195	65.0	43	43.0	83	83.0	69	69.0	
Presence of a lump in the breast is a sign of breast cancer									
Wrong	50	20.4	28	28.0	9	9.0	13	13.0	0.001*
Correct	195	79.6	72	72.0	91	91.0	87	87.0	
Presence of a lump or swelling in the axilla is a sign of breast cancer									
Wrong	65	21.7	36	36.0	13	13.0	16	16.0	<0.001*
Correct	235	78.3	64	64.0	87	87.0	84	84.0	
Breast cancer has a cure									
Wrong	222	74.0	78	78.0	74	74.0	70	70.0	0.435
Correct	78	26.0	22	22.0	26	26.0	30	30.0	
Breast cancer is a communicable disease									
Wrong	118	39.3	30	30.0	50	50.0	38	38.0	0.014*
Correct	182	60.7	70	70.0	50	50.0	62	62.0	

**= Statistically Significant at p<0.05; SD=Standard Deviation. EG I (Experimental group I at Ido Local Government Area trained by RMMs); EGII (Experimental group II at Akinyele Local Government Area trained by CHEWs); Control Group (Egbeda Local Government Area)*

Table 4.3: Respondents' Knowledge about Breast Cancer and Breast Self-examination at Baseline (cont'd)

Variable	Total (n=300)		EGI (n=100)		EGII (n=100)		Control(n=100)		p-value
	N	%	N	%	N	%	N	%	
Use of birth control pills can cause breast cancer									
Wrong	232	77.3	80	80.0	78	78.0	74	74.0	0.587
Correct	68	22.7	20	20.0	22	22.0	26	26.0	
Physical inactivity can cause breast cancer									
Wrong	256	85.3	84	84.0	93	93.0	79	79.0	0.018*
Correct	44	14.7	16	16.0	7	7.0	21	21.0	
Obesity / overweight can cause breast cancer									
Wrong	264	88.0	86	86.0	96	96.0	82	82.0	0.007*
Correct	36	12.0	14	14.0	4	4.0	18	18.0	
Birth of first child after the age of 30 years can cause breast cancer									
Wrong	276	92.0	91	91.0	96	96.0	89	89.0	0.171
Correct	24	8.0	9	9.0	4	4.0	11	11.0	
Intake of low-fat diet can cause breast cancer									
Wrong	159	53.0	44	44.0	59	59.0	56	56.0	0.080
Correct	141	47.0	56	56.0	41	41.0	44	44.0	
Appropriate time for breast examination is after menstruation									
Wrong	228	76.0	84	84.0	71	71.0	73	73.0	0.068
Correct	72	24.0	16	16.0	29	29.0	27	27.0	

** =Statistically Significant at p<0.05; SD=Standard Deviation. EG I (Experimental group I at Ido Local Government Area trained by RMMs); EGII (Experimental group II at Akinyele Local Government Area trained by CHEWs); Control Group (Egbeda Local Government Area)*

Table 4.3: Respondents' Knowledge about Breast Self-examination at Baseline (cont'd)

Variable	Total (n=300)		EGI (n=100)		EGII (n=100)		Control(n=100)		p-value
	N	%	N	%	N	%	N	%	
Appropriate frequency of performing breast self-examination									
Wrong	172	57.3	61	61.0	64	64.0	47	47.0	0.035*
Correct	128	42.7	39	39.0	36	36.0	53	53.0	
Discharge from nipple is a sign of breast cancer									
Wrong	275	91.7	89	89.0	95	95.0	91	91.0	0.295
Correct	25	8.3	11	11.0	5	5.0	9	9.0	
Correct ways of detecting breast cancer or anomaly (*BSE, CBE and imaging)*									
Wrong	250	83.3	75	75.0	91	91.0	84	84.0	0.010*
Correct	50	16.7	25	25.0	9	9.0	16	16.0	
Early detection of breast cancer improves a woman's chance of survival									
Wrong	67	22.3	20	20.0	30	30.0	17	17.0	0.069
Correct	233	77.7	80	80.0	70	70.0	83	83.0	
Breast cancer grows through early and late stages									
Wrong	254	84.7	75	75.0	95	95.0	84	84.0	<0.001*
Correct	46	15.3	25	25.0	5	5.0	16	16.0	

**=Statistically Significant at p<0.05; SD=Standard Deviation. EG I (Experimental group I at Ido Local Government Area trained by RMMs); EGII (Experimental group II at Akinyele Local Government Area trained by CHEWs); Control Group (Egbeda Local Government Area)*

4.3.4 Respondents' Attitude towards Breast cancer and Breast Self-examination at Baseline (Pre-intervention)

It was observed that most (95.0%) of the 300 respondents agreed that if they detect a breast lump or any anomaly in their breast during BSE, they will report to the nearest health facility for further evaluation. About 96.7% of the total respondents disagreed that praying alone will not be their sole action when they detect a breast lump or any anomaly. Majorityof the respondents (84.0%) disagreed to conceal their health status if they detect a breast lump or any anomaly in the breast during BSE. Nearly all the respondents maintained that they will take seriously any finding when they detect a breast lump or any anomaly in the breast during BSE (99.7%). About 87.0% of the total respondents would like to perform BSE monthly.

There were variations in all the 14 attitudinal items across the three groups. Attitudinal items that were significantly different across the three groups include *'I would like to perform breast self-examination monthly', 'I feel comfortable while practicing breast self-examination', 'It is good to share one's experience about BSE with other women'* and *'It is not good to teach other women BSE'.* A higher proportion (91.0%) of respondents in the EGI (anchored by RMMs) and EGII (anchored by CHEWs) (97.0%) did not decide whether they will perform BSE monthly compared to those in the CG (73.0%). Similarly, more of the respondents(89.0%) in EGI (anchored by RMMs) and EGII (anchored by CHEWs) (94.2%) were also undecided as to whether they will feel comfortable to practice BSE compared to those in the CG (72.0%). The greater proportion EI, EII and CG (82.0%), (83.0%) and (94.0%) respectively agreed that is good to share experiences of BSE with other women.

Table 4.4: Respondents' Attitude towards Breast Self-examination at Baseline

Variable	Total (n=300)		EGI (n=100)		EGII (n=100)		Control (n=100)		p-value
	N	%	N	%	N	%	N	%	
I would like to perform breast self-examination monthly									
Agree	35	11.7	6	6.0	3	3.0	26	26.0	
Disagree	4	1.3	3	3.0	0	0.0	1	1.0	<0.001*
Undecided	261	87.0	91	91.0	97	97.0	73	73.0	
I feel comfortable while practicing breast self-examination									
Agree	39	4.7	10	10.0	3	3.0	26	26.0	
Disagree	3	1.1	1	1.0	0	0.0	2	2.0	<0.001*
Undecided	258	94.2	89	89.0	97	97.0	72	72.0	
Breast cancer can be detected by oneself during BSE									
Agree	268	89.3	82	82.0	94	94.0	92	92.0	
Disagree	14	4.7	9	9.0	2	2.0	3	3.0	0.052
Undecided	18	6.0	9	9.0	4	4.0	5	5.0	
I am afraid of detecting breast cancer by doing BSE									
Agree	21	7.0	7	7.0	4	4.0	10	10.0	
Disagree	40	13.3	19	19.0	9	9.0	12	12.0	0.106
Undecided	239	79.7	74	74.0	87	87.0	7.8	78.0	
Screening for breast abnormality using BSE is important and useful									
Agree	18	6.0	4	4.0	8	8.0	6	6.0	
Disagree	10	3.3	3	3.0	2	2.0	5	5.0	0.587
Undecided	272	90.7	93	93.0	90	90.0	89	89.0	

**=Statistically Significant at p<0.05; SD=Standard Deviation. EG I (Experimental group I at Ido Local Government Area trained by RMMs); EGII (Experimental group II at Akinyele Local Government Area trained by CHEWs); Control Group (Egbeda Local Government Area)*

Table 4.4: Respondents' Attitude towards Breast Self-examination at Baseline (Cont'd)

Variable	Total (n=300)		EGI (n=100)		EGII (n=100)		Control (n=100)		p-value
	N	%	N	%	N	%	N	%	
Increased awareness of breast cancer can motivate one to practice BSE									
Agree	135	45.0	41	41.0	48	48.0	46	46.0	
Disagree	9	3.0	1	1.0	4	4.0	4	4.0	0.093
Undecided	156	52.0	58	58.0	48	48.0	50	50.0	
BSE is a "shameful" practice in that other people may see one in a bad-light while touching or examining the breast									
Agree	33	11.0	13	13.0	7	7.0	13	13.0	
Disagree	242	80.7	83	83.0	82	82.0	77	77.0	0.208
Undecided	25	8.3	4	4.0	11	11.0	10	10.0	
It is important to perform BSE regularly									
Agree	264	88.0	95	95.0	82	82.0	87	87.0	
Disagree	13	4.3	2	2.0	6	6.0	5	5.0	0.082
Undecided	23	7.7	3	3.0	12	12.0	8	8.0	
It is good to share one's experience about BSE with other women									
Agree	259	86.3	94	94.0	83	83.0	82	82.0	
Disagree	12	4.0	4	4.0	3	3.0	5	5.0	0.030*
Undecided	29	9.7	2	2.0	14	14.0	13	13.0	
It is not good to teach another women BSE									
Agree	32	10.7	22	22.0	5	5.0	5	5.0	
Disagree	250	83.3	72	72.0	90	90.0	88	88.0	<0.001*
Undecided	18	6.0	6	6.0	5	5.0	7	7.0	

**=Statistically Significant at p<0.05; SD=Standard Deviation. EG I (Experimental group I at Ido Local Government Area trained by RMMs); EGII (Experimental group II at Akinyele Local Government Area trained by CHEWs); Control Group (Egbeda Local Government Area)*

Table 4.4: Respondents' Attitude towards Breast Self-examination at Baseline (Cont'd)

Variable	Total (n=300)		EGI (n=100)		EGII (n=100)		Control (n=100)		p-value
	N	%	N	%	N	%	N	%	
If I detect a breast lump or any anomaly in the breast during BSE, I will conceal the information									
Agree	48	16.0	23	23.0	18	18.0	7	7.0	0.322
Disagree	252	84.0	87	87.0	82	82.0	93	93.0	
If I detect a breast lump or any anomaly in the breast during BSE, I will ignore/ disregard the finding									
Agree	1	0.3	0	0.0	0	0.0	1	1.0	0.367
Disagree	299	99.7	100	100.0	100	100.0	99	99.0	
If I detect a breast lump or any anomaly in the breast during BSE, I will pray about it									
Agree	10	3.3	6	6.0	1	1.0	3	3.0	0.140
Disagree	290	96.7	94	94.0	99	99.0	97	97.0	
If I detect a breast lump or any anomaly in the breast during BSE, I will report to the nearest health facility for further evaluation									
Agree	285	95.0	94	94.0	99	99.0	92	92.0	0.065
Disagree	15	5.0	6	6.0	1	1.0	8	8.0	

**=Statistically Significant at p<0.05; SD=Standard Deviation. EG I (Experimental group I at Ido Local Government Area trained by RMMs); EGII (Experimental group II at Akinyele Local Government Area trained by CHEWs); Control Group (Egbeda Local Government Area)*

4.3.5 Respondents' Practice of Breast Self-examination at Baseline

Overall, the respondents' practice of breast self-examination at pre-intervention shows that about 50.7% had performed breast self-examination (BSE) in the 12 previous months to the study with 31.6% and 48.0% daily and monthly respectively (Table 4.5). The correct conduct of the ten (10) stepwise BSE techniques was poorly performed in all the three study groups. Nearly all the respondents (99.3%) did not practice the 9th step of the sequence of BSE steps (i.e. The axilla of each breast is palpated first on that side). Similarly, 96.3% of the total respondents failed to practice the 2nd step (i.e. During BSE, the arms should first be placed by the side followed by placing the arms firmly on the waist and then the arms behind the head).

Across the three study groups, there were significant variations in the practice of 3rd step (i.e. One of the abnormal things to look for while standing in front of the mirror includes breast swelling or swellings and dimpling skin and changes in nipple size); the 6th step (i.e. Palpation is done in 3 pressures (Light, middle, deep palpations) using the palm surface of the ends of the index and middle fingers); and the 7th step (i.e. Palpation is done with the right hand while examining the left breast and with the left hand while examining the right breast). The correct practice of the 6th step was significantly higher (20.0%) among the respondents in the CG compared to the EG1 (8.0%) and EGII (11.0%). Similarly, the 7th step was better practiced correctly by the CG (14.0%) than the EGI (6.0%) and EGII (5.0%).

Table 4.5: Respondents' Practice of Breast Self-examination at Baseline

Variable	Total (n=300)		EGI (n=100)		EGII (n=100)		Control (n=100)		p-value
	N	%	N	%	N	%	N	%	
BSE practice/frequency									
Had breast self-examination (BSE) in the last 12 months									
Yes	152	50.7	45	45.0	48	48.0	59	59.0	0.114
No	148	49.3	55	55.0	52	52.0	41	41.0	
Frequency of BSE (n=152)									
Everyday	48	31.6	15	16.9	18	37.5	15	25.4	
Every month	73	48.0	24	27.0	18	37.5	31	52.5	0.482
Twice in a year	7	4.6	5	5.6	2	4.2	4	6.8	
Once in a year	24	15.8	45	50.5	10	20.8	9	15.3	
Stepwise BSE performance									
I start BSE in a standing position in front of a mirror (step 1)									
Poor	250	83.3	89	89.0	86	86.0	83	83.0	0.634
Good	50	16.7	11	11.0	14	14.0	17	17.0	
I can start BSE in a lying down position									
Poor	256	85.3	85	85.0	89	89.0	82	82.0	0.622
Good	44	14.7	15	15.0	11	11.0	18	18.0	
During BSE, the arms should first be placed by the side, followed by placing the arms firmly on the waist and then the arms behind the head (step 2)									
Poor	289	96.3	95	95.0	98	98.0	96	96.0	0.517
Good	11	3.7	5	5.0	2	2.0	4	4.0	
One of the abnormal things to look for while standing in front of the mirror includes breast swelling or swellings and dimpling skin and changes in nipple size (step 3)									
Poor	280	93.3	88	88.0	97	97.0	95	95.0	0.028*
Good	20	6.7	12	12.0	3	3.0	5	5.0	

**=Statistically Significant at p<0.05; SD=Standard Deviation. EG I (Experimental group I at Ido Local Government Area trained by RMMs); EGII (Experimental group II at Akinyele Local Government Area trained by CHEWs); Control Group (Egbeda Local Government Area)*

Table 4.5: Respondents' Practice of Breast Self-examination at Baseline (cont'd)

Variable	Total (n=300)		EGI (n=100)		EGII (n=100)		Control (n=100)		p-value
	N	%	N	%	N	%	N	%	
Stepwise BSE performance									
While lying down, one must place a towel or pillow under shoulder before examining the breast on the other side (step 4)									
Poor	262	87.3	91	91.0	83	83.0	88	88.0	0.228
Good	38	12.7	9	9.0	17	17.0	12	12.0	
While in standing, palpation is done to feel for lumps, hard knots or thickening (step 5)									
Poor	258	86.0	86	86.0	87	87.0	85	85.0	0.920
Good	42	14.0	14	14.0	13	13.0	15	15.0	
Palpation is done in 3 pressures (light, middle, deep palpations) using the palm surface of the ends of the index and middle fingers (step 6)									
Poor	261	87.0	92	92.0	89	89.0	80	80.0	0.032*
Good	39	13.0	8	8.0	11	11.0	20	20.0	
Palpation is done with the right hand while examining the left breast and with the left hand while examining the right breast (step 7*)*									
Poor	275	91.7	94	94.0	95	95.0	86	86.0	0.041*
Good	25	8.3	6	6.0	5	5.0	14	14.0	

** = Statistically Significant at p<0.05; SD=Standard Deviation. Experimental group I (Ido Local Government Area trained by RMMs);* EGII (Akinyele *Local Government Area trained by CHEWs); Control Group (Egbeda Local Government Area)*

Table 4.5: Respondents' Practice of Breast Self-examination at Baseline (cont'd)

Variable	Total (n=100)		EGI (n=100)		EGII (n=100)		Control (n=100)		p-value
	N	%	N	%	N	%	N	%	
Stepwise BSE performance									
Each breast is examined in a circular, clockwise motion moving from outside inwards (step 8)									
Poor	280	93.3	92	92.0	98	98.0	90	90.0	0.062
Good	20	6.7	8	8.0	2	2.0	10	10.0	
The axilla of each breast is palpated first on that side (step 9)									
Poor	298	99.3	98	98.0	100	100.0	100	100.0	0.134
Good	2	0.7	2	2.0	0	0.0	0	0.0	
The nipple of each breast is squeezed and checked for discharge (step 10)									
Poor	285	95.0	92	92.0	97	97.0	96	96.0	0.229
Good	15	5.0	8	8.0	3	3.0	4	4.0	

**= Statistically Significant at p<0.05; SD=Standard Deviation. EG I (Experimental group I at Ido Local Government Area trained by RMMs); EGII (Experimental group II at Akinyele Local Government Area trained by CHEWs); Control Group (Egbeda Local Government Area)*

4.4. Endline Findings

4.4.1 Respondents' Socio-demographic Characteristics at Endline

After the six-month intervention period, a total of 215 respondents, all between the ages of 19 to 60 years, who were recruited at baseline, were followed up till endline (i.e. for the EGI and II) and exactly 6 months after baseline data collection in the Control group (CG). Summarily, the end-line statistics revealed that of these 215 respondents that remained at end-line data collection stage, 78 respondents were successfully followed up after intervention in EGI (anchored by RMMs); 79 respondents were successfully followed up after intervention in EGII (anchored by CHEWs); and 58 respondents were captured at endline in the CG (no intervention).

Table 4.6 presents the analysis further. There was an overall drop-out rate of 28.3% (85 respondents) across the entire study population. Of the 85 respondents who dropped out, 22 (representing 7.3% of the total study population of 300 recruited at baseline) were from the EGI (anchored by RMMs); 21 (representing 7% of the total study population of 300 at baseline) were from EGII (anchored by CHEWs); and 42 (representing 14% of the total study population of 300 recruited at baseline) were from the Control Group. Information collated from the research team inquiries indicated that "loss to follow-up due to residential relocation" (75%) was the commonest reason adduced and this was the commonest finding in the CG (60% of reason given) which had the largest proportion of overall and individual group participant drop-out. The next commonest reason was "loss of interest" which accounted for 30% amongst the drop-out population in the CG. The only other reason found was loss of communication via proxies and or phone calls which was more (75%) among the drop-outs in the EGI (anchored by CHEWs). However, the drop-out rate did not affect the overall conduct of this study as both the total and the individual group frequencies of the respondents followed up from baseline to endline, fall within the previously estimated minimum sample sizes required to conduct the quasi-experimental study.

Table 4.6 Participation and Drop-out of Respondents from Baseline (Pre-intervention) to Endline (Post-intervention)

Stage of Study (y)/Study Group (x)	EG I (Number of participants)	EG II (Number of participants)	Control (Number of participants)	Total (Number of participants)
At Baseline	100	100	100	300
At Endline after 6 months follow-up	78	79	58	215
Attrition rate	7.3%	7%	14%	28.3%

Detailed analysis of the socio demographic characteristics of the 215 followed-up respondents at endline revealed an overall mean age and standard deviation of respondents of 37.7± 9.7 years. The predominant age group was 30 to 35 years. Nearly all the respondents (94.4%) were Yoruba. The respondents were either Christians (53.5%) or Muslims (46.5%). More than one-third (45.6%) of the respondents had secondary school education while 29.8% had tertiary education. Majority of the respondents (85.6%) were married with a higher proportion (23.0%) having spent 6 to 10 years in marriage. Also, more than one-third of the respondents (37.2%) were traders while 15.3%, 21.8% and 7.4% were traders, farmers and employeesrespectively. Most of the respondents (61.9%) earned between ₦10,000 and ₦20,000 on monthly basis, while only 18 respondents (8.4%) earned above ₦30,000 in a month. More than one-third of the respondents (40.9%) had daughter(s) who had attained puberty while more than three-quarter of the respondents (85.6%) had sister(s) who had attained puberty.

Further review of the socio-demographic characteristics of those captured at endline across the three different study groups revealed that the CG had the largest proportion of younger respondents (i.e. <30 years (44.8%)), while EGIaccounted for the highest proportion of older respondents (i.e. 41 – 45 years) and >45 years (19.2% and 26.9% respectively) with p<0.001. The EGII (anchored by CHEWs) had the highest proportion (57.0%) of Muslims whileEG I (anchored by RMMs) had the highest proportion (60.3%) of Christians. The CG had the highest proportion (5.2%) of respondents without formal education while the EGIhad the highest number (32.1%) of respondents with tertiary education. EGIIaccounted for the highest proportion (54.4%) of respondents with secondary education P=0.151. With regards to marital status, the CG had the highest proportion (25.9%) of single respondents while EGII (anchored by CHEWs) had the highest proportion (91.1%) of married respondents. EG I (by the RMMs) accounted for the highest number (5.1%) of widowed respondents with p<0.001. The CG accounted for the highest proportion (37.2%) of respondents with the least years in marriage (i.e. < 5 years) and EG I (anchored by RMMs) accounted for the highest proportion (21.9%) of respondents with the longest duration in marriage i.e. >25 years.

Based on gravidity, the CG had respondents with the highest proportion (23.3%)of single or no pregnancy while respondents in EGI (anchored by RMMs) and II (anchored by CHEWs) had equal proportion each (2.7%). EGI (Ido LGA anchored by RMMs) had respondents

accounting for the highest proportion (23.0%) of >5 (five or more) pregnancies. Based on parity, the CG accounted for one-fifth of the lowest parity group (i.e., ≤1), followed by EGI (4.1%) while EGII accounted for the largest proportion (14.7%) of respondents in the highest parity group (i.e., >5 children) followed by EG I (9.5%). About 40.9% of the respondents had daughters that had attained puberty. The CG had the least proportion (13.8%) of daughters that had attained puberty. Majority of the respondents (85.6%) had sisters that had attained puberty. The full details of the sociodemographic characteristics of the respondents at endline are displayed in Table 4.7.

Table 4.7: Respondents' Socio-demographic Characteristics at Endline

Variables	Total (n=215)		EGI (n=78)		EGII (n=79)		Control (n=58)		p-value
	N	%	N	%	N	%	N	%	
Age (years)									
< 30	45	20.9	9	11.5	10	12.7	26	44.8	
30-35	52	24.2	17	21.8	20	25.3	15	25.9	
36-40	43	20.0	16	20.5	17	21.5	10	17.2	<0.001*
41-45	32	14.9	15	19.2	13	16.5	4	6.9	
>45	43	20.0	21	26.9	19	24.1	3	5.2	
Mean±SD	37.7±9.7		40.3±9.8		39.4±9.2		31.8±7.7		
Ethnic Group									
Yoruba	203	94.4	73	93.6	73	92.4	57	98.3	0.309
Non-Yoruba	12	5.6	5	6.4	6	7.6	1	1.7	
Religion									
Islam	100	46.5	31	39.7	45	57.0	24	41.4	0.063
Christianity	115	53.5	47	60.3	34	43.0	34	58.6	
Education									
None	10	4.7	3	3.8	4	5.1	3	5.2	
Primary	43	20.0	16	20.5	9	11.4	18	31.0	0.151
Secondary	98	45.6	34	43.6	43	54.4	21	36.2	
Tertiary	64	29.8	25	32.1	23	29.1	16	27.6	
Marital Status									
Single	24	11.2	5	6.4	4	5.1	15	25.9	
Married	184	85.6	69	88.5	72	91.1	43	74.1	0.001*
Widowed	7	3.3	4	5.1	3	3.8	0	0.0	

**= Statistically Significant at p<0.05; SD=Standard Deviation. EG I (Experimental group I at Ido Local Government Area trained by RMMs); EGII (Experimental group II at Akinyele Local Government Area trained by CHEWs); Control Group (Egbeda Local Government Area)*

Table 4.7: Respondents' Socio-demographic Characteristics at Endline (cont'd)

Variables	Total (n=215)		EGI (n=78)		EGII (n=79)		Control(n=58)		p-value
	N	%	N	%	N	%	N	%	
Duration in marriage (years)									
<5	24	12.6	3	4.1	5	6.7	16	37.2	
6-10	44	23.0	14	19.2	17	22.7	13	30.2	
11-15	29	15.2	15	20.5	7	9.3	7	16.3	<0.001*
16-20	37	19.4	16	21.9	17	22.7	4	9.3	
21-25	24	12.6	9	12.3	14	18.7	1	2.3	
>25	33	17.3	16	21.9	15	20.0	2	4.7	
Mean±SD	16.2±9.5		18.4±9.4		18.1±8.8		9.3±7.3		
Number of pregnancy									
≤1	14	7.3	2	2.7	2	2.7	10	23.3	
2	32	16.7	9	12.2	12	16.0	11	25.6	
3	32	16.7	12	16.2	8	10.7	12	27.9	<0.001*
4	49	25.5	21	28.4	21	28.0	7	16.3	
5	35	18.2	13	17.6	20	26.7	2	4.7	
>5	30	15.6	17	23.0	12	16.0	1	2.3	
Mean±SD	3.9±1.8		4.3±1.7		4.3±1.8		2.6±1.4		
Number of children									
≤1	14	7.3	3	4.1	2	2.7	9	21.4	
2	39	20.4	12	16.2	13	17.3	14	33.3	
3	46	24.1	20	27.0	14	18.7	12	28.6	<0.001*
4	48	25.1	20	27.0	22	29.3	6	14.3	
5	26	13.6	12	16.2	13	17.3	1	2.4	
>5	18	9.4	7	9.5	11	14.7	0	0.0	
Mean±SD	3.5±1.5		3.6±1.4		3.9±1.4		2.4±1.2		
Occupation									
Trader	80	37.2	33	42.3	43	54.4	4	6.9	
Artisan	75	34.9	24	30.1	22	27.8	29	50.0	
Employee	16	7.4	3	3.8	3	3.8	10	17.2	<0.001*
Farming	33	15.3	14	17.9	9	11.4	10	17.2	
Unemployed	5	2.3	2	2.6	1	1.3	2	3.4	
Student	6	2.8	2	2.6	1	1.3	3	5.2	

**=Statistically Significant at p<0.05; SD=Standard Deviation. EG I (Experimental group I at Ido Local Government Area trained by RMMs); EGII (Experimental group II at Akinyele Local Government Area trained by CHEWs); Control Group (Egbeda Local Government Area)*

Table 4.7: Respondents' Socio-demographic Characteristics at Endline (cont'd)

Variables	Total (n=215)		EGI (n=78)		EGII (n=79)		Control (n=58)		p-value
	N	%	N	%	N	%	N	%	
Average monthly income (₦)									
<10,000	22	10.2	11	14.1	4	5.1	7	12.1	
10,000 – 20,000	133	61.9	39	50.0	59	74.7	35	60.3	0.005*
21,000 – 30,000	42	19.5	15	19.2	13	16.5	14	24.1	
>30,000	18	8.4	13	16.7	3	3.8	2	3.4	
Had any daughter that attained puberty									
Yes	88	40.9	45	57.7	35	44.3	8	13.8	<0.001*
No	127	59.1	33	42.3	44	55.7	50	86.2	
Number of daughters that attained puberty (n = 88)									
1	46	52.3	28	62.2	14	40.0	4	50.0	
2	28	31.8	10	22.2	16	45.7	2	25.0	0.208
≥3	14	15.9	7	15.6	5	14.3	2	25.0	
Mean±SD	1.7±0.9		1.6±0.9		1.8±0.8		1.8±0.9		
Had any sister that attained puberty									
Yes	184	85.6	68	87.2	65	82.3	51	87.9	0.571
No	31	14.4	10	12.8	14	17.7	7	12.1	
Number of sisters that attained puberty (n =184)									
1	42	22.8	13	19.1	17	26.2	12	23.5	
2	68	37.0	27	39.7	21	32.3	20	39.2	
3	40	21.7	14	20.6	11	16.9	15	29.4	0.402
4	21	11.4	8	11.8	10	15.4	3	5.9	
≥5	13	7.1	6	8.8	6	9.2	1	2.0	
Mean±SD	2.6±1.5		2.5±1.4		2.7±1.7		2.2±1.0		

**= Statistically Significant at p<0.05; SD=Standard Deviation. EG I (Experimental group I at Ido Local Government Area trained by RMMs); EGII (Experimental group II at Akinyele Local Government Area trained by CHEWs); Control Group (Egbeda Local Government Area)*

4.4.2: Respondents' Source of Information on Breast Cancer at Endline

Only one-third (31.6%) of the total respondents got their information about breast cancer via the radio. Less than 10.0% of the total respondents (9.8%) got their information about breast cancer from the television. Only 12 out of the total respondents (5.6%) got their information about breast cancer from religious centers (i.e. Churches/Mosques). A lower proportion (6.0%) of the total respondents got their information about breast cancer from friends or peer group. With regard to the role of social media in the awareness of breast cancer, 11.2% of the total respondents got their information from this channel. Majority (87.9%) of the total respondents got their information about breast cancer from health workers. Only 6 (2.8%) of the total respondents became aware about breast cancer from Newspapers/Posters.

Respondents from EGI had the highest proportion (48.7%) of respondents per group who heard about breast cancer via radio; this was followed by respondents in CG (36.2%). Similarly, respondent from EG I (anchored by the RMMs) LGA had the highest proportion (20.5%) per group for those who sourced about breast cancer from the TV, this was followed by CG (8.6%) and EGII (anchored by CHEWs) (0.0%). The EG I (anchored by the RMMs) accounting for the highest proportion (7.7%) per group of respondents that heard about breast cancer from religious centers, while EGII (anchored by CHEWs) accounted for the least (2.5%) in this category. The respondents in EG I (anchored by the RMMs) accounted for the highest proportion (12.8%) of respondents per group who heard about breast cancer through their friends; this was followed by the CG with 5.2%. The CG accounted for the highest proportion (17.2%) of respondents per group who heard about breast cancer from the social media, and this was followed by respondents in the EGII (anchored by the CHEWS) with 15.4%.

Respondents in the EGII (anchored by the CHEWS) accounted for the highest proportion (97.5%) of respondents per group that were told about breast cancer by the health workers, while those in the EG I (anchored by the RMMs) respondents accounted for the least proportion (73.1%) per group. The respondents in EG I (anchored by the RMMs) accounted for the largest proportion (5.1%) per group of those who received information about breast cancer from Newspapers/Posters.Table 4.8 presents the distribution of respondents based on their source of information on breast cancer at endline

Table 4.8: Respondents' Source of Information on Breast Cancer at Endline

Variable	Total (n=215)		EGI (n=78)		EG II (n=79)		Control(n=58)		p-value
	N	%	N	%	N	%	N	%	
Radio									
Yes	68	31.6	38	48.7	9	11.4	21	36.2	<0.001*
No	147	68.4	40	51.3	70	88.6	37	63.8	
TV									
Yes	21	9.8	16	20.5	0	0.0	5	8.6	<0.001*
No	194	90.2	62	79.5	79	100.0	53	91.4	
Church/Mosque									
Yes	12	5.6	6	7.7	2	2.5	4	6.9	0.326
No	203	94.4	72	92.3	77	97.5	54	93.1	
Friends/peers									
Yes	13	6.0	10	12.8	0	0.0	3	5.2	0.003*
No	202	94.0	68	87.2	79	100.0	55	94.8	
Social media									
Yes	24	11.2	12	15.4	2	2.5	10	17.2	0.009*
No	191	88.8	66	84.6	77	97.5	48	82.8	
Health worker									
Yes	189	87.9	57	73.1	77	97.5	55	94.8	<0.001*
No	26	12.1	21	26.9	2	2.5	3	5.2	
Newspaper/posters									
Yes	6	2.8	4	5.1	0	0.0	2	3.4	0.140
No	209	97.2	74	94.9	79	100.0	56	96.6	
Seminar/workshop									
Yes	34	15.8	17	21.8	15	19.0	2	3.4	0.009*
No	181	84.2	61	78.2	64	81.0	56	96.6	
Relatives									
Yes	0.0	0.0		0.0	0	0.0	0	0.0	NR
No	215	100	78	100.0	79	100.0	58	100.0	
Victims									
Yes	3	1.4	3	3.8	0	0.0	0	0.0	0.069
No	212	98.6	75	96.2	79	100.0	58	100.0	

**= Statistically Significant at p<0.05; SD=Standard Deviation. EG I (Experimental group I at Ido Local Government Area trained by RMMs); EGII (Experimental group II at Akinyele Local Government Area trained by CHEWs); Control Group (Egbeda Local Government Area) NR=No Result*

4.4.3 Respondents' Knowledge on Breast Cancer and Breast Self-examination at Endline

Of the total respondents at endline, 76.7% gave a correct response regarding the item *'putting of money in the brassiere causes breast cancer'.* Almost all respondents (93.5%) of the total respondents knew that discharge from the breast was a sign of breast cancer.

Comparing among the groups, the highest proportion (100.0%) of correct response per group for '*Breast cancer is caused by spiritual forces*', was observed among those in the EG I. Majority (84.2%) of the respondents knew that Breast Cancer is not a communicable disease and only 21.4% of total respondents did not know that advancing age was a predisposing factor to breast cancer. Almost all respondents (92.6%) and 91.6% of respondents knew that presence of a lump and swelling of the axilla were signs of breast cancer. Only 23.3% of total respondents did not know that nipple retraction is a sign of breast cancer.

The CG had a highest proportion (81.0%) per group of respondents that did not know that early onset of menses (before the age of 12 years) is positively associated with breast cancer. The EGII had the highest (93.7%) correct response per group about the associated risk of physical inactivity and EGI had the highest (65.6%) correct responses to the associated risk of obesity/overweight to breast cancer.

Further details on the distribution of correct and wrong responses on knowledge of breast cancer among respondents are found in table 4.9.

Table 4.9 Respondents' Knowledge on Breast Cancer and Breast Self–examination at Endline

Variable	Total (n=215)		EG I(n=78)		EGII (n=79)		Control(n=58		p-value
	N	%	N	%	N	%	N	%	
Breast cancer is caused by spiritual forces									
Wrong	13	6.0	0	0.0	10	12.7	3	5.2	0.149
Correct	202	94.0	78	100	69	87.3	55	94.8	
Putting of money in the brassiere causes breast cancer									
Wrong	50	23.3	10	12.8	20	25.3	20	34.5	0.001*
Correct	165	76.7	68	87.2	59	74.7	38	65.5	
Every woman is at risk of developing breast cancer									
Wrong	45	20.9	5	6.4	12	15.2	28	48.3	0.545
Correct	170	79.1	73	93.6	67	84.8	30	51.7	
I know I am at risk of developing breast cancer									
Wrong	82	38.1	9	11.5	27	34.2	46	79.3	0.271
Correct	133	61.9	69	88.5	52	65.8	12	20.7	
Breast cancer is a major cause of death in women worldwide									
Wrong	25	11.6	6	7.7	11	13.9	8	13.8	0.102
Correct	190	88.4	72	92.3	68	86.1	50	86.2	
Advancing age can cause breast cancer									
Wrong	46	21.4	7	9.0	18	22.8	21	36.2	0.040*
Correct	169	78.6	71	91.0	61	77.2	37	63.8	

**= Statistically Significant at P<0.05; SD=Standard Deviation. EG I (Experimental group I at Ido Local Government Area trained by RMMs); EGII (Experimental group II at Akinyele Local Government Area trained by CHEWs); Control Group (Egbeda Local Government)*

Table 4.9: Respondents' Knowledge on Breast Cancer and Breast Self–examination at Endline (cont'd)

Variable	Total (n=215)		EGI (n=78)		EII (n=79)		Control(n=58)		p-value
	N	%	N	%	N	%	N		
Genetic predisposition can cause breast cancer									
Wrong	78	36.3	17	21.8	35	44.3	26	44.8	0.420
Correct	137	63.7	61	78.2	44	55.7	32	55.2	
Family history of breast cancer can cause one to have breast cancer									
Wrong	103	47.9	31	39.7	42	53.2	30	51.7	0.192
Correct	112	52.1	47	60.3	37	46.8	28	48.3	
Early onset of menses (before the age of 12 years) can cause breast cancer									
Wrong	62	28.8	4	5.1	11	13.9	47	81.0	0.041*
Correct	153	71.2	74	94.9	68	86.1	11	19.0	
Dimpling of the breast skin is a sign of breast cancer									
Wrong	14	6.5	1	1.3	7	8.9	6	10.3	0.858
Correct	201	93.5	77	98.7	72	91.1	52	89.7	
Breast pain on palpation is a sign of breast cancer									
Wrong	31	14.4	5	6.4	5	6.3	21	6.2	0.624
Correct	184	85.6	73	93.6	74	93.7	37	63.8	
Enlargement of lymph node (around armpit) is a sign of breast cancer									
Wrong	14	6.5	2	2.6	3	3.8	9	15.5	0.073
Correct	201	93.5	76	97.4	76	96.2	49	84.5	

** = Statistically Significant at p<0.05; SD=Standard Deviation. EG I (Experimental group I at Ido Local Government Area trained by RMMs); EGII (Experimental group II* at *Akinyele Local Government Area trained by CHEWs); Control Group (Egbeda Local Government Area)*

Table 4.9: Respondents' Knowledge on Breast Cancer and Breast self–examination at Endline (cont'd)

Variable	Total (n=215)		EGI (n=78)		EGII (n=79)		Control(n=58)		p-value
	N	%	N	%	N	%	N	%	
Nipple retraction is a sign of breast cancer									
Wrong	50	23.3	15	19.2	11	13.9	24	41.4	<0.001*
Correct	165	76.7	63	80.8	68	86.1	34	58.6	
Asymmetric sagging of the breast is a sign of breast cancer									
Wrong	99	46.0	32	41.0	40	50.6	27	46.6	0.480
Correct	116	54.0	46	59.0	39	49.4	31	53.4	
Presence of a lump in the breast is a sign of breast cancer									
Wrong	16	7.4	2	2.6	5	6.3	9	15.5	0.048*
Correct	199	92.6	76	97.4	74	93.7	49	84.5	
Presence of a lump or swelling in the axilla is a sign of breast cancer									
Wrong	18	8.4	1	1.3	4	5.1	13	22.4	0.030*
Correct	197	91.6	77	98.7	75	94.9	45	77.6	
Breast cancer has a cure									
Wrong	144	67.0	21	26.9	26	33.0	35	60.3	0.256
Correct	71	33.0	57	73.1	53	67.0	23	39.7	
Breast cancer is a communicable disease									
W*rong*	34	15.8	8	10.3	12	15.2	14	24.1	0.016*
Correct	181	84.2	70	89.7	67	84.8	44	75.9	

**= Statistically Significant at p<0.05; SD=Standard Deviation. EG I (Experimental group I at Ido Local Government Area trained by RMMs); EGII (Experimental group II at Akinyele Local Government Area trained by CHEWs); Control Group (Egbeda Local Government Area)*

Table 4.9: Respondents' Knowledge on Breast Cancer and Breast self–examination at Endline (cont'd)

Variable	Total (n=215)		EGI (n=78)		EGII (n=79)		Control(n=58)		p-value
	N	%	N	%	N	%	N	%	
Use of birth control pills can cause breast cancer									
Wrong	159	74.0	56	71.8	60	75.9	43	74.1	<0.001*
Correct	56	26.0	22	28.2	19	24.1	15	25.9	
Physical inactivity can cause breast cancer									
Wrong	43	20.0	15	19.2	5	6.3	23	39.7	<0.001*
Correct	172	80.0	63	80.8	74	93.7	35	60.3	
Obesity / overweight can cause breast cancer									
Wrong	101	47.0	27	34.6	36	45.6	38	65.5	<0.001*
Correct	114	53.0	51	65.4	43	54.4	20	34.5	
Birth of first child after the age of 30 years can cause breast cancer									
Wrong	186	86.5	71	91.0	67	84.8	48	82.8	0.323
Correct	29	13.5	7	9.0	12	15.2	10	17.2	
Intake of low-fat diet can cause breast cancer									
Wrong	74	34.4	18	23.1	24	30.4	24	41.4	0.395
Correct	141	65.6	60	76.9	55	69.6	34	58.6	
Appropriate time for breast examination is after menstruation									
Wrong	77	35.8	19	24.4	29	36.7	29	50.0	0.008*
Correct	138	64.2	59	75.6	50	63.3	29	50.0	

**= Statistically Significant at p<0.05; SD=Standard Deviation. EG I (Experimental group I at Ido Local Government Area trained by RMMs); EGII (Experimental group II at Akinyele Local Government Area trained by CHEWs); Control Group (Egbeda Local Government Area)*

Table: 4.9: Respondents' Knowledge on Breast Cancer and Breast self–examination at Endline (cont'd)

Variables	Total (n=215)		EGI (n=78)		EGII (n=79)		Control(n=58)		p-value
	N	%	N	%	N	%	N	%	
Appropriate frequency for breast self-examination									
Wrong	58	27.0	15	19.2	24	30.4	19	32.8	0.148
Correct	157	73.0	63	80.8	55	69.6	39	67.2	
Discharge from nipple is a sign of breast cancer									
Wrong	14	6.5	4	5.1	5	6.3	5	8.6	0.714
Correct	201	93.5	74	94.9	74	93.7	53	91.4	
Ways of detecting breast cancer or anomaly									
Wrong	150	69.8	55	70.5	52	65.8	43	74.1	0.569
Correct	65	30.2	23	29.5	27	34.2	15	25.9	
Early detection of breast cancer improves a woman's chance of survival									
Wrong	30	14.0	8	10.3	13	16.5	9	15.5	0.492
Correct	185	86.0	70	89.7	66	83.5	49	84.5	
Breast cancer grows through early and late stages									
Wrong	117	54.4	38	48.7	45	57.0	34	58.6	0.440
Correct	98	45.6	40	51.3	34	43.0	24	41.4	

**= Statistically Significant at p<0.05; SD=Standard Deviation. EG I (Experimental group I at Ido Local Government Area trained by RMMs); EGII (Experimental group II at Akinyele Local Government Area trained by CHEWs); Control Group (Egbeda Local Government Area)*

4.4.4 Respondents' Attitude towards Breast Cancer and Breast self-examination at Endline

About 97.7% of the respondents agreed to report to the nearest health facility for further evaluation if they detect any breast lump or anomaly during BSE. Nearly all the respondents (99.1%) disagreed to only 'praying' if they detect any breast lump or anomaly during BSE. All the respondents consented that they would not disregard or ignore any finding after they detect a breast lump or anomaly in the breast during BSE. About 96.3% of the respondents opined that it is important to perform BSE regularly.

All the 14 attitudinal items varied significantly across three study groups. However, the two items that showed significant variations across the three groups are '*Increased awareness of breast cancer can motivate one to practice BSE'* and *'It is not good to teach other women BSE'*. A higher proportion (100.0%) of respondents in the CG was recorded to believe that increased awareness of breast cancer can motivate one to practice BSE compared to the EG I (97.4%) and EGII (82.3%). Teaching fellow women about BSE was supported by respondents in all the three groups but it was higher among the EG I (88.5%) and EGII (75.9%) than the CG (72.4%).

The distribution of respondents' attitude towards breast cancer and Breast Self-examination at end line is presented in Table 4.10.

Table 4.10: Respondents' Attitude towards Breast Cancer and Breast Self-examination at Endline

Variable	Total (n=215)		EGII (n=78)		EGII (n=79)		Control(n=58)		p-value
	N	%	N	%	N	%	N	%	
I would like to perform breast self-examination monthly									
Agree	207	96.3	77	98.7	73	92.4	57	98.3	
Disagree	8	3.7	1	1.3	6	7.6	1	1.7	0.072
Undecided	0	0.0	0	0.0	0	0.0	0	0.0	
I feel comfortable while practicing breast self-examination									
Agree	205	95.3	77	98.7	73	92.4	55	94.8	
Disagree	10	4.7	1	1.3	6	7.6	3	5.2	0.167
Undecided	0	0.0	0	0.0	0	0.0	0	0.0	
Breast cancer can be detected by oneself during BSE									
Agree	203	94.4	70	89.7	75	94.9	58	100.0	
Disagree	9	4.2	6	7.7	3	3.8	0	0.0	0.152
Undecided	3	1.4	2	2.6	1	1.3	0	0.0	
I am afraid of detecting breast cancer by doing BSE									
Agree	142	66.0	55	70.5	49	62.0	38	65.5	
Disagree	64	29.8	20	25.6	28	35.4	16	27.6	0.496
Undecided	9	4.2	3	3.8	2	2.5	4	6.9	
Screening for breast abnormality using BSE is important and useful									
Agree	204	94.9	75	96.2	75	94.9	54	93.1	
Disagree	9	4.2	2	2.6	3	3.8	4	6.9	0.679
Undecided	2	0.9	1	1.3	1	1.3	0	0.0	

**= Statistically Significant at p<0.05; SD=Standard Deviation. EG I (Experimental group I at Ido Local Government Area trained by RMMs); EGII (Experimental group II at Akinyele Local Government Area trained by CHEWs); Control Group (Egbeda Local Government Area)*

Table 4.10: Respondents' Attitude towards Breast Cancer and Breast Self-examination at Endline (contd.)

Variables	Total (n=215)		EGI (n=78)		EG II(n=79)		Control(n=58)		p-value
	N	%	N	%	N	%	N	%	
Increased awareness of breast cancer can motivate one to practice bse									
Agree	199	92.6	76	97.4	65	82.3	58	100.0	
Disagree	13	6.0	0	0.0	13	16.5	0	0.0	<0.001*
Undecided	3	1.4	2	2.6	1	1.3	0	0.0	
BSE is a "shameful" practice in that other people may see one in a bad light while touching or examining the breast									
Agree	26	12.1	8	10.3	12	15.2	6	10.3	
Disagree	177	82.3	68	87.2	64	81.0	45	77.6	0.112
Undecided	12	5.6	2	2.6	3	3.8	7	12.1	
It is important to perform BSE regularly									
Agree	207	96.3	76	97.4	75	94.9	56	96.6	
Disagree	3	1.4	0	0.0	3	3.8	0	0.0	0.206
Undecided	5	2.3	2	2.6	1	1.3	2	3.4	
It is good to share one's experience about BSE with other women									
Agree	192	89.3	73	93.6	73	92.4	46	79.3	
Disagree	11	5.1	3	3.8	3	3.8	5	8.6	0.064
Undecided	12	5.6	2	2.6	3	3.8	7	12.1	
It is not good to teach another women BSE									
Agree	31	14.4	7	9.0	17	21.5	7	12.1	
Disagree	171	79.5	69	88.5	60	75.9	42	72.4	0.001*
Undecided	13	6.0	2	2.6	2	2.5	9	15.5	

**= Statistically Significant at p<0.05; SD=Standard Deviation. EG I (Experimental group I at Ido Local Government Area trained by RMMs); EGII (Experimental group II at Akinyele Local Government Area trained by CHEWs); Control Group (Egbeda Local Government Area)*

Table 4.10: Respondents' Attitude towards Breast Cancer and Breast Self-examination at Endline (contd.)

Variable	Total (n=215)		EGI (n=78)		EGII (n=79)		Control(n=58)		p-value
	N	%	N	%	N	%	N	%	
If I detect a breast lump or any anomaly in the breast during BSE, I will conceal the information									
Agree	0	0.0	0	0.0	0	0.0	0	0.0	NR
Disagree	215	100.0	78	100.0	79	100.0	58	100.0	
If I detect a breast lump or any anomaly in the breast during BSE, I will ignore/ disregard the finding									
Agree	0	0.0	0	0.0	0	0.0	0	0.0	NR
Disagree	215	100.0	78	100.0	79	100.0	58	100.0	
If I detect a breast lump or any anomaly in the breast during BSE, I will pray about it									
Agree	2	0.9	1	1.3	1	1.3	0	0.0	0.689
Disagree	213	99.1	77	98.7	78	98.7	58	100.0	
If I detect a breast lump or any anomaly in the breast during BSE I will report to the nearest health facility for further evaluation									
Agree	210	97.7	75	96.2	78	98.7	57	98.3	0.528
Disagree	5	2.3	3	3.8	1	1.3	1	1.7	

** = Statistically Significant at p<0.05; SD=Standard Deviation. EG I (Experimental group I at Ido Local Government Area trained by RMMs); EGII (Experimental group II at Akinyele Local Government Area trained by CHEWs); Control Group (Egbeda Local Government Area);* NR *(No result)*

4.4.5 Respondents' Practice of Breast Self-examination at Endline

About 76.3% of the respondents reported to have performed BSE on themselves in the 12 previous months to the study. The highest proportion of respondents in this category was found in EGI (100%) followed by EGII (90%) and the CG (25%). About 15.3% and 71.6% had performed BSE daily and monthly respectively within 12 months at the endline. Of those who did it monthly, 97.2% were in EGI; 72.2% in EGII; and 37.9% in CG with no significant difference between the groups.

The proportion of accurate performance of the 10 steps of breast self-examination (BSE) in the right sequence was generally higher in both Experimental Groups compared to the Control Group though only Steps 1 to 6 and Steps 8 and 9 were significantly different among the groups. Of the 10 sequences of steps to accurately perform breast self-examination, the 9th step was the most correctly practiced by the total respondents (89.8%). However, the level of practice was not significantly different across the three groups with 84.6%, 94.9% and 89.7% in the EG I, EGIIand CG respectively ($p>0.05$). Of the 10 steps, Steps I *(I can start BSE in a lying down position)* and II *(In the standing position during BSE, the arms should first be placed by the side followed by placing the arms firmly on the waist and then the arms behind the head)* elicited the highest wrong responses at 31.2% each. There was however a significant difference in the wrong responses between the Groups with the CG accounting for 77.6% and 86.2% of the wrong responses for both steps respectively ($p<0.05$).

Among the individual steps, about 71.6% of the respondents practiced the 5th step (i.e. *While in standing, palpation is done to feel for lumps, hard knots or thickening*) while 82.8% correctly practiced the 7th step (i.e. *Palpation is done with the right hand while examining the left breast and with the left hand while examining the right breast*). Correct practice of the 1st step was significantly higher (100%) among the respondents in the EGI than the CG (29.3%) and EGII (78.5%). Similarly, the 2nd step was more correctly practiced by the EGI(91.0%), followed by the EGII (87.3%) and the CG (13.8%). The practice of the 3rd step was significantly higher in the EG I (88.5%), then the EGII (89.9%) and CG (55.2%). The level of practice of the 4th step was higher in the EGI (82.1%) and Group II (74.7%) compared to the CG (63.8%). Of the total respondents, the 4th step was poorly practiced (25.6%) with the CG recording the highest proportion of wrong practice (36.2%) per group ($p<0.05$). Only 20% of the overall respondents could not practice the 8th

step with CG recording the highest proportion per group (%). The 10th step was well practiced amongst all participants (86.0%); while EGII had significantly the highest proportion (39.8%) per group ($p<0.05$). Highlights of respondent's practice of breast self-examination at endline are presented in Table 4.11.

Table 4.11: Comparison of Practice Items in the three Groups at Endline

Variables	Total (n=215)		EGI (n=78)		EGII (n=79)		Control (n=58)		p-value
	N	%	N	%	N	%	N	%	
BSE practice/frequency									
Had breast self-examination (BSE) in the last 12 months									
Yes	164	76.3	78	100.0	71	90.0	15	25.9	0.002*
No	51	23.7	0	0.0	8	10.0	43	74.1	
Frequency of BSE									
Everyday	33	15.3	3	3.8	19	24.1	11	19.0	
Every month	154	71.6	75	96.2	57	72.2	22	37.9	0.180
Twice in a year	13	6.1	0	0.0	3	3.7	10	17.3	
Once in a year	15	7.0	0	0.0	0	0.0	15	25.8	
Stepwise BSE performance									
Step I: I can start BSE in a standing position in front of a mirror									
Wrong	58	27.0	0	0.0	17	21.5	41	70.7	0.001*
Correct	157	73.0	78	100.0	62	78.5	17	29.3	
Or									
I can start BSE in a lying down position									
Wrong	67	31.2	8	10.3	14	17.7	45	77.6	0.002*
Correct	148	78.8	70	89.7	65	82.3	13	22.4	
Step II: In the standing position during BSE, the arms should first be placed by the side followed by placing the arms firmly on the waist and then the arms behind the head									
Wrong	67	31.2	7	9.0	10	12.7	50	86.2	0.002*
Correct	148	68.8	71	91.0	69	87.3	8	13.8	
One of the abnormal things to look for while standing in front of the mirror includes breast swelling or swellings and dimpling skin and changes in nipple size (step 3)									
Wrong	43	20.0	9	11.5	8	10.1	26	44.8	<0.001*
Correct	172	80.0	69	88.5	71	89.9	32	55.2	

**= Statistically Significant at p<0.05; SD=Standard Deviation. EG I (Experimental group I at Ido Local Government Area trained by RMMs); EGII (Experimental group II at Akinyele Local Government Area trained by CHEWs); Control Group (Egbeda Local Government Area)*

Table 4.11: Comparison of Practice Items in the three Groups at Endline (cont'd)

Variable	Total (n=215)		EGI (n=78)		EGII (n=79)		Control (n=58)		p-value
	N	%	N	%	N	%	N	%	
Stepwise BSE performance									
While lying down, one must place a towel or pillow under shoulder before examining									
The breast on the other side (step 4*)*									
Wrong	55	25.6	14	17.9	20	25.3	21	36.2	0.017*
Correct	160	74.4	64	82.1	59	74.7	37	63.8	
While laying or standing, palpation is done to feel for lumps, hard knots or thickening (step 5)									
Wrong	61	28.4	11	14.1	23	29.1	27	46.6	0.009*
Correct	154	71.6	67	85.9	56	70.9	31	53.4	
Palpation is done in 3 pressures (light, middle, deep palpations) using the palm surface of the ends of the index and middle fingers (step 6)									
Correct	156	72.6	63	80.8	59	74.7	34	58.6	0.042*
Wrong	59	27.4	15	19.2	20	25.3	24	41.4	
Palpation is done with the right hand while examining the left breast and with the left hand while examining the right breast (step 7)									
Correct	178	82.8	70	89.7	66	83.5	42	72.4	0.209
Wrong	37	17.2	8	10.3	13	16.5	16	27.6	

**=Statistically Significant at p<0.05; SD=Standard Deviation. EG I (Experimental group I at Ido Local Government Area trained by RMMs); EGII (Experimental group II at Akinyele Local Government Area trained by CHEWs); Control Group (Egbeda Local Government Area)*

Table 4.11: Comparison of practice Items in the three groups at Endline (cont'd)

Variable	Total (n=215)		EGI (n=78)		EGII (n=79)		Control (n=58)		p-value
	N	%	N	%	N	%	N	%	
Stepwise BSE performance Each breast is examined in a circular, clockwise motion moving from outside inwards (step 8)									
Correct	172	80.0	68	87.2	62	78.5	42	72.4	0.016*
Wrong	43	20.0	10	12.8	17	21.5	16	27.6	
The axilla of each breast is palpated first on that side (step 9)									
Correct	193	89.8	66	84.6	75	94.9	52	89.7	0.103
Wrong	22	10.2	12	15.4	4	5.1	6	10.3	
The nipple of each breast is squeezed for any nipple discharge (step 10)									
Correct	185	86.0	67	85.9	70	88.6	48	82.8	<0.001*
Wrong	30	14.0	11	14.1	9	11.4	10	17.2	

**= Statistically Significant at p<0.05; SD=Standard Deviation. EG I (Experimental group I at Ido Local Government Area trained by RMMs); EGII (Experimental group II at Akinyele Local Government Area trained by CHEWs); Control Group (Egbeda Local Government Area)*

4.5 Comparison of Baseline and Endline Data

4.5.1 Respondents' Overall Knowledge, Attitude and Practice Score

Mean knowledge score increased at endline in the two experimental groups I (trained by RMMs) and II (trained by CHEWs) as well as the CG. From the pre- to the post-intervention phase of the study, mean knowledge score significantly increased in the EGI(trained by the RMMs) from 11.4 to 19.9 ($p<0.05$). In the EG EGII (trained by CHEWs), mean knowledge score significantly increased from 11.7 to 18.5 ($p<0.05$); while in the CG, the mean knowledge score only marginally increased from 13.00 to 14.3 ($p<0.05$).

Comparing the mean knowledge score among the three groups, the CG had the highest mean knowledge score (13.0) at base line but the EGI had the highest (19.9) at endline. Also, this observed difference in mean knowledge score across the three groups at baseline and endline was statistically significant ($p<0.001$).

The mean attitude score was not significantly different among the three study groups at baseline ($p=0.125$) but were significantly different at endline ($p=0.027$). Comparing the mean attitude score among the three study groups, EG I (trained by the RMMs) had the highest mean attitude score (5.1±1.9) pre-intervention while the CG accounted for the least mean attitude score (4.5±1.1). There was however a significant improvement in the mean attitude score at endline in all the groups ($p<0.05$) with the highest improvement observed in EGI (increasing from 5.6±1.9 to 11.7±1.9). The lowest improvement was observed in CG with a marginal improvement from 4.5±1.1 to 7.4±1.2.

The mean BSE practice score significantly increased in all the three study groups from baseline to endline ($p<0.001$). The CG had the highest mean practice score at pre-intervention (3.9±1.9) while the EG I (trained by the RMMs) had the highest mean BSE practice score at post-intervention (10.0±2.7). While the mean practice score only marginally increased in the CG (from 3.9 to 6.1), it only doubled in EGII trained by CHEWs (3.8 to 8.8) but tripled (three-fold rise) in EGI trained by RMMs (from 3.3 to 10.0). This observed improvement in mean practice scores was significantly difference among and across the three study groups only in the post-intervention phase ($p<0.05$).

The comparison of overall mean knowledge, attitude and practice scores of respondents in this study is represented in Table 4.12.

Table 4.12: Comparison of Overall Knowledge, Attitude and Practice in the three Groups at Baseline and Endline

Variable (Total Score Range)	EGI Mean±SD	EGII Mean±SD	Control Mean±SD	p-value (ANOVA)
Knowledge (0-29)				
Baseline	11.36±4.16	11.70±4.25	13.00±4.76	0.067
Endline	19.86±3.66	18.48±3.41	14.29±2.35	0.018*
p-value (Paired t-test)	<0.001*	<0.001*	<0.001*	
Attitude (0-14)				
Baseline	5.15±1.86	5.10±1.80	4.54±1.07	0.125
Endline	11.71±1.87	11.36±1.56	7.40±1.21	0.027*
p-value (Paired t-test)	0.012*	0.035*	0.042*	
Practice (0-12)				
Baseline	3.25±1.68	3.84±1.84	3.96±1.94	0.467
Endline	10.02±2.76	8.81±2.62	6.09±1.64	0.018*
p-value (Paired t-test)	<0.001*	<0.001*	<0.001*	

** = Statistically Significant at p<0.05; EGI (anchored by the RMMs);* EGII (*anchored by CHEWs); CG (No Intervention)*

4.5.2: Proportion of Respondents' vs Level of Knowledge, Attitude and Practice of Breast Self-Examination at Baseline and Endline

At baseline, the highest proportion of community women with good knowledge (40.0%) was observed among those in the CG while community women in the EGI had the highest proportion with good knowledge (76.6%) at endline, followed by women in EGII (60.2%) (Figure 4.1). Among the experimental groups, it was observed that from baseline to endline, the community women in EGI (75.2% down to 23.4%) had a greater proportional reduction of women with poor knowledge compared to those in EGII (71.8% to 59.8%)

Respondents in the EGI had the highest proportion of women (48.0%) with positive attitude at baseline. The CG had the lowest proportion of women (46.0%) with positive attitude at endline. Between baseline and endline, the EGI, EGII and CG had a 32.0%, 14% and 4.0% proportional increase in the number of women with positive attitude towards Breast Self-examination respectively (Figure 4.2).

The proportion of women who demonstrated correct practice of Breast Self-examination was generally low at baseline in the three groups. The women in the CG had the highest proportion of those with correct practice of BSE (19.4%) at baseline while EGI had the highest proportion of women (57.3%) who demonstrated correct BSE practice at endline. As regards relative proportional increment in the number of women demonstrating correct practice from baseline to endline among the groups, EG I had the highest proportional increment at endline (44.5%) followed by EGII (40.8%) and the CG (8.6%) (Figure 4.3). Also, there was an observed rise in the proportion of women who performed monthly BSE in the experimental groups (42.9% proportional increase in EGI and 34.7% proportional increase in EGI) while the women in the CG showed a proportional reduction from 52.5% to 37.9% (Figure 4.4).

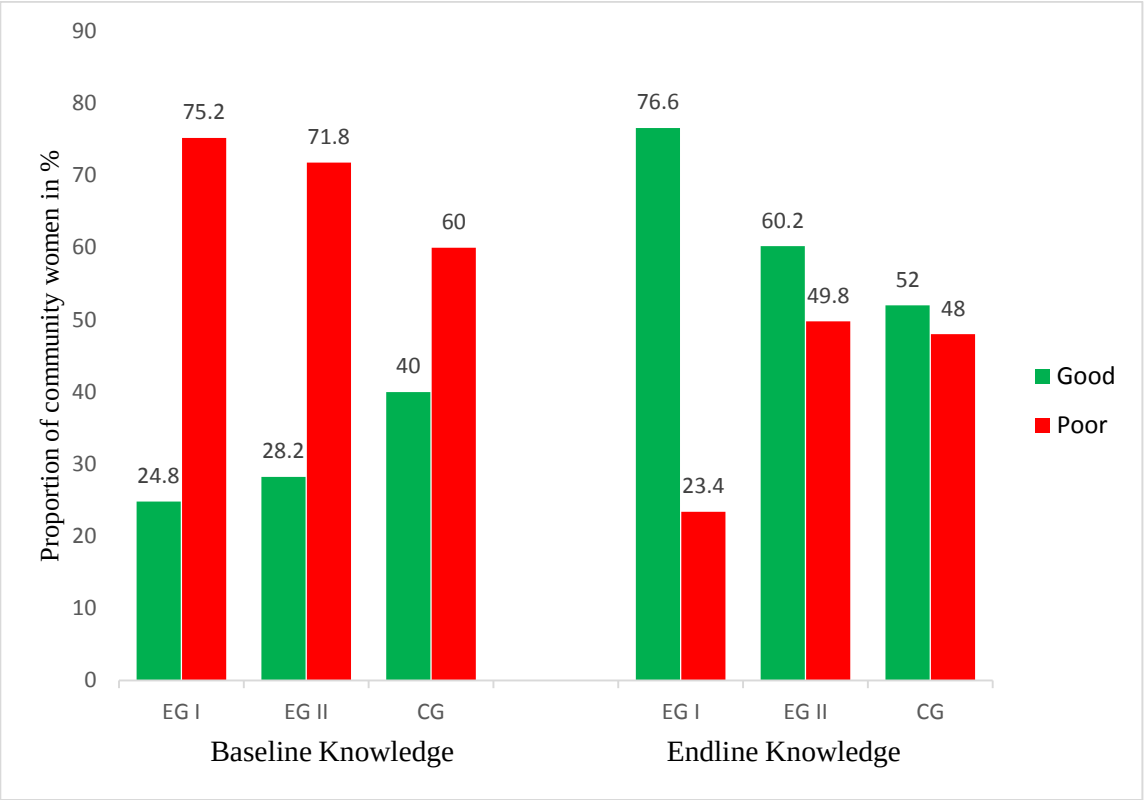

Figure 4.1: Percentage Level of Respondents' Knowledge of Breast Self-Examination

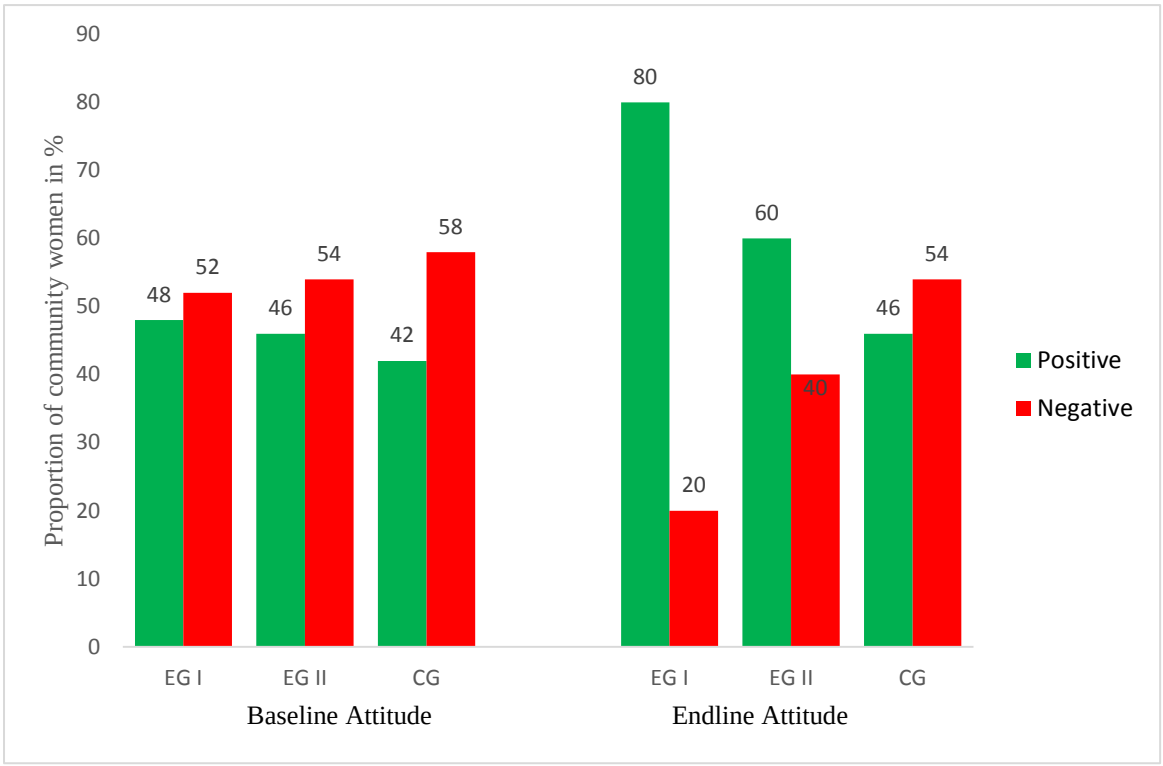

Figure 4.2: Percentage Level of Respondents' Attitude of Breast Self-Examination

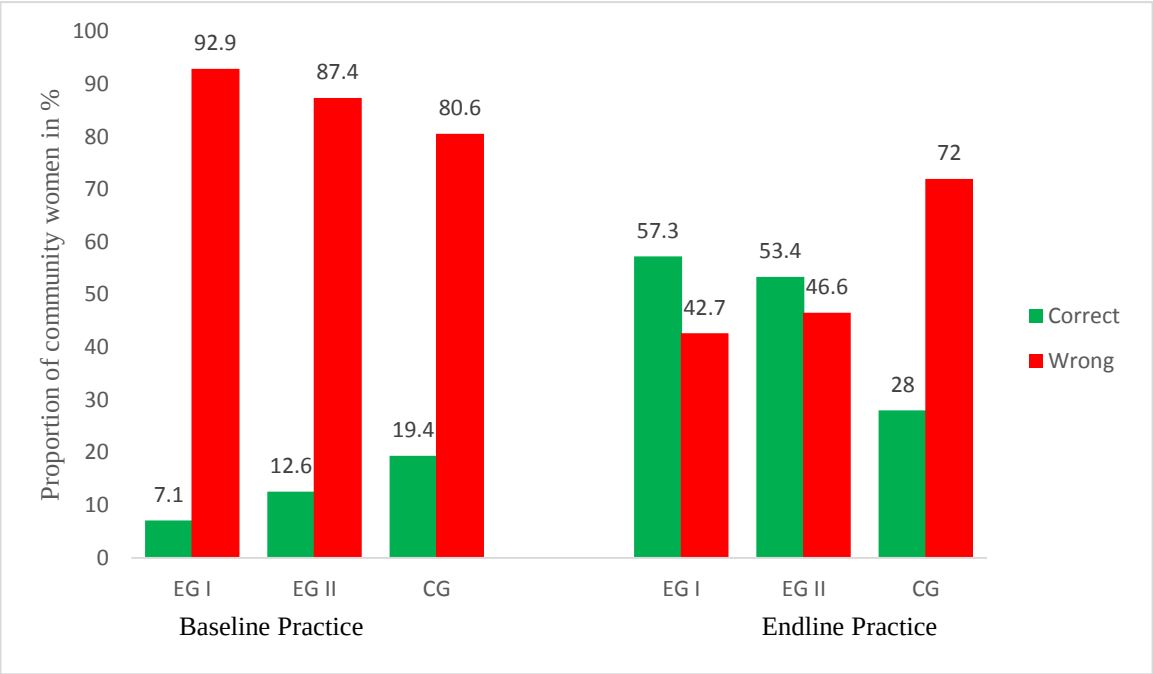

Figure 4.3: Percentage Level of Respondents' Practice of Breast Self-Examination

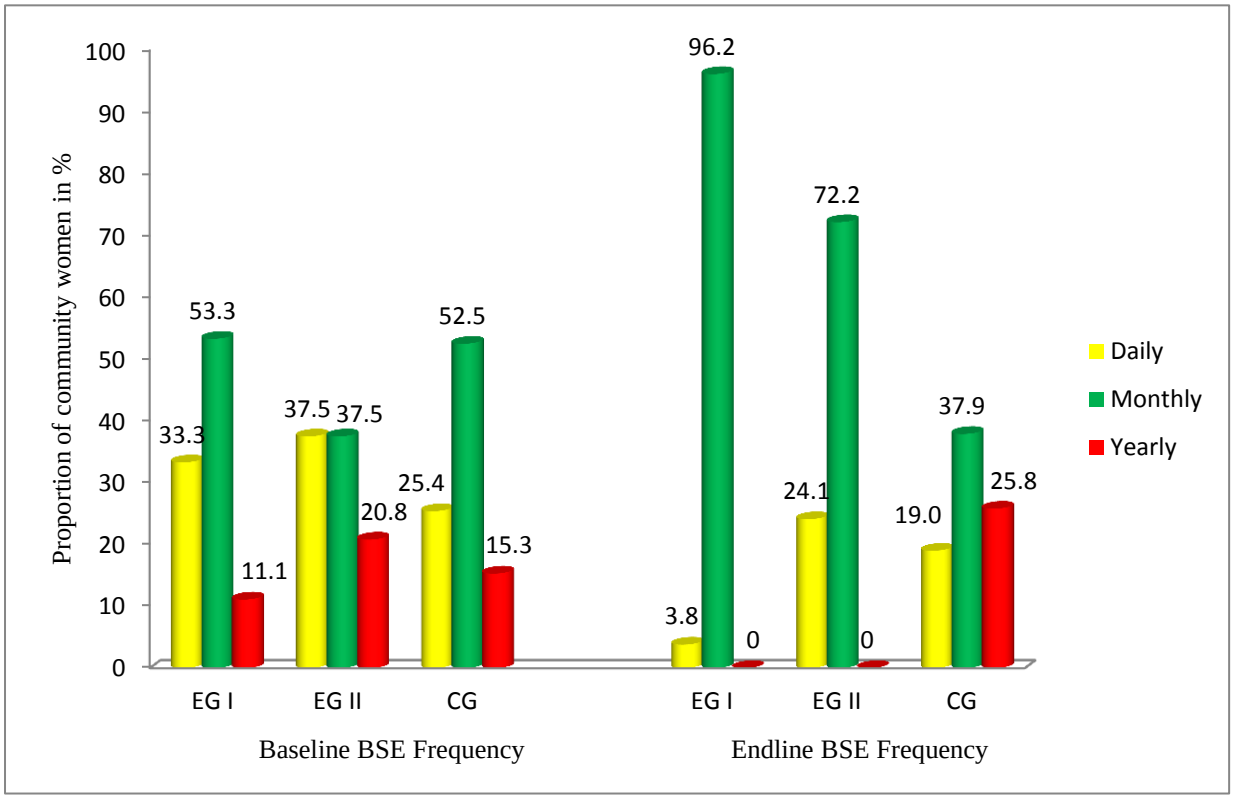

Figure 4.4: Percentage Level of Respondents' Frequency of Breast Self-Examination

4.6.1 The results of Analysis of Covariance (ANCOVA)

The Effect of Socio-demographic variables on Respondents' Post-intervention Knowledge score on Breast cancer and Breast Self-Examination

The analysis of covariance (ANCOVA) of the three study groups was used to demonstrate effect of the study group and socio-demographic factors on respondents' endline knowledge score on breast cancer and breast self-examination while controlling for respondents' baseline knowledge score on breast cancer and breast self-examination. Of the total respondents, none of the individual socio-demographic characteristics significantly influenced the endline knowledge score. However, three out of the four combined sets of the socio-demographic characteristics significantly accounted for the variation in the end line knowledge score ($p<0.05$). The baseline knowledge score had no significant impact in the observed variations in the end line knowledge score ($p<0.05$). Study group and respondents' level of education accounted for the highest variation (8.2%) in the end line knowledge score (effect size=0.082; $p<0.05$). This was followed by a combined interaction of level of education and marital status which contributed about 7.2% to the variations observed in the end line knowledge score (effect size = 0.072; $p<0.05$) (Table 4.13).

The diagrammatic representation of the interaction between marital status and the study groups on the end line knowledge score while controlling for baseline knowledge score is shown in Figure (4.5). The Interventional groups had higher marginal means than the CG at all levels of the marital status except 'widowed'. In the overall, the highest marginal mean was observed among the single in the EGII (anchored by the CHEWs).

The interaction of respondents' level of education and study groups on the knowledge score at end line is shown in Figure 4.6. There was a convoluted relationship between the estimated marginal mean and each level of education. Among respondents who had tertiary education, EGII had the highest estimated marginal mean followed by EGI and the CG.

Table 4.13: The Results of Analysis of Covariance (ANCOVA): The Effect of Socio-demographic Variables on Respondents' Knowledge Score about Breast-Self Examination at Post-intervention

Variables	Mean Square	F	Effect Size	p-value
Corrected Model	23.16	1.77	0.183	0.019*
Intercept	3336.06	255.01	0.573	>0.001*
Study Groups	19.45	2.61	0.015	0.229
Level of Education	34.20	2.61	0.040	0.053
Marital Status	36.21	2.77	0.028	0.065
Study Groups Vs Level of Education	37.08	2.83	0.082	0.012*
Study Groups Vs Marital Status	25.33	1.94	0.039	0.106
Level of Education Vs Marital Status	48.38	3.70	0.072	0.006*
Study Groups Vs Marital Status Vs Level of Education	45.05	3.44	0.035	0.034*
Knowledge score (pre-intervention)	11.17	0.85	0.004	0.357

** = Statistically Significant at $p < 0.05$; $R^2=0.183$; Adjusted $R^2=0.079$*

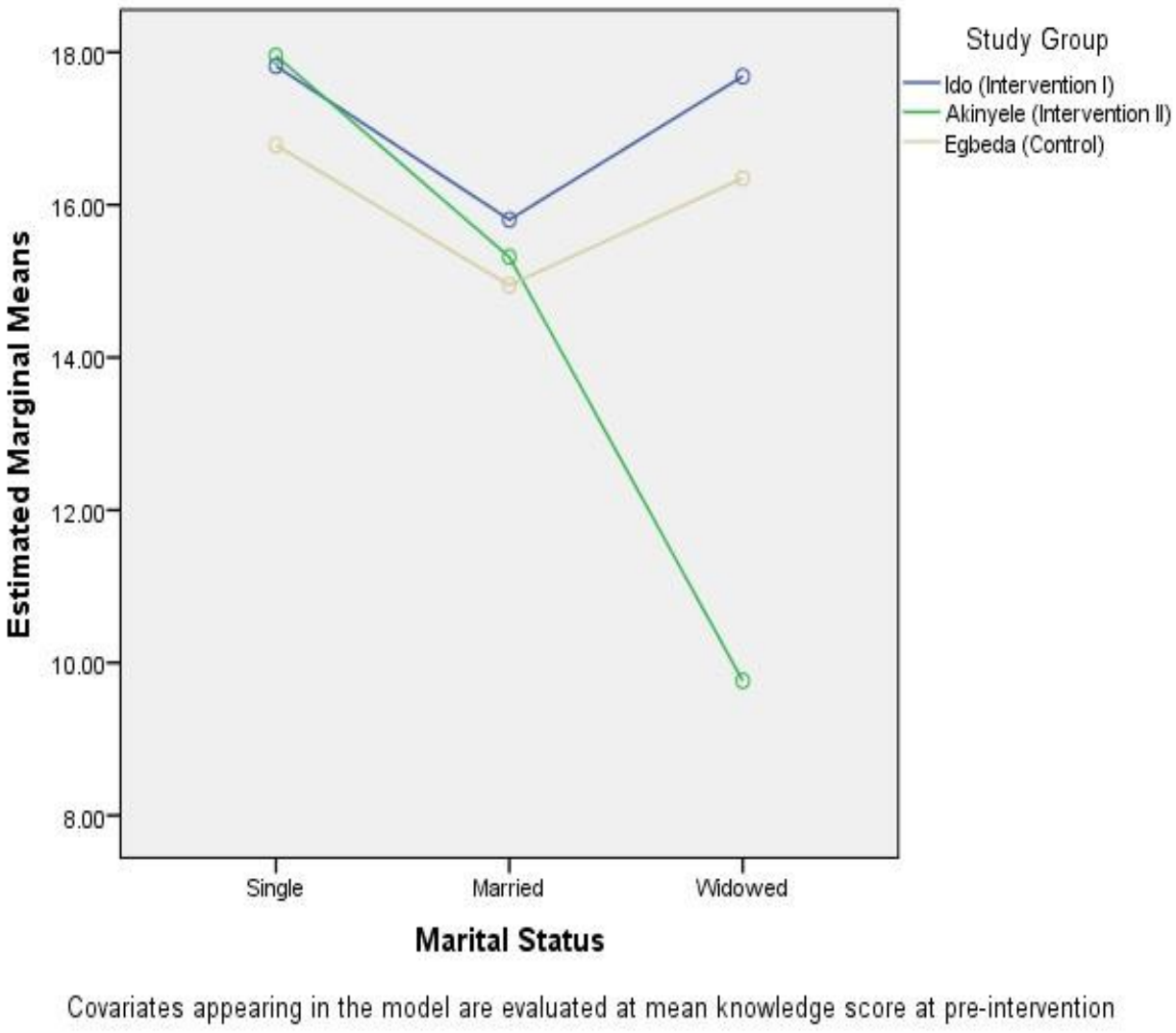

Figure 4.5: Interaction between Marital Status and Estimated Marginal Means of Knowledge Score (post-intervention) among the three study Groups

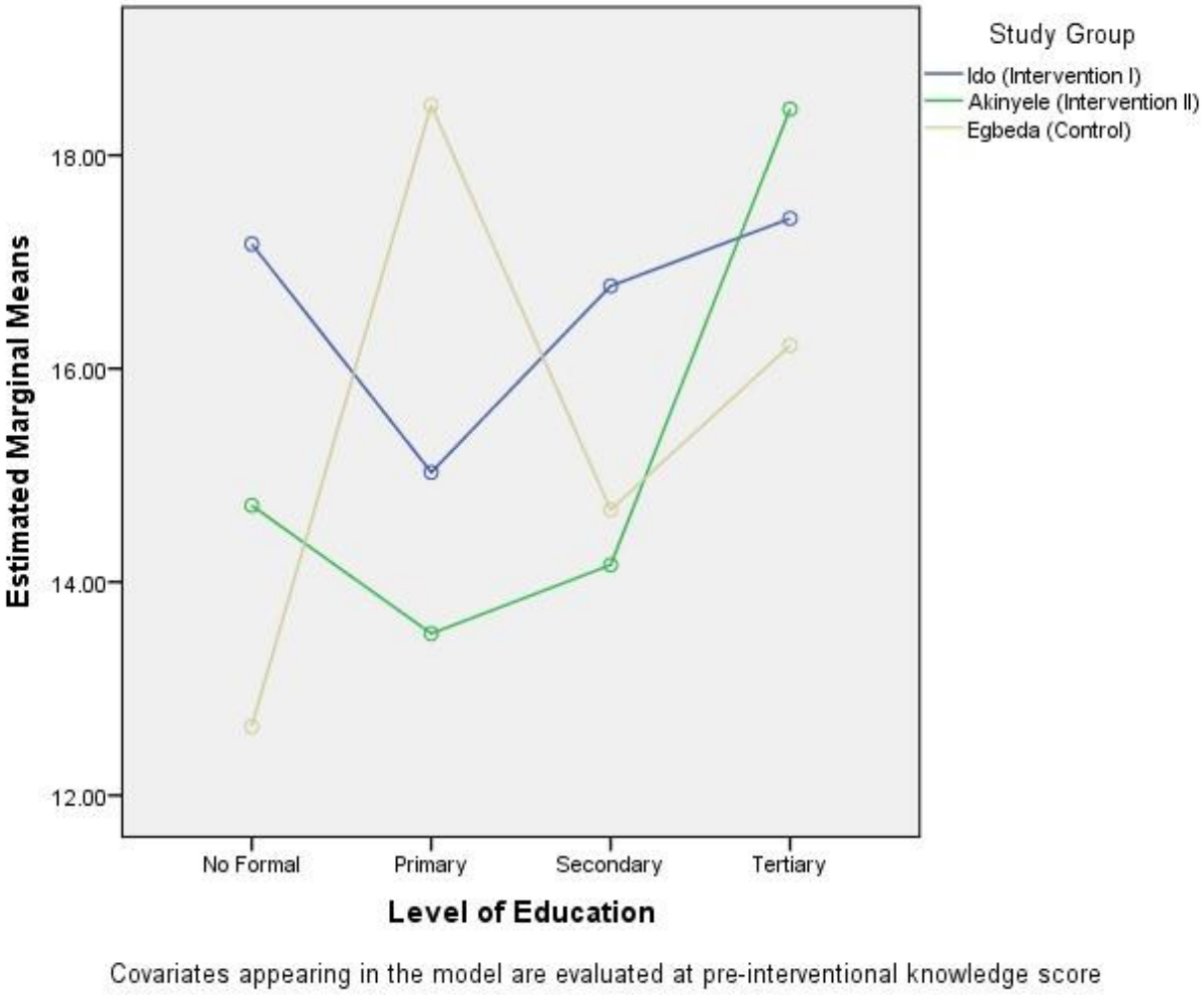

Figure 4.6: Interaction between Level of Education and Estimated Marginal Means of Knowledge Score (post-intervention) among the three Study Groups

4.6.2 The Results of Analysis of Covariance (ANCOVA)

The effect of Socio-demographic variables on Respondents' Post-Intervention Attitude Score towards Breast Self-examination

The analysis of covariance (ANCOVA) described the factors associated with the endline attitude score while controlling for respondents' baseline attitude score towards breast self-examination in the three study groups.

None of the socio-demographic characteristics significantly influenced the variation in the endline attitudinal score for BSE ($p>0.05$). A combined interaction of study and marital status accounted for the highest variation in the end-line attitudinal score for BSE (effect size=0.029; $p>0.05$). This was followed by a combined interaction of study group and level of education (effect size=0.021; p value>0.05). Pre intervention (baseline) attitudinal score had no significant impact on the observed variation in the end-line attitude score (effect size=0.011; $p>0.05$).

Figure 4.7 shows the interaction between respondent level of education and the study groups on the endline attitude score while controlling for baseline attitude score. The intervention groups had higher marginal mean attitude than the CG at each level of education except those with tertiary education. In the overall, the highest marginal mean was observed among those who had primary education in the EGII (anchored by CHEWs).

The interaction of respondents' marital status and study groups on the attitude score at baseline is shown in Figure 4.8. The Intervention groups had far higher marginal mean attitude score among the married and widowed. Respondents in the CG had the highest marginal mean among the single.

Further details on the analysis of covariance (ANCOVA) are presented in Table 4.14.

Table 4.14: The Results of Analysis of Covariance (ANCOVA): The effect of Sociodemographic Variables on Respondents' Attitude Score (Post-intervention) towards Breast Self-Examination

Variables	Mean Square	F	Effect Size	p-value
Corrected Model	2.02	1.02	0.115	0.438
Intercept	494.02	250.15	0.011	<0.001*
Study Groups	2.79	1.41	0.015	0.246
Level of Education	0.85	0.43	0.007	0.730
Marital Status	0.18	0.09	0.001	0.090
Study Groups Vs Level of Education	1.35	0.69	0.021	0.662
Study Groups Vs Marital Status	2.81	1.42	0.029	0.228
Level of Education Vs Marital Status	0.26	0.13	0.003	0.971
Study Groups Vs Marital Status Vs Level of Education	2.48	1.26	0.013	0.287
Attitude Score (pre-intervention)	4.11	2.08	0.011	0.151

** = Statistically Significant at $p < 0.05$; $R^2=0.115$; Adjusted $R^2=0.003$*

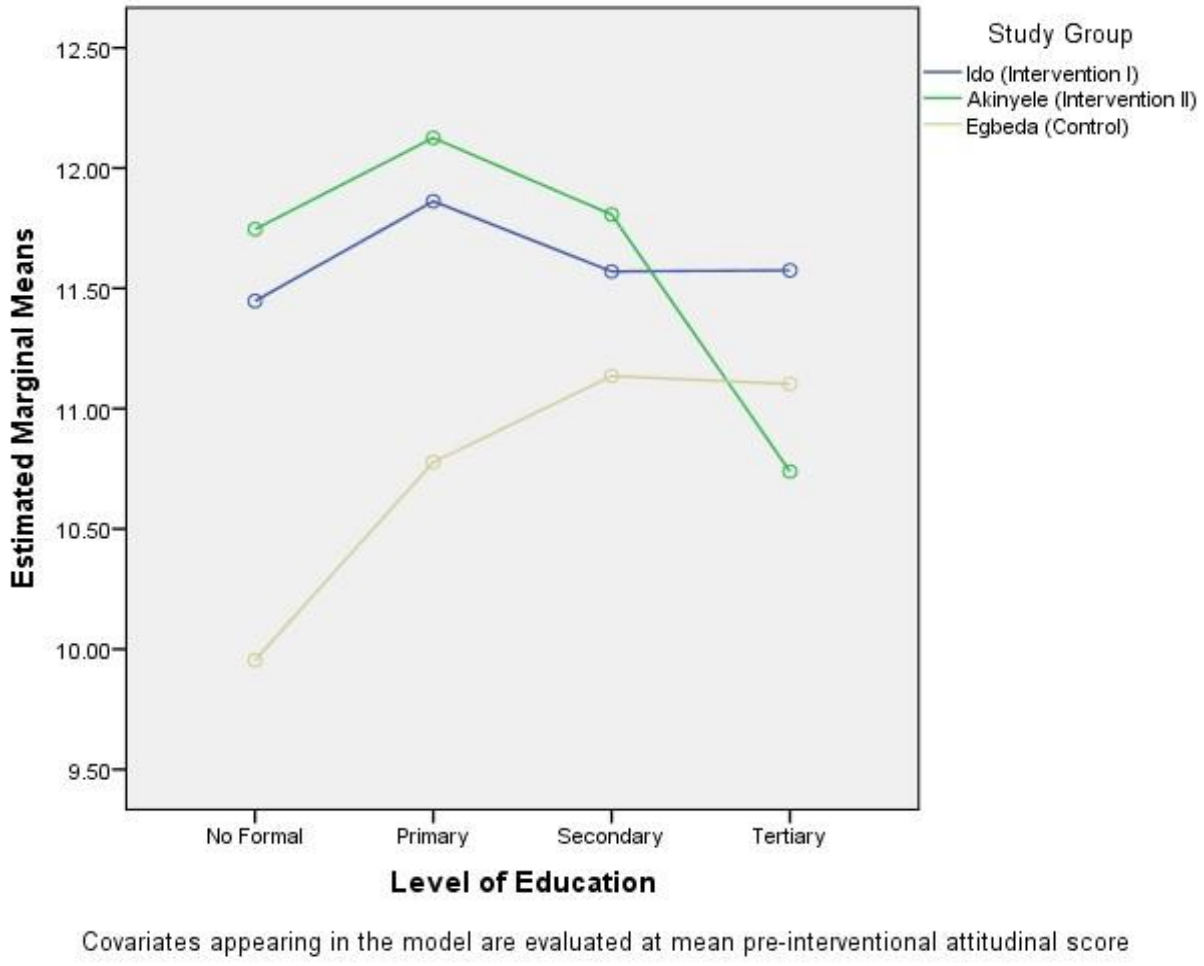

Figure 4.7: Interaction between Level of Education and Estimated Marginal Means of Attitude Score (post-intervention) among the three Study Groups

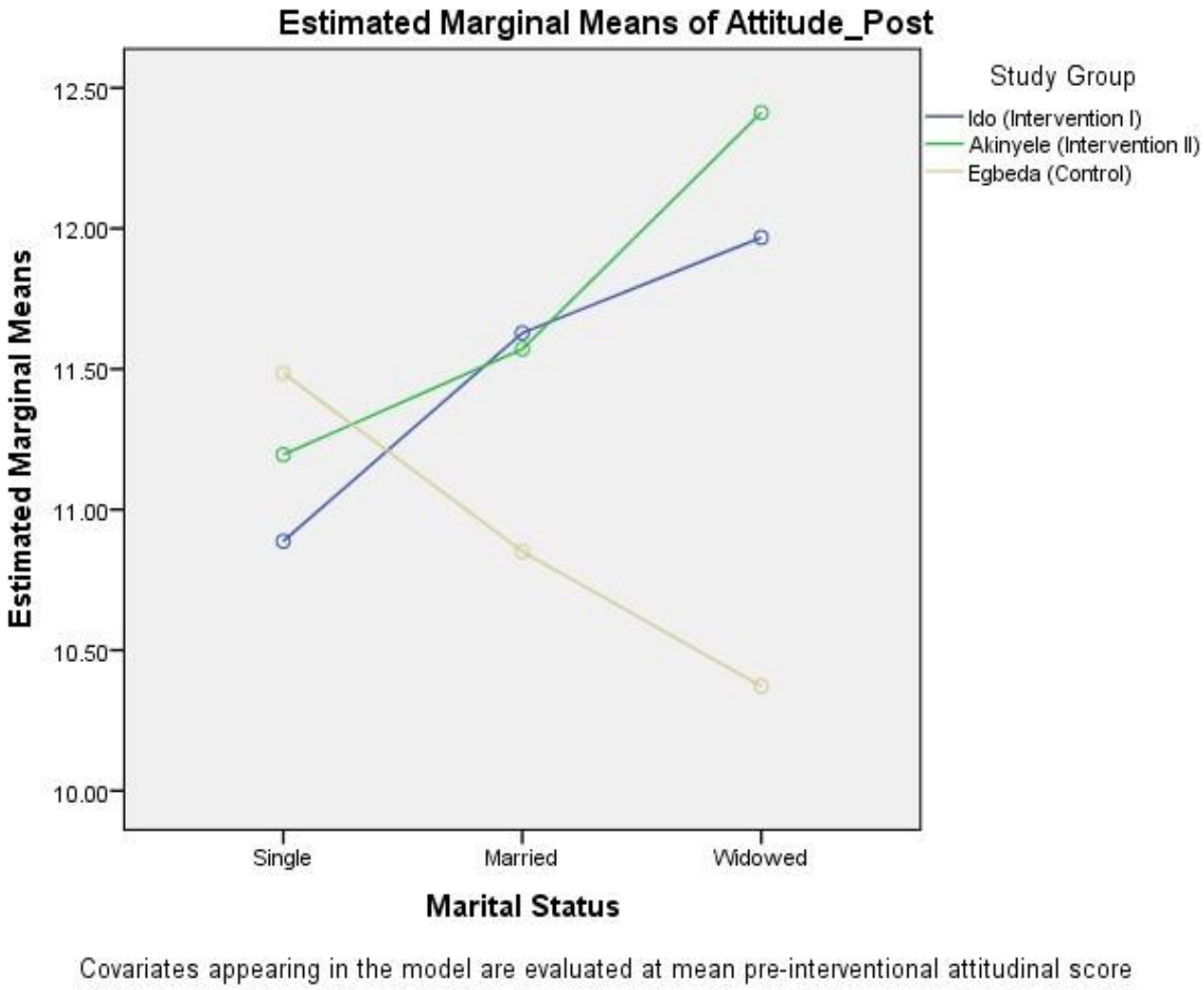

Figure 4.8: Interaction between Marital Status and Estimated Marginal Means of Attitude Score (post-intervention) among the three Study Groups

4.6.3 The Results of Analysis of Covariance (ANCOVA)

The effect of Socio-demographic Variables on Respondents' Practice Score (Post-intervention) of Breast Self-Examination

None of the socio-demographic characteristics and the study group significantly impacted the variation in the end line practice score ($p>0.05$). The pre-interventional (baseline) practice score did not significantly influence the variations in the end line practice score ($p>0.05$). The interaction between Level of Education and Marital status significantly contributed to the observed variations in the end line practice score (effect size =0.020; $p>0.05$).

The interaction between the level of education and the study groups on the endline practice score while controlling for baseline practice score was shown in Figure (4.9). The CG had the highest marginal mean among respondents with primary and tertiary education while the EGs I and II had the highest marginal mean practice score among respondents with secondary and primary education respectively.

The interaction of respondents' marital status and study groups on practice score at baseline is shown in Figure 4.10. The CG had the highest estimated marginal mean practice score among the single and widowed women while respondents in EGII had the highest marginal mean among the married.

The analysis of covariance (ANCOVA) in Table 4.15 shows the effect of the interaction of the study group and the respondents' demographic characteristics on the end line score on breast self-examination while controlling for respondents' baseline practice score on breast self-examination.

Table 4.15: The Results of Analysis of Covariance (ANCOVA): The Effect of Socio-demographic Variables on Respondents' Practice Score (post-intervention) of Breast Self-Examination

Variables	Mean Square	F	Effect Size	p-value
Corrected Model	5.71	0.67	0.078	0.875
Intercept	511.32	60.18	0.241	<0.001*
Study Groups	7.23	0.85	0.009	0.429
Level of Education	3.96	0.47	0.007	0.706
Marital Status	5.67	0.67	0.007	0.515
Study Groups Vs Level of Education	2.19	0.26	0.008	0.956
Study Groups Vs Marital Status	7.50	0.88	0.018	0.476
Level of Education Vs Marital Status	8.36	0.98	0.020	0.418
Study Groups Vs Marital Status Vs Level of Education	0.70	0.08	0.001	0.922
Practice Score (pre-intervention)	9.81	1.15	0.006	0.284

** = Statistically Significant at $p < 0.05$; $R^2=0.078$; Adjusted $R^2= -0.038$*

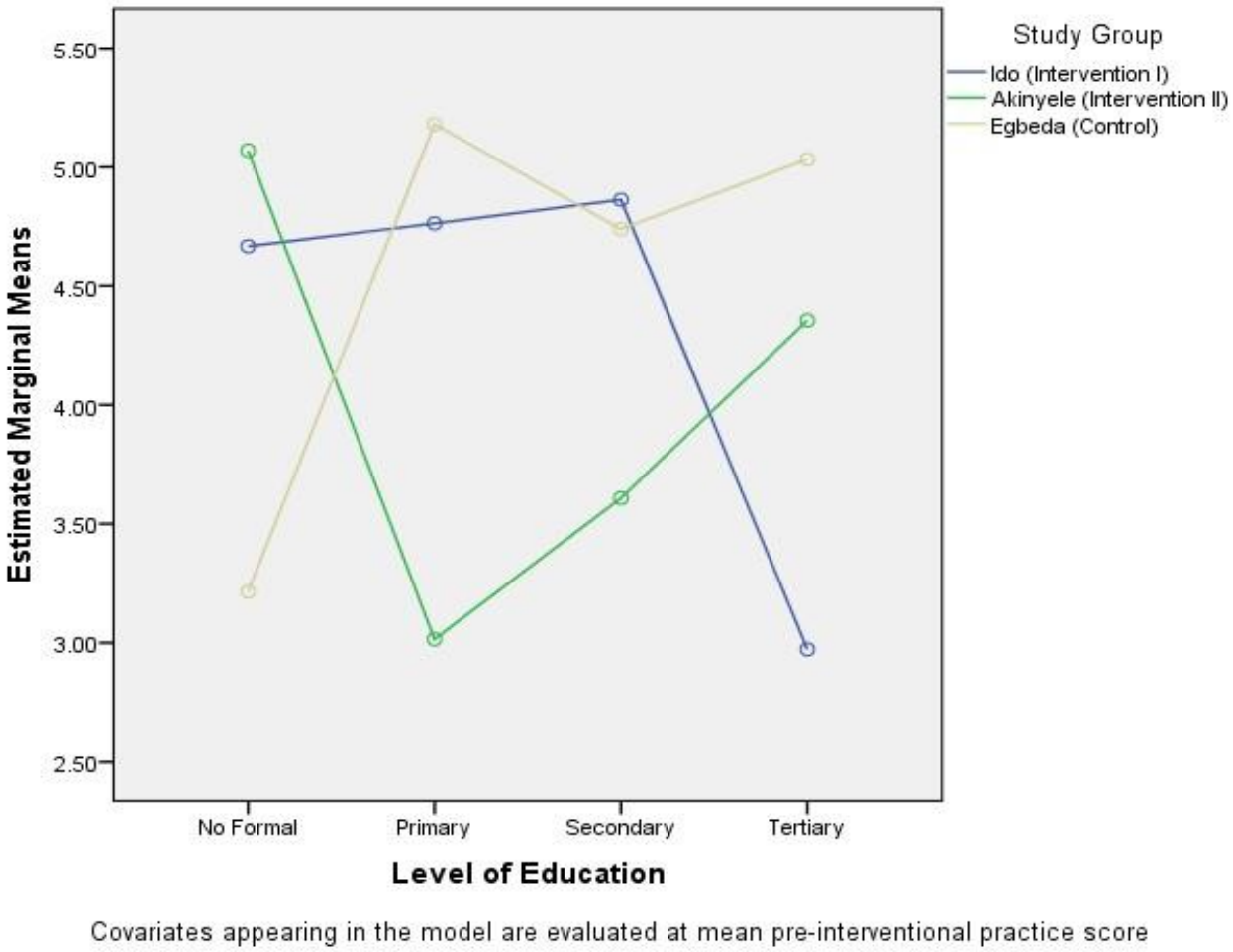

Figure 4.9: Interaction between Level of Education and Estimated Marginal Means of Practice Score (post-intervention) among the three Study Groups

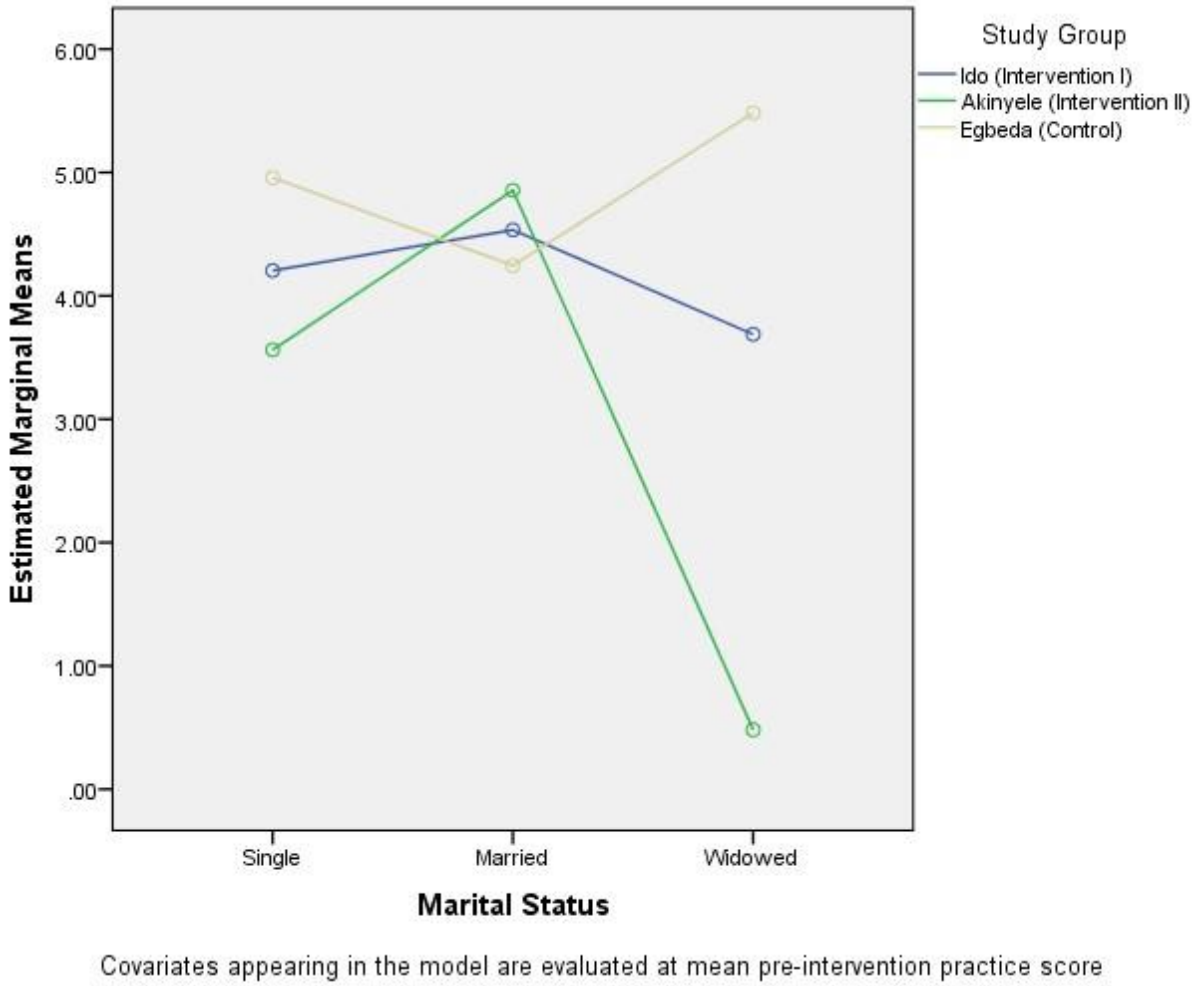

Figure 4.10: Interaction between Marital Status and Estimated Marginal Means of Practice Score (post-intervention) among the three Study Groups

4.7 Testing of Hypotheses

The difference between EGI(anchored by Role Model Mothers RMMs) and EGII(anchored by Community Health Extension Workers (CHEWs) was tested using the Independent sample t-test. The decision rule holds that a significant difference exists between the tested study groups if the calculated t value is greater than the tabulated t value. Hence, the p value will be less than 0.05.

Three hypotheses were tested to evaluate the effect of the trainings on breast self-examination by the RMMs in Group I and CHEWs in Group II. The differences between these groups were tested in respect to the followings:

a. Knowledge about breast cancer and of its detection using Breast Self-Examination
b. Attitude towards breast cancer and of its detection using Breast Self-Examination
c. Practice of Breast Self-Examination

4.7.1 Hypothesis Testing on Knowledge of Breast Self-examination EGI and EGII

H_{01}: There is no significant difference in knowledge about breast cancer and of its detection using BSE between women in EGI(trained by Role Models Mothers) and EGII (*trained by Community Health Extension Workers) at baseline and endline.*

Baseline and Endline

At baseline, the Independent Sample t-test was used to determine the difference in knowledge of breast cancer and its detection by BSE between women trained by CHEWs (EG II) and those trained by RMMs (EG I) before the intervention (95% CI = -1.54 – 0.86; P>0.05) (Table 4.16).

Therefore, we fail to reject the Null hypothesis that states that there is no significant difference in knowledge about breast cancer and of its detection using BSE between women trained by CHEWs and those trained by RMMs before the intervention.

At endline, the Independent Sample t-test was used to measure the difference in knowledge of breast cancer and its detection by BSE between women trained by CHEWs (EG II) and those trained by RMMs (EG I) (95% CI = -0.74 – 1.49; P >0.05) (Table 4.16).

Therefore, we fail to reject the Null hypothesis that states that there is no significant difference in knowledge about breast cancer and of its detection using BSE between women trained by CHEWs and those trained by RMMs after the intervention.

Table 4.16: Knowledge of Breast Self-Examination between EGI and EGII

Survey/group		N	Mean±SD	Df	95% CI		p-value
Knowledge score (baseline)	EGI	100	11.36±4.16	198	-1.54	0.86	0.576
	EGII	100	11.70±4.25				
Knowledge score (endline)	EGI	78	19.86±3.66	155	-0.74	1.49	0.504
	EGII	79	18.48±3.41				

EGItrained by RMMs; EGII trained by CHEWs; SD= Standard Deviation

4.7.2 Attitude towards Breast Self-examination between EGI and EII

H_{02}: There is no significant difference in attitude towards BSE between women in EGI and EGII at baseline and endline

Baseline and Endline

At baseline, the Independent Sample t-test was used to determine the difference in attitude towards BSE between women trained by CHEWs (EG II) and those trained by RMMs (EG I) before the intervention (95% CI = -0.39– 0.50; P>0.05) (Table 4.17).

Therefore, we fail to reject the Null hypothesis that states that there is no significant difference in attitude towards BSE between women trained by CHEWs and those trained by RMMs before the intervention.

At endline, the Independent Sample t-test was used to measure the difference in attitude towards BSE between women trained by CHEWs (EG II) and those trained by RMMs (EG I) (95% CI = -0.13 – 0.80; P>0.05) (Table 4.17).

Therefore, we fail to reject the Null hypothesis that states that there is no significant difference in attitude towards BSE between women trained by CHEWs and those trained by RMMs after the intervention.

Table 4.17: Attitude towards Breast EGI and EGII

Survey/group		N	Mean±SD	Df	95% CI		p-value
Attitude score	EGI	100	5.15±1.86	198	-0.39	0.50	0.826
(Baseline)	EGI	100	5.10±1.80				
Attitude score	EGI	78	11.71±1.87	155	-0.13	0.80	0.151
(Endline)	EGII	79	11.36±1.56				

SD= Standard Deviation; EG I(Ido Local Government Area) by RMMs; EGII (*Akinyele Local Government Area) by CHEWs*

4.7.3 Hypothesis Testing on Practice of Breast Self-Examination between EGI and EGII

H_{03}: There is no significant difference in practice of Breast-Self Examination between women in EG I (trained by Role Model Mothers) and EGII (*trained by Community Health Extension Workers) at baseline and endline.*

Baseline and Endline

At baseline, the Independent sample t-test was used to determine the difference in practice of Breast Self-Examination between women trained by CHEWs (EG II) and those trained by RMMs (EG I) before the intervention (95% CI = -0.35 – 0.77; P> 0.05) (Table 4.18).
Therefore, we fail to reject the Null hypothesis that states that there is no significant difference in practice of Breast Self-Examination between women trained by CHEWs and those trained by RMMs before the intervention.

At the endline, the Independent Sample t-test was used to measure the difference in practice of Breast Self-Examination between women trained by CHEWs (EG II) and those trained by RMMs (EG I) (95% CI = 1.27 – 2.96; P<0.05) (Table 4.18).

Therefore, we reject the Null hypothesis that states that there is no significant difference in practice of Breast Self-Examination between women trained by CHEWs and those trained by RMMs after the intervention.

Table 4.18: Practice of Breast Self-Examination between EGI and EGII

Survey/group		N	Mean±SD	Df	95% CI		p-value
Practice score	EGI	100	3.25±1.68	198	-0.35	0.77	0.462
(Baseline)	EGI	100	3.84±1.84				
Practice score	EGI	78	10.02±2.76	155	1.27	2.96	<0.001*
(Endline)	EGII	79	8.81±2.62				

*SD= Standard Deviation; * = Statistically Significant at p<0.05; EG I (by the RMMs);* EGII (*by the CHEWs)*

4.8 Post-Intervention Feedback

At the end of the intervention and data collection processes, an in-depth interview (IDI) guide was used to obtain a feedback about the study from 20 randomly selected participants across the three LGAs. The participants freely expressed their opinions about the entire intervention, its benefits and weakness, and the participants' attitude towards being part of such intervention in the future. The responses are as follows:

4.9 Potential Benefits of the Interventions

The respondents mentioned various benefits they derived from the intervention. Some of the highlighted benefits include:

1) Acquisition of the BSE skill.
2) Confidence to teach BSE to others.
3) Ability to know when to seek medical help from cancer experts based on BSE findings.
4) Establishment of a relationship with the trainers (CHEWS/RMMs)

Some recorded comments include:

" I thank God that I was selected among those that took part in this study, I now know when I have a breast problem"(Participant in EGII at Akinyele LGA)

"*It was as if the training should not stop. I enjoyed the mama that came to teach us*. (Participants in EGI at Ido LGA)

"*I will love to do the training again and again as I can now teach more people"* (Participant in EGI at Ido LGA)

4.10 Potential Drawbacks of the Intervention

Despite the numerous benefits mentioned above especially by participants from the Experimental/Intervention Groups, a few participants nonetheless made observations about drawbacks to the study. The key negative highlights that were mentioned about the study include:

1) Lengthy time span of the step-down trainings was mentioned by participants from both Experimental Groups
2) A few participants from both Experimental groups, also believed that the training sessions became too repetitive after a few sessions and would have preferred fewer sessions

3) Some participants from both Experimental groups were displeased because they believed that not everyone in the community benefited from the study.

A few of the recorded comments are highlighted below:

"*Aunty nurse will say the same thing today and repeat tomorrow"* (Participant from EGII at Akinyele LGA)

"*I wish everyone in Moniya knows how to check her breast so that no one develops a breast cancer" (*Participant from EGII at Akinyele LGA)

It was emphasized to them that the purpose of the repetition was to achieve reinforcement of the skills of step-wise BSE performance.

4.11 Interest in Taking Part in Such Study in the Future

All respondents declared that they would want to be part of the similar study in the future.

"*I thank God for the opportunity and I will always want to learn more about my health" (*Participant from EGI at Ido LGA).

"Though I was only just asked to fill forms about breast cancer on two occasions, it made me think more about my breasts and the need to pay more attention to them. I will be happy to get such reminders from time to time because one can easily get carried away by life challenges. I will want more of such projects to happen frequently in the future" (Participant from CG at Egbeda LGA)

CHAPTER FIVE

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

The primary focus of this study was to determine the effects of two training approaches by trained Role Model Mothers (RMMs) and Community Health Extension Workers (CHEWs) on the knowledge, attitude and practice of BSE for early Breast Cancer (BC) detection among community women enrolled from three selected local government areas (LGAs) in Ibadan viz Ido LGA, Akinyele LGA and Egbeda LGA.

This chapter discusses the major findings of the study in relation to the major themes; it also reports the overall conclusion drawn from the study findings and their implications for health promotion and education. It then presents recommendations and suggestions for further studies.

5.1 Socio-demographic Characteristics of Study Participants (Baseline and Endline)

The overall mean age of respondents in this study was 37.7± 9.7 years at endline with the mean age in the experimental groups approaching 40 years and significantly higher than that of the control group (closer to 30 years). This finding of younger women in the Control Group at endline may not be unconnected to attrition from participants' drop-out with a higher occurrence in the Control Group. However, regardless of this observed inter-group mean age difference, further analysis found no significant effect of age of community women on the measured intervention outcomes.

In addition, recruitment of women between the ages of 19 and 60 years into this study infers from other quasi-experimental studies assessing effect of health education intervention on Breast Cancer screening among women like in rural India (Nisha & Murali, 2020) and Dezful Iran (Masoudiyekta *et al.*, 2018), based on breast cancer screening guidelines of the American Cancer Society. Other quasi-experimental studies on breast cancer screening from Iran expanded the study participants' age group from 20 up to 69 years with no clear reason given which may imply researcher's idiosyncrasy (Savabi-Esfahani *et al.*, 2017; Esfahani *et al.*, 2018).

Nonetheless, the observed overall study and experimental group mean ages at endline mirror the findings of studies on breast cancer screening conducted among community women in other countries like in Ashanti Ghana by Molly and Mercy (2016) (Mean Age:37.9± 14.2); rural women in Tamil Nadu in Southern India as reported by Nisha and Murali (2020) (Mean Age:42.3 years) and among community women in Isfahan, Iran as reported by Esfahani *et al*. (2018) (Mean Age: 45.5 years). Within Nigeria, the age of 40 years and above appears to be the prime age for Breast Cancer development with older studies on breast cancer among women by Adebamowo and Ajayi (2000) and breast cancer screening among women by Oluwatosin and Oladepo (2006), reporting predominance of Breast Cancer among pre-menopausal women with a mean age of occurrence ranging between 43 and 50 years across different regions of Nigeria and a peak age of incidence of 42.6 years. Those figures have not been revised till date. Also, those studies reported prevalence rate of breast cancer as 12% before the age of 30 years and 20% in post-menopausal women (>50 years), meaning that the significant proportion of those afflicted or at-risk of affliction by Breast Cancer falls between the ages of 30 and 50 years. Therefore, the mean age of women found in this study fits the appropriate demographic profile of women at risk of Breast Cancer who are expected to be mainly targeted by screening programmes. Targeting the appropriate age potentially harbours a lot of benefits in minimizing their inherent future breast cancer risks.

At baseline and endline, there were significantly more married community women enrolled as study participants with a greater proportion in the Experimental Groups than the Control Group. The community women in the Control Group had a lower average age (31years) than the women in the experimental groups, and with reported older median age at first marriage among women in South-west Nigeria, put at 28 years by the 2018 Demographic Health Survey (National Population Commission, 2018), there remains a strong possibility that a major proportion of the younger women in the Control Group may not have married at the time of this study. Also, the average duration that the married community women had stayed in marriage was 16 years in this study with a significantly longer average stay in marriage among the women in the Experimental Groups compared to those in the Control Group, possibly tied to the presence of younger and more unmarried women in the Control Group. Inferring from reported length of stay of women by other studies assessing impact of educational interventions on breast cancer awareness, this finding may be a reflection of the

semi-urban study setting at which this study was conducted (Oluwatosin&Oladepo; 2006; Khiyali *et al*., 2017; Esfahani *et al*., 2018; Masoudiyekta *et al.*, 2018; Alameer *et al.*, 2019; Nisha&Murali, 2020). With marital status significantly influencing BSE knowledge, attitude and practice of community women in this study, there may be need to further explore the impact of these other co-factors in future studies.

Edem *et al.* (2011) emphasized the acquisition of a minimum of secondary level of education as a reliable metric of literacy and (or) numeracy, and that the attainment of both (literacy and numeracy) can significantly impact assimilation and application of new knowledge. At baseline, the women in the Control Group had a significantly higher level of education at the secondary and post-secondary levels than those in the Experimental Groups but there was no significant difference at endline. The observed higher level of education in the Control Group at baseline can be attributed to inherent differences in demographic dynamics between the study local governments which may have impacted to educational attainment (Lutz *et al*., 2008) but could not be determined as it fell out of the scope of this study.

Specifically, at baseline, it was observed that women in the EGII at Akinyele LGA had the lowest level of educational attainment at secondary school level and above. However, inferring from a much older study conducted over a decade ago by Oluwatosin and Oladepo (2006), on the knowledge of Breast Cancer and its early detection methods at Akinyele LGA, it will appear that the average educational attainment of women at this location has gradually improved over time. While the 2006 study found that just a little over 15% out of 402 respondents (63 in all) sampled at Akinyele LGA had attained at least secondary education, this study found up to 70% of women recruited from the same location (70 out of 100) at baseline and up to 83.5% (66 out of 79) at endline, had attained at least secondary level of education. This inference can be considered important as the old and the current study share similarities in sampling technique (multi-stage sampling) for the same demographic location and targeted women of similar profile in the study recruitment. Johnson and Ifeoma (2018) note that there is a gradual change in the distribution of educational status and socio-demographic dynamics in many semi-urban communities in South-western Nigeria with a gradual trend towards attaining the demographics observed in Urban locations which can be adduced to a gradual reversal of rural-urban migration as a

fall-out of population-related high pressure and worsening living conditions within most densely-populated urban cities.

In spite of the observed high literacy level, this study nonetheless observed a preponderance of merchandise trading as a major occupation amongst the study participants (55.25 at baseline and 39.1% at endline) with significantly more traders among the women in EGI community women trained by CHEWS at Akinyele LGA than those in the Control Group.

Akinyele LGA has one of the largest agrarian communities in Ibadan with many farmlands but merchandise trading activities take place at an equally high level (Yekinni&Oguntade, 2014). This study however found no influence of occupation on the assessed intervention-related outcomes at endline. It should be noted as well that this study finding bears similarity to the finding in a study by Mena *et al.* (2014) on Breast Cancer awareness among a similar population to this study (sub-urban population of women in Ashanti Ghana). In the study, carried out on behalf of a Non-Governmental Organisation called Breast Care International (BCI), the researchers reported a higher proportion of traders amongst the women in the Intervention Group of their study population (41.4%) in spite a significantly higher proportion of literate study participants (56.6%) with at least secondary education within the same group. Like in this present study, further analysis in their own study also found no influence of occupation on the intervention-related outcomes.

Another key finding in the socio-demography of the participating community women in this study was the presence of a rich social network of other women who were equally at risk of breast cancer, around the study participants. It was found that the women had an average of approximately 2 daughters and 3 sisters who had attained puberty, who were equally at risk of breast cancer.With daughters and sisters being personalities within the immediate social sphere of influence of every woman, the multiplier effect of any benefits of the breast cancer screening intervention holds promise especially as up to 86% of the women in this study at baseline and 89% at endline, expressed willingness to share their BSE training with other women. Inference of this benefit can be obtained from previous reports of the knock-on effect of social networking on health-seeking behaviour especially among women (Berkman, 1995; Elewonibi & BeLue, 2017). This was expressly discovered during FGD with a woman in EGII at Akinyele, who had five daughters and eight sisters willing to

acquire breast cancer knowledge and improve her BSE skills in order to be able to transfer the knowledge and skills to those 13 females within her immediate social network.

5.2 Source of Information about Breast Cancer and Breast Self-examination

Prior to the intervention, the FGDs conducted across the study LGAs as well as quantitative data obtained and analysed revealed the source of information on breast cancer and its screening techniques especially BSE to be mainly from mainstream media of radio/television broadcasts and radio programmes (for 62.7% of the participants) which was closely followed by information received from any type of formal health worker (for 40.4% of the participants). There was a reversal of major information source after intervention at endline with more women reporting health worker contact as a major source (87%) as against mainstream media, with significantly more women coming from EGII that had been trained by CHEWs than the other Experimental Group and the Control Group. This may be tied to the impact of the CHEWs' intervention on Breast cancer and BSE. A study by Oluwatosin and Oladepo (2006) previously conducted in Akinyele LGA (the study LGA for the community women in EGII trained by CHEWs) reported that people within community women's immediate social sphere, like neighbours and elders, tend to provide more information on breast cancer to the women, though health workers played a key role in informing women about BSE as a screening tool. Another study by Olaogun *et al.* (2017) in Ikere-Ekiti reported health workers to play a major role in informing women about BSE. The inference drawn from those studies owes much to similarity in study sample population between those studies and the current study despite the differences in study design and methodologies.

Some other external (from outside Nigeria) studies abound that recruited women to assess Breast Cancer and BSE awareness. The studies acknowledge the important roles of mainstream media (especially television) as a source of information about Breast Cancer and BSE, especially through health and wellness promoting television programmes (Dandash&Al-Mohaimeed, 2007; Al-Naggar *et al.*, 2011; Alwan *et al.*, 2012). With radio/television being a predominant source of breast cancer information in this study at baseline and second major source at endline, promoting the role of mainstream media in breast cancer control programmes reserves invaluable benefits especially as media penetration is on a progressive rise within sub-urban communities in the country. Social

media significantly played a major role as information source on Breast Cancer and BSE for participants in the Control Group, before and after intervention. This may be due to the fact that women in this group were relatively younger and had a higher overall level of education than the women in the Experimental Groups. The influence of educational attainment on source of information can be inferred from earlier reports that the more educated adults are, the more likely social media becomes a general source of information or as an alternative to traditional media sources (Uzuegbunam, 2015; Dunu&Uzochukwu, 2015).

In this study, religious bodies constituted 10% of information source on Breast Cancer and BSE for the participants. The summary implication of all these findings is that the different sources of Breast Cancer and BSE information have complementary roles and can vary from one community to another. This must be emphasized and deliberately captured in the design of any breast cancer screening programme with additional roles given to religious and traditional institutions like worship centres in educating and counselling women about their health as advised by Ifediora and Azuike (2018).

5.3 Participants' Knowledge of Breast Cancer and Breast Self-examination (Baseline)

The FGDs and quantitative data analysis of this study, revealed that overall level of knowledge was poor in all the study groups at baseline (pre-intervention). There were observed gross misconceptions about Breast Cancer and BSE with a greater proportion of participants significantly giving a wrong response about Breast Cancer and its risk factors such as advancing age, genetic predisposition, physical inactivity and obesity/overweight. There was a greater proportion of wrong responses from women in EGII compared to the women in the EGI and the Control Group. As an example, at baseline, with up to 88% of the community women in this study unaware that advancing age increases the risk of breast cancer, a significant proportion of which belonged to EGII.

It can be inferred from the Ghanaian study by Mena *et al*. (2014) that a significant number of women living in rural and semi-urban areas lack sufficient awareness of Breast Cancer and its risk factors. Mena *et al.* (2014) reported that 67.6% of rural women lacked this particular knowledge about Breast Cancer risk and its causal relationship. Another study

that examined rural community women's knowledge about Breast Cancer from South-eastern Nigeria, reported similar observations (Nwaneri *et al.*, 2017).

Other prominent misconceptions among the community women at baseline in this study include wrong notions linking infection, application of deodorants and anti-perspirants to the armpit area, and putting money in brassiere; to the occurrence of breast cancer, most of which were discovered during the bn sessions. Though older reports by McGrath (2003) and Darbre (2005) had suggested possible causal relationship between application of anti-perspirants in the armpit and breast cancer developments. However, the reports were flawed in methodology and design and are commonly considered to be very weak evidence of any link. Nonetheless, a greater proportion of women, mostly in EGII, had this wrong notion that the use of deodorants causes breast cancer.

Regarding the relationship between infection and breast cancer, the quasi-experimental study by Mena *et al.* (2014) reported that among rural Ghanaian women, up to 87.8% of the study population wrongly believed that breast cancer is caused by an infection. Also, inferring from a cross-sectional study on breast cancer knowledge among a population of women of reproductive age group in North-eastern Nigeria, Omotara *et al.* (2012) reported that 28.2% of 1600 rural women believed breast cancer to be caused by infections and other medical illnesses while another 21% associated it with spiritual attack. This study recorded up to 9% of women associating spiritual attack with breast cancer with most of them belonging to EGI and Control Groups, though no significant inter-group difference existed. Relationship between putting money in brassiere and occurrence of breast cancer was a prominent finding in the FGD from this study. The persistence of this old myth can be inferred due to an earlier report of a high frequency of the same misconception among women in Ibadan by Oluwatosin (2006) through a cross-sectional survey assessing knowledge of Breast Cancer and its early detection. Similar inferences can be drawn from other reports by Adegbenro *et al.* (2014) though Omotara *et al.* (2012) reported lower rates of similar misconceptions in their study among North-eastern Nigerian women with no clear reason given.

Overall, a poor level of knowledge about BSE was observed at baseline (pre-intervention) across all the study groups as reflected in the low mean knowledge scores, though this did

not differ significantly between the experimental groups and the control group. Molly and Mercy (2016) recorded similarly low BSE knowledge scores at the pre-intervention phase in a quasi-experimental study among Mahila Mandal rural women in Mugalur, Bangalore (India). From this study, it was observed that at baseline, there were significantly more incorrect responses given by participants to the questions on appropriate frequency of BSE routine practice, the methods used for breast cancer detection and the stages of breast cancer growth. The participants from EGII significantly contributed to the high proportion of incorrect responses given to these three questions. These findings from the FGDs and the baseline quantitative BSE knowledge data (using an exploratory sequential model of data analysis) were used to guide the design of the training manual for the RMMs and CHEWs to conduct a step-down training of the recruited women in the experimental groups, highlighting these significant wrong perceptions about Breast Cancer and BSE by utilizing key constructs of the Health Belief Model on perceived susceptibility to and perceived severity of breast cancer in the promotion of behavioural change of the women within those groups while being trained using the two approaches.

5.4 Participants' Baseline Attitude towards Breast Cancer and Breast Self-examination and Identified Barriers

Attitude to BSE implies a settled way of thinking about the screening method that includes accepting that BSE is necessary, it should be performed by all women, other women should be encouraged to get information about it, to practice it and to seek for CBE by a formal health worker when abnormalities are detected at BSE (Doshi *et al.*, 2012; Pengpid&Peltzer, 2014). Having the right attitude to BSE is a strong indicator used to assess the impact of training and educational intervention on behavioural constructs of perceived benefits of performing BSE, using the HBM model. The findings of this study showed that at baseline (pre-intervention), in spite of majority of the community women across the three study groups (89%) agreeing that Breast Cancer can be detected by oneself during BSE, a large proportion of them, most of whom significantly belonged to the Experimental Groups as compared to the Control Group; demonstrated an indifferent attitude to being comfortable to perform BSE and also to performing it on a monthly basis as required (86% and 87% respectively). This will be in sharp contrast to inferences that can be made from studies assessing attitude to BSE screening among population of women by Alwan *et al.* (2012), and Ibitoye and Thupayegale-Tshwenegae (2021) who found that

87.9% and 84.6% of women in their respective studies demonstrated a favourable attitude to BSE adoption, though both studies were of cross-sectional design. However, both studies also reported that majority of their respondents were willing to educate others on the benefits and techniques of BSE, a finding that shares similarity to this study's observation of willingness to share BSE knowledge with other women. Up to 86% of the women in this study demonstrated a good attitude of wanting to share their BSE experience with other women (significantly more of them belonging to the Experimental Groups than to the Control Group) and up to 83% disagreed with the statement that "it is not good to teach other women about BSE and how to perform it" (with significantly more women in the EGII demonstrating this good attitude compared to the Control Group). This finding reserves a huge potential for multiplier effect of any benefits derived from an educational or training intervention on BSE within the community of women who have a strong social network of other impressionable women like a good number of the women in this study have around them.

A cross-sectional study by Sarfo *et al*. (2013) found that majority (89.0%) of respondents among a sample population of women, demonstrated a good attitude toward BSE by their willingness and readiness to report and be available for medical examination (CBE) and possible treatment within a week. A positive attitude was observed in certain attitudinal domains like early reporting after detecting breast abnormality on BSE despite earlier reported indifferences in some other key domains. A large proportion of women within this study indicated their willingness not to conceal any abnormal finding in the breast and to report such finding at the nearest health facility and this good attitude was not significantly different between the Experimental groups and the Control group. This finding can be regarded as a positive attitude by drawing inference to a report that an attitude of early reporting of any strange thing noticed in the breast area is said to be effective at reducing breast cancer morbidity and mortality rate (Ogunbode *et al.*, 2013).

A possible reason for some of the observed positive attitudes of respondents in this study towards BSE could be inferred from studies by Oztürk *et al*. (1999) and Ginseng *et al* (2012). These studies suggested that with BSE being generally accepted to be cheap, painless and easy to conduct; it is easier to convince women residing in resource-constrained settings about its benefits in early Breast Cancer detection. Despite the observed poor overall knowledge in this study, the presence of a positive attitude of early reporting

bodes well for any planned intervention to improve BSE adoption and practice as previously inferred by Ifediora and Azuike (2018).

In quantitative terms, the overall pre-intervention (baseline) mean attitude scores to Breast Cancer and BSE was observed to be poor in the current study ranging from 4.54±1.07 to 5.15±1.86 out of 14 with no significant difference between the Experimental Groups and the Control Group. An observed major perceived barrier among the community women to having a good attitude to BSE adoption and practice appeared to be the fear of the unknown emanating from possibility of finding a lump or other signs of Breast Cancer when they examine their own breast by themselves. This is exemplified by the fact that despite 89% of the respondents agreeing that Breast Cancer can be detected by oneself during BSE, up to 79% of the respondents still harboured fear of detecting Breast Cancer if they did a BSE. Ifediora and Azuike (2018) recorded a proportion of 19% of their study participants nursing fear of finding Breast Cancer if they did BSE. It was recorded during several FGD sessions that a number of respondents argued that "*what one doesn't know, doesn't kill one*" while another batch mentioned that faith in God was a key source of protection against Breast cancer and not BSE with such remarks as *"In my opinion, once you pray hard, you leave all your affairs to the Almighty God. The hands of the enemies can never overcome you. Therefore, you will be immune to BC. So no need to be practicing regular BSE"*. Similar findings characterized other studies assessing women's attitude to Breast Cancer and BSE use for cancer screening (Pilehvarzadeh*et al.* 2015; Mekonnen and Asefa, 2019). This observed poor attitude to aspects of BSE may have contributed to calculated low overall mean attitude scores at baseline (pre-intervention). In the design of RMM and CHEW training manual, the identified barriers and specific poor attitudinal items were addressed to target behavioural changes guided by the HBM.

5.5 Respondents' Baseline Practice of Breast Self-examination and Identified Barriers

Effective practice of BSE has been found to be a significant contributory factor to the reduction of breast cancer morbidity and mortality, especially in resource-challenged settings (Ezeome, 2010; Awofeso *et al.*, 2018). The findings of this study revealed at the baseline level that just about half of the respondents practiced BSE but majority at irregular intervals with no observed difference between the women in the Experimental Groups and those in the Control Group. A similarly poor BSE practice can be inferred from a study by Ojewusi and Arulogun (2016) that reported that among selected urban women in Ibadan,

only 36.2% had ever practiced BSE and of these, only 27.6% were doing it monthly. A similar inference can be drawn from a much older Experimental study by Oluwatosin and Oladepo (2006) which concluded that BSE awareness was low among Nigerian rural women and that low awareness was a forerunner to the observed low level of practice. Al-Azmy *et al*. (2013) and Molly and Mercy (2016) ascribed poor BSE adoption and practice to lack of the requisite knowledge and skill to carry out self-examination.

In the current study, the mean BSE practice scores were low at baseline (pre-intervention) in all the groups with no significant difference between the scores in the Experimental Groups and those in the Control Group. This is despite the earlier discussed high average level of educational attainment among the participants in this study especially those in the Control Group, at baseline. This may imply that the lack of knowledge of the steps to follow in performing BSE appropriately may have constituted a major barrier to adequate practice of BSE among majority of the participants in this study. Inferring from studies by Akpo *et al.* (2010) and Al-Azmy *et al.* (2013) that assessed women's practice of BSE, it was noted that a large proportion of women did not know the correct ways and steps of performing BSE appropriately. In this study, majority of the questions on the steps involved in performing BSE elicited incorrect responses from the participants at baseline. Specifically, only four out of the 10 steps viz steps 1, 4, 5 and 6, recorded proportions of participants less than 90% with incorrect responses and in fact, no step recorded proportion of women with incorrect response that was less than 80%. There was no significant difference between the women in the Experimental Groups and those in the Control Group concerning these wrong BSE practices. This abysmally poor BSE practice among the participants was equally pronounced during the FGDs conducted within the study groups in the pre-intervention phase, with several wrong assumptions recorded most notably those related to positioning and step-wise approach to conducting the examination. In some other studies where poor practice of BSE has been reported, such finding was attributed to the level of education of the respondents as well as that of their partners. For instance, Pilehvarzadeh *et al.* (2015) inferred that performing BSE is significantly related to higher level of educational attainment. In other words, women with higher levels of education tend to practice BSE more than those with a low level of education.

5.6 Effects of Training Approaches using RMMs and CHEWs on Knowledge, Attitude and Practice of BSE (Comparison of Baseline to Endline)

Following the intervention using the two step-down training approaches conducted by RMMs and CHEWs in EGI and EGII respectively, the observed effects of the designed intervention at endline are discussed below.

5.6.1 Effects of RMMs and CHEWs Training on Endline Knowledge in EGI and EGII Respectively

This study found that respondents' overall knowledge improved at endline (post-intervention) in all the study groups. Baseline to endline improvement in mean knowledge scores was significant in all the groups. Invariably, there was a significantly higher mean knowledge score among women in EGI after training intervention by RMMs than those in EGII who were trained by CHEWs and also a significantly higher mean knowledge score among the women in EGII trained by CHEWs compared to the untrained women in the Control Group. This implies both training approaches significantly increased the knowledge of the respondents on Breast Cancer and Breast Self-examination. This impact of a structured training approach that employs the HBM construct to significantly improve the knowledge of women about BSE had been previously reported by others not only in older but also in more recent works (Oluwatosin & Oladepo, 2006; Rai & Kaur, 2015; Molly & Mercy, 2016). The difference in the context of this study is the novelty of this study approach which utilizes RMMs and CHEWs to drive the structured step-down training of the women. Exploring further details of the impact of the training approaches in the experimental groups, some key individual knowledge items showed proportional increase in positive response among respondents after the training intervention. For instance, the percentage of respondents who knew that "the finding of nipple retraction on performing BSE may be a sign of breast cancer" increased from 64.3% of respondents in the baseline to 76.7% at endline with major contribution from the experimental groups. Similarly, the percentage of respondents who knew that "the presence of a lump in the breast is a strong sign of breast cancer" increased by about 10% following the intervention. Studies by Cohen and Azaiza (2010) in Saudi-Arabia, Chan *et al.* (2007) in Hong-Kong, Erwin *et al.* (2011) in Kashmir, as well as Zeinomar and Moslehi (2013) in New York, all of which were community-based interventions, had reported positive trends in participants'

overall knowledge of breast cancer screening post-intervention as can be inferred from this current study.

Specifically, the stepdown training by RMMs had significant impact on enhancing the knowledge of Breast Cancer and BSE among the community women participants (EGI) they interacted with in Ido LGA for the 6-month period of intervention. Gupta *et al.* (2009) have shown the benefit of health education of women using Information, Education and Communication (IEC) techniques on their knowledge, awareness and readiness to adopt BSE for breast cancer screening. The approach of using trained volunteer women to achieve preventive breast cancer screening health education of community women, especially utilising BSE as the screening tool, has been recently reported to be effective in urban settings by Memon *et al.* (2019). In that quasi-experimental study carried out in Ahmedabad (India), trained volunteer lay health workers referred to as Accredited Social Health Activists (ASHAs) demonstrated ability to receive and transfer information about BSE as a Breast Cancer screening method, to community women within their catchment areas in order to improve their knowledge and practice of BSE. The study emphasized need for training and retraining of the ASHAs in not only improving their BSE knowledge but reinforcing their behaviour and attitude to it with a potential for them to strongly influence the knowledge and practice of their women trainees. Mane *et al.* (2014) had earlier espoused the benefits of having the ASHAs as informal primary healthcare volunteers if they could be provided a formal and structured training as well as periodic supervision, in order to create a stop-gap measure to fill the vacuum created by personnel shortage of formal primary healthcare staff, particularly for children and women in underserved communities in India. The ASHA policy was formally adopted in India in 2017 (Memon *et al.*, 2019). Back in Nigeria, earlier reports by Ajayi *et al.* (2008) and Adeneye *et al*. (2013) had indicated that the intervention of lay health workers like Role Model Mothers has significant effect on the knowledge of women on malaria prevention and treatment in rural and largely underserved communities. This is further buttressed by the submission of Hartford *et al.* (2008) who posited that one important and useful area of informal health workers (like RMMs) is specifically the screening for breast cancer as a result of shortage of trained personnel who can deliver breast health services. However, the lack of appropriate training by the lay health workers was considered to limit the effect their role could have on the knowledge of the people they train. The emphasis of the approach of using RMMs for stepdown training of community women within their catchment is premised on conducting

regular training and retraining of the RMMs as a vehicle for BSE knowledge dissemination in order to achieve positive reinforcement.

The finding of positive improvement in the overall mean knowledge score among participants trained by the CHEWs also points to the usefulness of formal health worker's engagement in community-based health education programs on Breast Cancer screening. Utoo & Chirdan. (2012) found that the percentage of Community Health Workers who knew how to perform BSE (87%) was more than those who had the ability to teach their clients (75%), which suggests that any benefits in knowledge improvement experienced by clients is related to active engagement of the CHEWs in a deliberate process of BSE client training. Hartford *et al.* (2008), Daniel *et al.* (2016) and Aluko *et al.* (2019), at different times, had reported deficiencies with knowledge, competencies and performance of CHEWs working in the often deficient Primary Healthcare system in Nigeria, which was conceived to serve the majority of the grassroots population. Staff shortages, lack of periodic retraining and continuous education, loss of motivation and task shifting have been reported as certain factors that mitigate optimal performance by CHEWs (Uzondu *et al.*, 2015; Aluko *et al.*, 2019). The impact of knowledge improvement ascribed to CHEWs in this study will only be applicable to real life situation in practical terms, if they can be specifically deployed to carry out this task of improving BSE awareness using established methods of knowledge dissemination like Information, Education and Communication (IEC) especially on contact with their clients as advised by Gupta *et al.* (2009). Furthermore, their involvement should also be extended from facility-based interventions currently in practice to home- or community-based BSE training as employed in the design of this study.

Summarily, the study found that at the post-intervention stage, RMMs appeared to improve the mean knowledge score of the respondents in EGI about breast cancer and BSE screening more than the improvement in same scores achieved by the CHEWs with the women in EGII. There was a 200% proportional increment in the number of women who had good knowledge about BSE among those in EGI trained by RMMs, from baseline (24.8%) to endline (76.6%). Similarly, the CHEWs were only able to achieve a little over (100%) proportional increment in the proportion of women they trained who had good knowledge at endline (28.2% at baseline rising to 60.2% at endline). Though, both training approaches showed ability to improve knowledge in the women when compared to the untrained

women in the control group, there was however, no observed difference between the impact of the RMMs' trainings and those of the CHEWs in improving recruited community women's individual knowledge item and overall knowledge level about Breast Cancer and BSE. This implies that either or both approaches reserve the benefits of improving Breast Cancer and BSE knowledge and as such, either or both can be employed in any community level home-based BSE educational programme. The determination of the additive or complementary effect of combining both approaches for the same purpose is beyond the scope and objectives of this current study.

5.6.2 Effects of RMMs and CHEWs' Training on Endline Attitude in EGI and EGII Respectively

Another objective of this study was to determine the effect of the two stepdown training approaches on the attitude of the respondents to BSE adoption for Breast Cancer screening. Previous studies conducted by Hatefnia *et al*. (2010), Ceber *et al.* (2013), Eskandari-Torbagha *et al.* (2014), and Masoudiyekta *et al.* (2018) have revealed that people generally have positive attitude to health-related activities when they are engaged by, and receive guidance from trained personnel. On a general note, the findings of this study revealed an improvement at endline in some individual attitude items recorded as negative at baseline as well as an increase in overall mean attitude scores from low levels at baseline to higher levels at endline among the community women trained by RMMs in EGI at Ido LGA and those trained by CHEWs in EGII at Akinyele LGA. This overall improvement in mean attitude scores was significantly higher in the Experimental Groups than the marginally better increment seen in the Control Group at endline. This finding draws inference from similar findings by Ayed *et al.* (2015), Pilehvarzadeh *et al*. (2015) and Mekonnen and Asefa (2019) who all reported that majority of the women they studied had positive attitude towards BSE after training intervention. There was an overall improvement in many of the positive reinforcement attitude items of the HBM constructs suggesting improvement in participants "*perceived benefits"* and overall reduction of participants *"perceived constraints"*. There was a marked higher improvement in 7 of the positive attitude items with a significantly better attitude, and increased awareness and motivation to practice BSE by the trained women in the Experimental Groups than the untrained women in the Control Group. With the earlier reported finding of an improvement in post-intervention knowledge, this singular finding relating to positive attitudinal change among the participants in the

Experimental Groups can explain any observed improvement in practice as discussed in another section 5.6.3. Several educational experimental studies on BSE and Breast Cancer Screening have reported that improvement in attitude to BSE adoption parallels improvement in post-intervention practice of BSE when both are preceded by improvement in knowledge and awareness of the screening tool. These include studies by Chan *et al*. (2007), Soyer *et al*. (2007), Erwin *et al.* (2011), Mena *et al*. (2014) and that by Molly and Mercy (2016).

Amoran and Toyobo (2015) found that rural women attending antenatal clinics in south-western Nigeria reported statistically significant better knowledge and attitude to BSE practice with previous breast examination experience like a previous CBE or BSE. The women reported overcoming negative barriers to BSE adoption after undergoing an examination, either CBE or BSE. It will appear the fear-related factor associated with BSE practice that created a huge barrier to attaining good mean attitude scores by majority of the women in the experimental groups at baseline, as identified during the FGDs, had been tremendously allayed in the course of the training by the RMMs and CHEWS during the 6-month intervention phase. Other studies like those of Tuzcu *et al.* (2016); Savabi-Esfahani *et al*. (2017), Esfahani *et al*. (2018), and Nisha and Murali (2020) reported the effect of training intervention involving self-demonstration by participants as being able to enhance motivation and attitude to BSE adoption and in turn achieve and retain positive behaviour to BSE practice. This training approach was adequately captured in methodological design of the training interventions in this study.

Though among the experimental groups, between baseline and endline, the proportion of women with better attitude was observed among the women in EGI trained by the RMMs (48% at baseline rising to 80% at endline), there was however no difference between the influence of RMMs on community women in EGI at Ido LGA and the CHEWs on the women in EGII at Akinyele LGA; in terms of the extent and level of improvement in post-intervention attitude to BSE adoption and will to practice it. It means either of the training approaches has its inherent benefits and using either or both holds promise in enhancing breast cancer control programmes at the community-level.

5.6.3 Effects of RMMs and CHEWs' Training on Endline Practice in EGI and EGII Respectively

Though at baseline, there was no significant difference in the mean practice score among women in the Experimental Groups compared to those in the Control Group, the study found that the training intervention from the RMMs and CHEWs had significant influence on the practice of BSE among the women trained in the respective Experimental Groups when compared to the untrained women in the Control Group. This is in spite of a significant improvement in all the BSE practice items among women in all the study groups at endline (post-intervention).

An important highlight was the overall improvement in the manner of performing BSE at the post-intervention level particularly among the women in the Experimental Groups. As mentioned previously, a review of the pre-intervention practice analysis concluded that almost all the respondents did not know how to correctly conduct the 10 step-wise BSE techniques. This was equally a prominent finding in the conducted FGDs and it formed a major fulcrum of the training manual design for the two training approaches. The finding of poor knowledge about BSE steps mirrors a statement by Akpo *et al*. (2010) that a major proportion of women do not know the correct way of performing BSE. In contrast, post-intervention study finding revealed a significant increase in the proportion of women who could conduct the 10 steps of the BSE correctly especially among the women in the two Experimental Groups. In addition, the findings of this study showed that the women in EGI (trained by RMMs) performed the BSE steps more correctly than the women in the EGII and the untrained women in the Control Group. This could imply that RMMs are more impactful at training of women in their selected areas probably because of consistency and dedication. It must be mentioned that in the course of the intervention phase, some of the CHEWs occasionally defaulted the training schedule by not following the weekly schedule of training, citing reasons such as conflict of the study training schedule with other assigned tasks like pre-scheduled assignments of national immunization day which clashed with two of their training days in the course of the intervention phase of this study as well as other task shifting-related burden. This occasional inconsistency and the already suspicious relationship between CHEWs and their clients within their service communities has been reported by Uzondu et al. (2015) as a major limitation with the approach of using CHEWs to conduct home-based rather than facility-based interventions. The majority of the study

participants in the Experimental Groups maintained an ongoing BSE routine practice at endline in contrast to findings at baseline when less than half of the respondents in those groups regular performed BSE. Overall, the percentage of respondents who performed BSE at the post-intervention stage in this study was found to be higher compared to the percentage of respondents in other Experimental studies like those by Oche et al. (2012) and El Ftta Alli and Hussien (2018). There was however similarity of this study's outcome with other quasi-experimental study by Masoudiyekta et al. (2018) that was conducted among community women in Dezful, Iran, with an HBM design model. Overall, this study found that larger percentage of respondents (up to 79%) improved in their performance of BSE as a Breast Cancer screening method at the post-intervention stage.

Another important finding from this study is the significant aggregate and relative increment in the overall mean BSE practice score from baseline (before intervention) to higher levels at endline (post-intervention) in all the study groups. However, while there was a marginal increment in the mean BSE practice score of the untrained women in the Control Group from baseline to endline, that of the women in EGII trained by CHEWs doubled while those of the women in EGI trained by RMM tripled. There was also a 700% increment in the proportion of women whose practiced BSE correctly among those trained by RMM in EGI, from baseline to endline (7.1% at baseline rising to 57.3%). In the same vein, the number of women trained by CHEWs who practiced correctly at endline only improved by a little over 300% at the end of the training (12.6% at baseline rising to 53.4% at endline). These observed inter-group differences in BSE practice level improvement was also found to be significant. Furthermore, majority of the women demonstrated improvement in endline frequency of BSE performance (every day, weekly and monthly) as opposed to once or twice in a year. Equally, the proportion of women who practiced BSE in the twelve months prior to the study increased by 28.8% at the endline from the baseline figure of 50.7%. The trained women in EGI (by RMMs) formed the majority of women who performed BSE in the correct sequence and at the right frequency, followed by the trained women in EGII.

5.6.4 The content and context of the designed intervention (RMMs and CHEWs) on the comparative advantage and influence of each group

Breast cancer has been noted as one of the diseases with high morbidity and mortality rates among women all over the world. To reduce its effect on the health of women, especially in resource-challenged areas, BSE has been identified as one method that is cost-effective and efficient at detecting breast cancer in its early stage in women. Therefore, the practice of BSE is suggested to be encouraged among women to reduce breast cancer morbidity and mortality rate. This study found that the practice of BSE significantly improved among the respondents that were exposed to training from RMMs and CHEWs when compared to untrained women in the Control Group. However, in directly comparing the effect of the two training using the main outcome variable of improved practice, the RMMs had a better influence on the community women in EGI than the CHEWs had on the community women in EGII. The use of BSE practice as the main intervention outcome variable is to ensure an objective demonstration of cues to action about Breast Cancer Screening using BSE according to HBM construct.

From the foregoing discussion in 5.6.3, the training of women by RMMs and CHEWs significantly improved the two measures of BSE practice i.e. the adoption of regular BSE practice and the appropriate step-wise performance of BSE. It also implies that in directly comparing the two training approaches, the training by RMMs achieved better practice of community women, using the same two measures. Though previous reports (Danile *et al.* 2016; Aluko *et al.* 2019) have indicated a major influence of CHEWs on client education, the benefits of trained volunteer laywomen in community-based Breast Cancer control efforts cannot be overemphasized. In a previously found from a pilot study conducted in two rural counties of Gezira State in Sudan by Abuidris *et al.* (2013). One county had village women who had volunteered to partake in a training to enhance their skills in Breast Cancer Screening deployed for house-to-house screening of women. The study concluded that employing local women volunteers for breast cancer screening programme can significantly increase the detection of breast cancer in asymptomatic women particularly in low-income and resource-constrained rural communities. This corroborates the view of Dohan and Schrag (2005) who noted that the presence of lay-health workers (like RMMs) in their community would more likely enhance the follow-up of prescribed disease preventive and treatment measures among community women. There is likely to be a better

understanding between these RMMs and the members of the community who trust them as mature and experienced mothers. Such trust often translates to compliance with instructions from RMMs and is believed to save the women some waiting hours to be spent in the clinics and other formal healthcare settings, trying to consult formal health workers.

Similarly, with the confirmation of the effectiveness of the activities of lay-workers, especially RMMs in the reduction of malaria morbidity and mortality in Nigeria with the Roll Back Malaria programme (Adeneye *et al.*, 2013). Based on this report, it is not surprising that the RMMs in this study influenced the behaviour of women in the selected areas to not only practice BSE but to also improve in the frequency at which they performed it. In comparison to the RMMs, the lower level of influence of the CHEWs in the practice of BSE among women in the current study could be due to knowledge deficit among CHEWs as alluded to by Uto *et al.* (2012) that only 30.8% of the selected CHEWs in Plateau State (Nigeria) knew how frequently BSE should be performed. That study also reported a decline in the percentage of CHEWs who knew how to perform BSE and those who had the ability to teach the practice to their clients. Other authors such as Miller (2008) and Mitrra *et al.* (2010) have strongly suggested that CHEWs should be well trained on the proper way to examine the breast in both the theoretical and practical ways, using a standard breast cancer screening protocol. This is because of the BSE knowledge paucity observed among some community health workers. Some of the reasons for lower level of CHEWs influence on women's practice of BSE could be the huge burden of responsibility and inability to provide a consistent interaction with their clients. This may be as a result of task shifting as mentioned earlier or a result of CHEWs shortage, creating an imbalance in the ratio of CHEWs to clients in the country. Previous studies have acknowledged that though many CHEWS are trained and released into the labour market every year in Nigeria, personnel shortages still exist especially in remote locations and rural settings. CHEWs are rarely retained in rural settings with many preferring to settle in urban cities (Fagbamigbe & Idemudia, 2015).

5.7 The usefulness of the Health Belief Model in the study

In this study, the Health Belief Model (HBM) schema that was used created a reproducible platform for assessment and follow-up of Breast Cancer and BSE interventions within the study groups and enabled interphase comparison between the Experimental Groups and the

Control Group using a consistent and measurable tool that indicated either a positive or negative behavioural change at any phase of the study. An example is the construct of perceived breast cancer susceptibility and severity which was assessed within the 29-item knowledge scale of the study instrument with clear demonstration of lower perceptions in both Experimental Groups at baseline relative to the Control Group. This enabled ease of identification of improper perceptions with greater emphasis given to them during RMM and CHEW training in the Experimental Groups in the intervention phase. This must have translated into the observed improvement in the endline perception scores using the same scale in both groups relative to the Control Group that received no training. Other HBM assessments done within this study were perceived benefits and perceived constraints or barriers to adopting BSE, which was measured within the 14-item attitude scale; and stepwise BSE self-efficacy and cues to act on acquired breast cancer and BSE knowledge that was assessed using the 12-item practice scale.

There is paucity of community-based literature using HBM to compare BSE training approaches by Role Model Mothers versus CHEWs especially employing a quasi-experimental design. Nonetheless, some previous breast cancer screening non-community based studies that employed the HBM model concluded that among all the HBM constructs, perceived barriers remained the only predictor of possible behavioural change. Simiarly, Eskandari-Torbaghan *et al* (2014) in a similar study, found an 18% increase in behaviour score with every slightest improvement in this variable by. This was similarly reported by Mousavi *et al*. (2018) who also concluded in their own study that perceived barrier was the single most important construct for predicting behavioural change following a breast cancer screening intervention. In this study, identified barriers to BSE adoption and proper practice included fear of finding a lump and lack of knowledge of the steps in performing BSE appropriately. Both were built into the study instrument with higher contribution to cumulative scores for assessing positive or negative attitude, and good or poor practice, on the attitude and practice scales respectively. It was observed that at endline, there was a proportional improvement in the number of women who demonstrated positive attitude through lack of fear to perform BSE and adequate knowledge of its step-wise performance. This suggests the usefulness of the HBM in educational interventions designed to improve women's behaviour to breast cancer screening programmes.

5.8 Effect of socio-demographic variables of community women on their knowledge, attitude and practice of Breast Self-examination

Specific socio-demographic factors influencing the endline outcomes are reviewed below:

5.8.1 Community women's Socio-demography vs endline level of Knowledge

Findings of this study showed that some key socio-demographic variables influenced the knowledge outcomes on breast cancer and BSE among the respondents. One of such key parameters was the influence of the participants' level of educational attainment on their knowledge about Breast Cancer and BSE at endline. Also, marital status of the respondents was found to have influenced participants' knowledge at baseline and endline. Majority of the respondents who had the highest marginal mean increase in knowledge at the endline were found to be in the EGII (anchored by the CHEWs). The findings also revealed that respondents who had the tertiary education across the three groups showed significant increase in their knowledge of breast cancer and BSE. Majority of this cohort were found to be in EGI and the EGII. The result of this study is consistent with the findings of Ayed *et al.* (2015) who reported that women who had attained higher level of education demonstrated good knowledge of breast cancer and BSE, and that they tended to perform BSE more than women with lower levels of education. Similarly, Pilehvarzadeh *et al.* (2015) observed that educational level of respondents and that of their partners have significant influence on the knowledge of respondents. They opined that respondents with higher level of education and whose partners also have higher level of education demonstrate good knowledge of breast cancer and BSE.

5.8.2 Community women's Socio-demography vs endline attitude to BSE

The study further revealed that educational level and marital status were the socio-demographic variables that had the most significant effect on the attitude of the respondents in all the groups. The participants who had attained tertiary education were found to have positive and favourable attitude to breast cancer screening and BSE across the three groups (EGI, EGII and CG). Although, the highest marginal mean was observed among the respondents who had primary education in the EGII, the overall significant level showed that a more positive attitude was demonstrated among respondents with tertiary education. Similarly, marital status of the respondents was found to influence their attitude to BSE. Findings revealed that higher marginal mean score was observed among the married women

and widowed in all groups. The influence of higher educational attainment and current or previous marital experience on positive attitude to BSE adoption found in this present study are consistent with earlier reports by Sarfo *et al.* (2013) and Ayed *et al.* (2015) who submitted that there exists a significant relationship between the level of education of women, their marital status and positive attitude to BSE.

5.8.3 Community women's Socio-demography vs endline level of Practice

Furthermore, it was found that level of education and marital status had significant effect on the practice of BSE among women in all study groups. Across the three groups, respondents with tertiary education were found to practice and follow every step of BSE more than others in whichever study group they might belong to.

In addition, marital status was found to significantly impact BSE practice. The study found that the married and the widowed among the respondents practiced BSE more than respondents who were yet to get married at the time of the study. On the relationship between marital status and practice of BSE among the three groups, findings showed that women in the CG had the highest estimated marginal mean practice score among the single and widowed women while respondents in EGII had the highest marginal mean among the married. Consistently, the findings revealed that the married and the widowed in all the groups practiced BSE more frequently than the single participants irrespective of their group. This implies that the level of education and marital status have significant effect on the practice of BSE among the married, the widowed and those with tertiary education. This finding is also consistent with that of Ayed *et al*. (2015). Although, the percentage of respondents who practiced BSE in the Ayed *et al*.'s study was low compared to the percentage of respondents who practiced BSE in this study, they similarly found that there is significant relationship between the level of education and the adoption and practice of BSE among their respondents.

That study also found that respondents with tertiary education practiced BSE more than respondents with lower levels of education. Another study by Sarfo *et al.* (2013) found that respondents with higher level of education performed BSE more properly than respondents with lower level of education. Similarly, Olaogun *et al.* (2017) found that there is significant relationship between marital status, educational level and practice of BSE. They asserted

that females who were married, divorced or separated, and those with formal education knew how to perform and practiced BSE more than the unmarried and uneducated females in their study. Despite the significance in difference in occupation between the study groups at baseline and endline, the study did not find that the women's occupational type significantly influenced the knowledge, attitude or practice of BSE in the participants. This is corroborated by Moey *et al*. (2020) in their study among women in Malaysia.

5.9 Implications of Findings for Health Promotion and Education

The novelty of this study is that it engaged two different approaches to conducting a step-down training for community women either by Role Model Mothers (RMMs) or by Community Health Extension Workers (CHEWs), thereby equipping the trained women with adequate knowledge and skills to regularly perform Breast Self-examination (BSE) on themselves in the most appropriate way that will increase their chance of detecting breast cancer in the early stage. The "*do it yourself"* strategy justifies the definition of health promotion as described by the World Health Organisation (2006). The strategy's purpose is to enable people to increase control over their health and its determinants, and thereby improve their own health. Equally, the study encouraged the trained community women to utilize their newly acquired knowledge on Breast Cancer and BSE, and newly acquired skills on step-wise BSE performance to positively influence other at-risk women within their sphere of social influence (e.g. Daughters, sisters, other female relatives, friends, co-workers and colleagues etc.), to take up routine performance of BSE as a tool for breast cancer screening, thereby achieving a multiplier effect of the study.

The Health Belief Model used in the study design has a unique approach and peculiar methodology. These features of HBM ensure the bridging of the gap from Perceived Susceptibility and Perceived Threat of Breast Cancer, and Perceived Barriers to using BSE for early detection to taking Cues to action by performing BSE routinely in the appropriate manner. The model also sustains the Perceived Benefits by employing the "Social Diffusion Model" as espoused by Karlova and Fisher (2013) to expand and cement these Perceived Benefits of BSE in early breast cancer screening to achieve a multiplier effect of the benefits of the intervention within a wider section of their sphere of social influence. This potential benefit of the approach employed by this study and the cross-over between the Health Belief Model and the Social Diffusion Model has implications for future policy

direction of health promotion interventions and programmes targeting Breast Cancer Control at a community level in Nigeria and other similar settings around the world.

Secondly, the strategies adopted in the study intervention targeted achievement of primary and secondary prevention of Breast Cancer (BC). Primary prevention of diseases implies a set of interventions that ensures a disease does not occur at all (World Health Organisation, 2015). The study achieved this by promoting breast cancer prevention primarily by emphasizing the risk factors associated with developing BC; empowering and educating the community women on healthy choices and lifestyles to adopt during the pre-intervention and the intervention phases.

It is worthy to mention that during the period of this study, three out of the study participants and five other random community women (friends and relatives of the participants) reported anomalies in their breasts. They were referred to a target Consultant Oncological Surgeon at the University College Hospital Ibadan for CBE, further investigations and treatment. The three women in this cohort had the presence of breast lumps confirmed by CBE and subsequently had excision biopsy of the lumps which all returned as benign tumours. Unfortunately, two others declined further investigations and all efforts by the Principal Investigator and Project Supervisor to convince them to seek further care proved abortive.

5.10 Policy Implications

The roles of CHEWs and RMMs have been highlighted in this study with both groups achieving the purpose of using them for the training to enhance BSE adoption and appropriate practice among community women. While CHEWs are already formally deployed in many rural and semi-urban communities in Nigeria, they are much fewer than required to achieve a community-based intervention programme on a sustained basis. There is another issue of CHEWs' conflicting responsibilities with other equally important public healthcare and health promotion engagements like antenatal and immunization programs. This calls for an alternative albeit informal health promotion and education group like RMMs. These RMMs can be easily found in every community in most parts of the country and are capable of effectively substituting for CHEWs on breast cancer screening at the community level.

The current National Cancer Control Plan (2018-2022) referred to as the ICCP is a desk under the Federal Ministry of Health (FMOH). The current plan is yet to develop a model national plan for community-based breast cancer screening. The findings from this study could be taken into consideration when such model is being designed in the future by the legacy ICCP or any offspring cancer control agency. Also, different sub-national cancer control bodies or agencies can take a cue from these study findings to evolve new strategies and policies that takes into strong consideration the important short, intermediate and long-term roles that Role Model Mothers can play in Breast Cancer control programmes.

In addition, all the numerous and prospective Non-governmental Organisations (NGOs), actively involved at the community level in Breast Cancer prevention programmes can also engage this untapped pool of informal human resource (i.e. the Role Model Mothers) to fill identified health resource vacuums at the local levels, in the design of their numerous interventions.

5.11 Summary

This study reveals the necessity for interventions to promote breast cancer awareness and BSE at community levels. The study was carried out to compare the effectiveness of two separate training interventions (by the CHEWs or by the RMMs) on breast self-examination for breast cancer detection among women in semi-urban LGAs in Ibadan. The third LGA served as the Control Group. Three hundred community women were recruited through multi-stage sampling technique into this study across the three LGAs (100 women per LGA). The criteria of being female with age ranging between 18 and 60 years, and permanent residency in the community were considered.

The selected LGAs were assigned into Experimental Groups and Control Group by balloting. Two separate interventions by the CHEWs or by the RMMs were used to promote Breast Cancer awareness and BSE for a period of six months in each of the experimental groups. Ten RMMs in EGI and 10 CHEWs in EGII conducted a weekly training for community women on BSE for six months in form of lectures, drama, step-wise demonstrations and return demonstrations using breast models. Post-intervention evaluation was conducted on the community women in the three study groups using the same instrument as baseline.

Highlights of the findings of the intervention revealed:

- Poor level of knowledge, poor attitude and poor practice of BSE (lowest in EGII) among women in Ibadan at baseline which increased at endline across the three groups
- The two Experimental Groups recorded statistically significant improvements in the level of knowledge, in positive attitude and in better practice of BSE at end line
- The RMMs were more effective vehicles for BSE training interventions at community levels than the CHEWs

This study validates the conceptual framework of the Health Belief Model. It typically demonstrates and explains why the study participants in the experimental groups did not practice BSE. At baseline, when the mean scores knowledge and attitude of the community women on BC and BSE were low, majority of the participants did not perceive themselves as being susceptible to developing BC. They also did not perceive BC as a severe illness and gave a wide range of excuses to non-performance. However, at post-intervention, when the mean scores of knowledge increased, it had a resultant effect on attitude and practice of the community women. They demonstrated a better self-efficacy because they were equipped with the knowledge and skill of BSE. The HBM helps to explain and predict BSE with a guide development of a fool-proof approach.

The findings of this study acknowledge the efficiency of the RMMs as a better channel for promoting and training community women on BSE. Considering this fact, it is recommended that the activities of the RMMs be formally integrated into health care delivery system of Nigeria and their activities should be scaled up to state and national levels.

5.12 Conclusion

This study elucidates the effects of two different training approaches (by Role-model mothers versus by the Community Health Extension Workers) and their effects on the knowledge, attitude and practice of Breast self-examination as a tool for early detection of Breast cancer. There was a general poor knowledge about Breast cancer and BSE; poor attitude to doing BSE and wrong practice of BSE among all the women recruited at baseline, irrespective of the group. There existed a lot of wrong notions and myths among the women tied to their poor scores on the knowledge, attitude and practice scales utilized in

quantitatively assessing these women at baseline. Majority of women in the two experimental Local Government Areas recorded remarkable improvements in knowledge, had better attitude and demonstrated better practice of Breast self-examination, after the intervention especially when compared to the women in the control group who received no trainings. However, a number of myths and misconceptions still persisted among the trained women despite the intense training they went through for a 6-month period.

Generally, across these two experimental groups and even the control, this study created awareness and made the entire population more conscious about changes in their breast and made them more "breast aware". This was evident in the post-training feedback by the respondents in the expeimental groups. The effectiveness of the two training approaches using Role-model mothers and Community Health Extension Workers, was apparent at the end of the study indicating the existence of a huge potential by both groups of trainers, to conduct a step-down- training on Breast Self Examination and to overcome barriers to BSE adoption and practice. However, the women trained by the Role model mothers recorded a better performance of BSE practice (in terms of the correct frequency of practice and the skills to demonstrate accurate step-wise examination) than those trained by the CHEWs. This has finally established the answers to the research questions stated at the conception stage of this study. It has also provided answers to the hypotheses postulated at the initiation of this study. With Role-model Mothers being ubiquitous in many societies and women in many societies still unaware of how to achieve early detection of Breast cancer, tapping into this readily available human resource (the Role-model Mothers), has a strong chance to help mitigate the poor outcomes that attend late presentation of Breast cancer among women in semi-urban and possibly in urban societies in Nigeria. This has a potential to improve the abysmally poor Breast cancer statistics that the country currently has.

5.13 Recommendations

In view of the findings of this study, the following proposals are hereby recommended:

1 The information generated from this study due to its novelty should be disseminated in and propagated through all possible media outlets.

2 A state policy should be established to incorporate educational programmes on BSE as part of other community-based health intervention programmes.

3 The government of Oyo State should recognise and formalise this category of largely untapped human resource pool of Role Model Mothers (RMMs) and harness their potential usefulness by integrating them into the health service delivery system towards achieving a better capture for health care service delivery. This approach should be used as a fulcrum to influence similar settings in other states and at national levels.

4 The Local government should have cancer desks responsible for documentation, diagnosis, treatment and management of cancer similar to the current status afforded HIV/AIDS in the healthcare schema. This should translate to better structure, funding and output.

5 Non-governmental Organisations should utilise the important findings from this study to develop impactful breast cancer control programmes at the community level. This should be done through massive publicity to the major stake holders and decision makers in such organizations.

5.14 Suggestions for Further Studies

(i) This study should be expanded and replicated to other regions of Nigeria so as to assist policy makers, government and non-governmental agencies in identifying its usefulness in addressing other breast cancer screening peculiarities that are unique to different parts of the country.

(ii) Further studies should investigate the effect of spousal involvement in promotion of BSE in comparison to RMMs and CHEWs.

(iii) Also, further studies should investigate the effect of a combination of both training approaches (RMM plus CHEWs) compared to stand-alone training approaches employed in this study.

(iv) Further studies should be conducted to determine if routine use of RMMs for BSE training in local communities will complement or complicate existing CHEWs' efforts in that regards.

(v) This study was conducted in semi-urban LGAs. It should be extended to urban and rural settings to determine if similar findings will be obtained after factoring in other socio-demographic confounders that are unique to these two other settings.

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APPENDIX I

SAMPLING FRAME WORK FOR THE STUDY

5 URBAN LGAs IN IBADAN- (1)IBADAN NORTH, (2)IBADAN NORTH-EAST, (3)IBADAN NORTH-WEST, (4) IBADAN SOUTH-EAST (5) IBADAN SOUTH-WEST
6 SEMI-URBAN LGAs IN IBADAN- (1) AKINYELE, (2) EGBEDA, (3) IDO LGA (4) LAGELU LGA (5) OLUYOLE LGA (6) ONA ARA LGA

IDO LGA for recruiting EGI with 3 districts and 128 communities	**AKINYELE LGA for recruiting EGII with 9 districts and 133 communities**	**EGBEDA LGA for recruiting control group with 6 districts and 113 communities**
1) Ido District (42 communities) **2) Akufo/Idigba/Araroni District** (45 communities) **3) Omi-Adio District** (41 communities)	**1) Ajibade district** (12 communities) **2) Akinyele district** (11 communities) **3) Arulogun/Ogbo-loyin district** (15 communities) **4) Ijaye district** (17 communities) **5) Ikereku district** (22 communities) **6) Iroko district** (10 communities) **(7) Moniya district** (22 communities) **(8) Olode/Onidundu district** (13 communities) **(9) Olorisakoko/Mele district** (11 communities)	**7) Egbeda District** (42 communities) **8) Osegere District** (8 communities) **3) Olodo / Kumapayi District** (25 communities) **4) Owobaale / Kasumu District** (13 ommunities) **5) Ayede / Alugbo District** (7 communities) **6) Erunmu District** (18 communities)

APPENDIX II

FOCUS GROUP DISCUSSION GUIDE

GREETING: My name is Baiyewu, Sakinat Tope, a PhD student of the Department of Health Promotion and Education, College of Medicine, University of Ibadan. I am carrying out a research on EFFECTS OF TWO TRAINING APPROACHES ON BREAST SELF-EXAMINATION FOR CANCER DETECTION AMONG WOMEN IN SELECTED LOCAL GOVERNMENT AREAS IN IBADAN.

My colleagues, ……..….. and I are involving you in a brief discussion relating to Breast cancer and Breast self-examination.

Ground rules

- It is important that only one person speaks at a time. Wait until the person speaking concludes.
- There is no right or wrong answer
- When you have something to say, please do so. Do not hessitste
- It is not compulsory to agree with the opinions of others in the group
- Does anyone have any questions? (answers).

Introductory question

I am just going to give you a couple of minutes to SHARE your opinions on breast cancer and self breast examination. Is anyone happy to share his or her experience?

Guiding questions

1) Have you ever heard about Breast cancer before?
   If Yes, What did you hear…….. ……
2) What are your thoughts about breast cancer?
3) Is Every woman has a risk of developing breast cancer?
4) Is it possible to cure breast cancer?
5) What are causes of breast cancer?
6) Breast cancer is communicable. Let's discuss

5) What are ways you know to detect a breast cancer?

6) What are possible signs of breast cancer?

7) What do you know about breast self-examination?

8) Do you think it's a good idea to talk about breast cancer publicly?

9) Does anyone here know how to perform breast self-examination? Kindly demonstrate

10) Will you like to teach others the skill of breast self-examination?...why would you?

Concluding question

- Of all the issues we have discussed today, what would you say are the most important issues you would like to express?

APPENDIX III

QUESTIONNAIRE FOR COMMUNITY WOMEN
EFFECTS OF EDUCATIONAL INTERVENTIONS ON BREAST SELF-EXAMINATION FOR BREAST CANCER DETECTION AMONG WOMEN IN IBADAN, NIGERIA

INTRODUCTION: My name is Baiyewu Sakinat Tope, a PhD student of the Department of Health Promotion and Education, College of Medicine, University of Ibadan. With my team, I am conducting this research project to determine the "Effects of Educational interventions on Breast Self-examination for Breast cancer detection among women" in your locality. My research team and I are here to learn from you and we would appreciate if you can kindly spare some minutes to share your experiences with us about breast cancer and breast self-examination. We will record our discussions on this questionnaire and we urge you to please feel free to share your beliefs and opinions with us because the findings of the interview will be used to design appropriate health education intervention programmes to promote the practice of breast self-examination among women in this community. We want you to be rest assured that all discussions and information recorded will be treated with utmost confidentiality. Your name and other personal identifiers are not required for this discussion.

S/NO_____LGA_____Community_____

Date of interview_____

SECTION A: SOCIO-DEMOGRAPHIC PARAMETERS

Instruction: Kindly provide answers to the following questions about yourself by ticking (√)

1. Age as at last birthday_____ (in years)
2. Marital status 1. Single 2. Married 3. Widowed 4. Divorced
3. If married, Duration in marriage (in years) _____
4. Number of pregnancies_____
5. Number of children _____
6. Ethnic group (1). Yoruba (2). Hausa (3). Igbo (4). Others (Specify_____
7. Religion (1) Islam (2). Christianity (3) Traditional (4.) Others Specify_____
8. Highest Level of Education. 1. No formal education 2. Primary 3. Secondary 4. Vocational 5.Tertiary- (i) NCE (ii) OND (iii). B.Sc /HND (iv). Post-grad.
9. Occupation (1) Civil Servant (2) Trading (3) Artisan (4) Farming (5) Private sector (6) Unemployed & able to work (8) Unemployed & unable to work (7) Others (specify)_____
10. Do you have any daughter that has attained puberty? 1. Yes 2. No
11. If Yes, how many? _____
12. Do you have any sister that has attained puberty? 1. Yes 2. No
13. If Yes, how many? _____
14 What is your average monthly personal income?.....

SECTION B: KNOWLEDGE ABOUT BREAST CANCER AND BREAST SELF-EXAMINATION

15. Have you ever heard about Breast cancer? 1. Yes 2. No

16. If yes, what were your source(s) of information about Breast cancer? (you may tick more than one option) If no, proceed to 18
1. Radio 2. Television 3. Church/Mosque 4. Friends /Peer 5. Social media
6. Health worker 7. News paper /Posters 8. Seminar/workshop 9. Relatives 10. A victim of breast cancer

17 What were you told? (you may tick more than one option) (1) It is curable (2) it is incurable (3) it kills (4) it is communicable (5) it is spiritual (6) it is caused by keeping money in bra (7) I cant remember. (8) Others specify_____

18a. Does every woman have a risk of developing breast cancer? 1. Yes 2. No 3. I don't know

18b. Do you believe you are at risk of developing breast cancer? (1)Yes (2) No (3) I don't know

19. If no, please state why? (1) My breast is small. (2) I pray hard (3) I check up regularly (4) no history of breast cancer in my family. (5) I don't put money in bra (6) Others please specify…….

20. Do you believe breast cancer is a major cause of death in women world-wide? 1. Yes. 2. No. 3. I don't know

21 Do you know any female with a history of breast cancer? 1. Yes 2. No

22. If yes, what is your relationship? 1) Mother (2) Sister (3) Friend (4) Aunt (5) Cousin (6) Others…….

23 Does breast cancer have a cure? 1. Yes 2. No 3. I don't know

24. Is breast cancer communicable? 1. Yes 2. No 3.I don't know

25. Does breast cancer grow through early and late stages 1. Yes 2. No 3.I don't know

26. Tick (√) either True or False, about risk factors to developing breast cancer

SN	Risk factors to developing breast cancer	True	False	Don't Know
1.	Use of birth control pills			
2.	Physical inactivity			
3.	Obesity / overweight			
4.	Advancing age			
5.	Genetic predisposition			
6.	Family history of breast cancer			
7.	Birth of first child after the age of 30 years			
8.	Early onset of menses (before the age of 12 years)			
9.	Intake of low-fat diet			

27. Have you ever heard about breast self -examination? (1)Yes (2) No

28. If yes, where did you first hear about breast self-examination? 1.Radio/Tv 2. Church/Mosque 3. Relatives/Friends 4. Social media/internet 5. Health worker 6. School

29. Do you believe BSE can detect a breast anomaly or cancer early?

1. Yes 2. No 3. I don't know or I am not sure

30. Do you know how to perform breast self examination? 1. Yes 2. No

31. Can early detection of breast cancer improve a woman's chance of survival?
1. Yes 2. No 3. I don't know/ I am not sure

32. Do you know any other ways of detecting a breast cancer or anomaly? 1. Yes 2. No

33. If yes, What are other ways of detecting a breast cancer?
1._____
2._____

34. How many days after your menstrual period should breast self examination be done?

1. First day 2. Fifth day 3. Tenth day 4. I don't know/ I am not sure

35. How often should breast self-examination be conducted? 1. Every day 2 .Every month 3. Once in 6 months 4. Once a year 5. I don't know / I am not sure

36. Which of the following are signs to watch out for that may suggest breast cancer; while performing BSE

SN	Signs of abnormality to watch out for while performing BSE	True	False	Don't Know/Not sure
1.	Dimpling of the breast skin			
2.	Breast pain on palpation			
3.	Enlargement of lymph node (around armpit)			
4.	Nipple retraction			
5.	Discharge from nipple			
6.	Asymmetric sagging of the breast			
7.	Presence of a lump in the breast			
8.	Presence of a lump or swelling in the axilla			

SECTION C: ATTITUDE TO BREAST SELF-EXAMINATION

37. Would you like to perform breast self-examination monthly? 1. Ye 2. No (If No, go to 38b)

38a. If yes, how comfortable will you feel to practice breast self-examination 1) very comfortable 2) Very uncomfortable (3) Indifferent

38b. If no, why won't you perform BSE (Tick whichever applies) (1) I don't have breast problem. (2) I don't have the time. (3) I don't know how to do it (4) It is not my portion. (5) I am afraid of detecting something strange

39. Tick (√) either agree, undecided or disagree to the following statements

SN	Statements	Agree	Disagree	Undecided
1.	Breast cancer can be detected by oneself			
2.	Most women are afraid of detecting breast cancer by doing BSE			
3.	Screening for breast abnormality using BSE is important and useful			
4.	Increased awareness can motivate one to practice BSE			

5.	BSE is a "shameful" practice in that other people may see one in a bad-light while touching or examining the breast			
6.	It is a good attitude to regularly perform BSE			
7.	It is a good attitude to share ones experience about BSE with other women			
8.	It is not good to teach other women BSE			

40. How confident are you to perform Breast self-examination?
(1)Very confident (2) Not confident (3) Not sure
41. Will you like to tell other women about Breast self-examination? 1. Yes 2. No
42. If yes, what will you tell them? 1. Something positive 2. Something negative
3. I don't know
43. Will you recommend regular BSE performance to other women? 1. Yes 2. No
44. If No, why not? _____
45. If you detect a breast lump or any anomaly in the breast during BSE, what will you do? 1. Conceal the information 2. Ignore/Disregard the finding 3. Report to the nearest health facility for further evaluation 4. Pray about it 5. I don't know / I am not sure

SECTION D: PRACTICE OF BREAST SELF-EXAMINATION

46. Have you ever performed breast examination? 1. Yes 2. No (If no, go to 49)
47. If yes, when last did you do perform breast examination? 1. Every day 2. This month 3. Two months ago 5. I can't remember 6. Other……
48. Who performed the breast examination for you? (1) My self (2) My spouse (3) A friend (4) A health worker (5) others please specify…….
49. If you have never performed BSE, what are the barriers to non performance ? (tickall that applies) (1) I don't have breast problem. (2)it is not necessary (3)I don't find is cofortable (4)I don't know how to do it (5) I don't believe it is important. (6) I am afraid of detecting something strange. (7) I am ashamed of performing BSE
50. How often should breast examination be performed? 1. Every day 2. Every month 3. Once in 6 months 4.Once every year 5.Others specify _____
51. How often do you practice the BSE? 1. Every day 2. Every month 3. Once in 6 months 4. Once every 12 months 5. Others specify _____
52. If you have been trained adequately, will you perform BSE? (1) Yes (2) No (3) I don't know
53. What factors can promote your practice of breast self-examination?

SN	Factors that can promote your practice of breast self-examination	Yes	No
1.	Recording the date of commencement of menses every cycle		
2.	Cooperation and reminder from one's spouse		
3.	Knowing how to perform BSE appropriately		
4.	Discussing and sharing experiences about BSE with other women		
5.	Teaching other women on how to perform BSE		
6.	Belonging to a women support group, association or cooperative		
7.	Knowing more about breast cancer		
8.	Being taught about breast cancer and importance of BSE in its detection		

SECTION E: CORRECT PERFORMANCE OF BREAST SELF-EXAMINATION

54. Do you have adequate knowledge on how to perform breast self-examination?
1. Yes 2. No

55. If Yes, how did you acquire the knowledge and skill? 1.Radio/TV……. 2. Church/Mosque 3. Relatives/Friends 4. Social media/internet 5. Health worker 6. School 7. Health awareness campaign 8. Self-directed learning

56. Would you be able to correctly demonstrate BSE on a breast model? 1. Yes 2. No

57. Confirm what you know about how to correctly perform BSE. (Assign codes according to the sequence of BSE)

SN	STEP WISE BSE PERFORMANCE	CODE	WRONG
1	I will start BSE in a standing position in front of a mirror		
2.	During BSE, the arms should first be placed by the side followed by placing the arms firmly on the waist and then the arms behind the head		
3.	One of the abnormal things to look for while standing in front of the mirror includes breast swelling or swellings and dimpling skin and changes in nipple size		
4a 4b	Then one lies down. While lying down, one must place a towel or pillow under shoulder before examining the breast on the other side OR One may remain standing. While in standing, one arm is raised above the head to examine the breast on the other side.		
5	While lying down or standing position, palpation is done to feel for lumps, hard knots, or thickening		
6	Palpation is done in 3 pressures (Light, middle, deep palpations) using the palm surface of the ends of the index and middle finger		
7	Palpation is done with the left hand while examining the right breast and with the right hand while examining the left breast		
8	Each breast is examined in a circular, clockwise motion moving from outside inwards		
9	The axilla of each breast is palpated first on that side		
10	Finally , the nipple of each breast is squeezed and the nipple discharge		

SECTION E: EVALUATION OF THE INTERVENTION

S/No	QUESTIONS	RMM	CHEW	OTHERS please specify)
A	Who was/were your trainer(s)?			
B	How will you access the training? (1)Necessary (2) Not necessary (3)I can't say anything about it			
C	Did you personally derive benefits from the programme? 1.Yes 2. No			
D	How was the intervention useful to you			
E	What are the things you liked most about the intervention?			
F	Did you have any challenges with your trainers? 1.Yes 2. No			
G	If (f) is Yes, what were the challenges			

60. If question 60 was No, Will you be willing to be trained if opportunity arises in the future? 1.Yes 2. No

61. If no, why not…….....

Thank you for your time in participating in this study and your cooperation in completing this questionnaire

APPENDIX IIIb

IBEERE FUN AWON OBINRIN NI AGBEGBE

IPA TI EKO N KO NIBI IDASI LORI SISE AYEWO OYAN ARA ENI FURA ENI LATI SAWARI JEJERE OYAN LAARIN AWON OBINRIN NI ILU IBADAN, NAIJIRIA

Ifihan: Oruko mi ni Baiyewu Sakinat Tope, akeko imo ijile lati Eka ti Itesiwaju ati Eko ilera, Eka ti Ilera Gbogbogbo Ile Eko Isegun Igbalode Fasiti ti Ilu Ibadan. Pelu awon akegbe mi, Mo n se ise iwadi lati pinu 'Ipa ti eko n ko nibi idasi lori sise ayewo oyan ara eni fura eni lati sawari jejere oyan laarin awon obinrin' ni agbegbe yi. Emi ati awon akegbe mi wa lati wa kogbon latara re ati pe a o mo riri re ti o ba le fun wa ni asiko die lati salaye iriri re pelu wa nipa jejere oyan ati isayewo oyan ara eni fura eni. A o gba alaye re sile sinu iwe ibeere yi ati pe a ro o pe ki o ma foya lati salaye igbagbo ati ero re pelu wa nitoeipe awari ijiroroyi yoo wulo lati se awon ojulowo eto eko ilera lati dasi igbega ihuwasi nipa isayewo oyan ara eni fura eni laarin awon obinrin ni agbegbe wa. A fe fi da o loju pe gbogbo ijiroro wa ati alaye ti a gba sile ni a o fi pamo banubanu. Oruko re tabi awon ami idanimo re miran ko nise pelu ijiroro yi.

Nomba Idanimo .....

Ijoba Ipinle..... Agbegbe.....

IPIN A: ORO T I O JE MO AGBEGBE ATI ARA RE

Itosona: Jowo dahun awon ibeere wonyi nipa ara re pelu fifalasi eyiti o ye (√)

1. Ojo ori ni odun: .....
2. Ipo Igbeyewo: 1. Adawa 2. Otiwole oko 3. Opo 4. Oti ko oko sile
3. Ti o bati loko, Iye odun melo.....
4. Iye onka oyun.....
5. Iye ona omo .....
6. Eya wo niyin : 1. Yoruba 2. Hausa 3. Ibo 4. Omiran.....
7. Elesin wo niyin: 1. Musulumi 2. Kirisiteni 3. Esin Ibile 4. Omiran.....
8. Iwe melo lo ka: 1. OoKawe ( ) 2. Alakobere ( ) 3. Iwe mewa ( ) 4. Olukose ( )
   5. Ile eko giga - a. Olukoni agba( ) b. Gbogbonise ( ) c. Fasiti/ Gbogboniseagba ( )
   d. post graduate ( )
9. Iru ise wo lo n se: 1. Osise Ijoba( ) 2. Onisowo( ) 3. Onise owo( ) 4. Agbe( )
   5. Aladani ( ) 6. N ko nise ( ) 7. Omiran .....
10. N je o mo obinrin ti o ni iriri arun jejere oyan ri? 1. Beeni( ) 2. Beeko( )
11. Ti o ba e beeni, Ki ni aosepo re? .....
12. N je o ni odomobinrin ti o ti balaga? 1. Beeni 2. Beeko
13. Ti o ba je beeni, meloni? .....
14. N je o ni aburo tabi egbon obinrin ti o ti balaga? 1. Beeni 2. Beeko
15. Ti o ba je beeni, meloni? .....
16. Ki ni odiwon owo osu re? _____

IPIN B: IMO NIPA ARUN JEJERE OYAN ATI SISE AYEWO FUNRA ENI

17. N je o ti gbo nipa arun jejere oyan ri? 1. Beeni 2. Beeko

18. Ti o ba je beeni, kini ona ti o ti gbo?

1. Ero asoromagbesi( ) 2. Ero Amohunmaworan ( ) 3. Ile Ijosin ( ) 4. Awon ore 5. Ero ayelujara ( ) 6. Osise eto ilera ( ) 7. Iwe iroyin ( ) 8. Ibi idanileko ( ) 9. Odo ebi( )10. Eni ti o ti seri( )

19. Ti o ba je beeni, Ki ni o gbo? 1. O gboogun 2. Ko gboogun 3. O n seku pani 4. O ma n ran 5. Afise ni

20. N je gbogbo obinrin ni o le ni arun jejere oyan? 1. Beeni ( ) 2. Beeko ( ) 3. N ko mo ( )

21. N je arun jejere oyan je okan gbogi ti o n fa iku obinrin lagbaye? 1. Beeni ( ) 2. Beeko ( ) 3. N ko mo ( )

22. N je Arun jejere oyan gbogun? 1. Beeni 2. Beeko 3. N ko mo

23. N je arun jejere oyan ma n ran latara enikan si ekeji? 1. Beeni 2. Beeko 3. N ko mo

24. N je arun jejere oyan n dagba sara lati ipo kinni de ipo kerin?. 1. Beeni 2. Beeko 3. N ko mo

25. Fala (√) si Beeni tabi Beeko, nipa okunfa ti o le fa aisan jejere oyan.

SN	Okunfa ti o le fa aisan jejere oyan	Beeni	Beeko	N ko mo
1.	Lilo oogun ifeto somobibi			
2.	Aise ere idaraya to			
3.	Titobiju/ sisanraju			
4.	Didagbasii			
5.	Fifijo lati ibi ibi			
6.	Itan iran ebi nipa jejere oyan			
7.	Bibi omo akobi leyin ogbon odun			
8.	Yiyara se n kan osu (siwaju ki o to pe omo odun mejila)			
9.	Jije onje ti ko lora ninu to			

26. N je o ti gbo nipa isayewo oyan eni fura eni ri? 1. Beeni 2. Beeko

27. Nibo ni o ti koko gbo nipa sise ayewo oyan fura eni?

1. Ero asoromagbesi ( ) 2. Ero Amohunmaworan ( ) 3. Ile Ijosin( ) 4. Awon ore ( ) 5. Ero ayelujara ( ) 6. Osise etoi lera ( ) 7. Iwe iroyin ( ) 8. Ibi idanileko ( ) 9. Odo ebi( )10. Eni ti o ti se ri( ) 11. N ko gbori

28. N je sise ayewo oyan ara eni fura eni le sawari jejere oyan lasiko?

1. Beeni 2. Beeko 3. N ko mo

29. N je o mo bi a ti se n se ayewo oyan ara eni fura eni? 1. Beeni 2. Beeko 3. N ko mo

30. N je sisawari arun jeere oyan lasiko le sagbega anfaani fun obinrin lati wosan?

1. Beeni 2. Beeko 3. N ko mo

31. N je o mo ona miran ti a le fi sawari arun jejere oyan? 1. Beeni 2. Beeko

32. Ti o ba je beeni. Awon ona miran wo ni a le fi sawari jejere oyan?

1._____

2._____

33. Ojo melo leyiin n kan osu ni sise ayewo oyan eni dara ju?

1. Ojo akoko 2. Ojo kewa 3. Ojo to gbeyin 4. N ko mo/Ko damiloju

34. Bi igba melo losu ni o dara ki a ma sayewo oyan ara eni lati sawari arun jejere oyan?

1. Losoosu 2. Eekan losu mefa 3. Eekan laarin osu mejila 4. Ko leto rara 5. N ko mo/ko damiloju

35. Awon wonyi ni aami ti a gbodo sakiyesi fun jejere oyan, ti a ba n sayewo fura eni

SN	Awon ami abawon ti a gbodo sakiyesi fun jejere oyan, ti a ba n sayewo fura eni (ti o le sokunfa jejere oyan)	Beeni	Beeko	N ko mo
1.	Lilui ho tototo ni ara oyan			
2.	Didun oyan ti a ba fowote			
3.	Wiwu leba abiya			
4.	Ki ori oyan ma kosinu			
5.	Ki oyan ma soyun tabi somi			
6.	Ki oyan kan ma denukole ju ekeji lo			
7.	Koko wiwa ninu oyan			
8.	Koko wiwa leba oyan			

IPIN C: IHUWA SI FUN SISE AYEWO OYAN FURA ENI

36. N je o nifesi lati se ayewo oyan re fura re losoosu? 1. Beeni 2. Beeko

37. Ti o ba je beeni, bawo lo se le ro o lorun to lati ma se ayewo oyan ara fura re?
1. Yoo rorun daradara ju 2. Ko le rorun rara 3. N ko mo

38. Fa ila (√) boya o faramo, o ko le so tabi o ko faramo si awon gbolohun wonyi:

	Gbolohun	Mo faramo	N ko le so	N ko faramo
1.	A le sa awari arun jejere oyan fura eni			
2.	Opolopo obinrin lo n beru ati sawari jejere oyan nibi sayewo oyan fura eni			
3.	Si sayewo fun abawon lilo isayewo oyan eni je koko ati wulo			
4.	Si safikun ipolongo le mu koriya ba eni lati sawari jejere oyan pelu lilo isayewo oyan fura eni			
5.	Si sayewo oyan araeni je ona itiju ti elomiran le ri gege bi asati ko dara to lati ma fowo kan tabi sayewo oyan eni			
6.	Asa ti o dara ni lati ma sayewo oyan ara eni loorekoore			
7.	Asa ti o dara ni lati so iriri eni nipa isayewo oyan ara eni fun awon obinrin miran			
8.	Asa ti o dara ni lati ma soro nipa isayewo oyan ara eni pelu awon obinrin miran			

39. Bawo ni o se da o loju si lati se ayewo oyan ara eni? 1. O dami loju gidi gan 2. N ko mo 3. Ko dami loju rara

40. N je o nife si lati so fun awon obinrin miran nipa isayewo oyan ara eni? 1. Beeni 2. Beeko

41. Ti o ba je beeni, kini o ma so fun won? 1. N kan ti o dara 2. N kan ti ko dara

42.. N je o gba awon obinrin miran nimoran nipa sisayewo loorekoore ati ibojumu isayewo oyan ara eni bi o tiye? 1. Beeni 2. Beeko

43. Ti o ba je beeko,kini idi? _____

44. Ti o ba ri koko oyan tabi ajeji kan ninu oyan lasiko isayewo oyan ara eni, kini o o se?

1. N o pa eri naa mora 2. N o da eri naa nu 3. N o fi eri naa to eleto ilera to sunmo leti lati se iwadi ni kikun 4. N o gbadura si 5. N ko mo ohun ti n o se/ko damiloju

IPIN D: ISESI NIPA AYEWO OYAN ARA ENI FURA ENI

45. N je o ti sayewo oyan ara re fura re ri? 1. Beeni 2. Beeko

46. Ti o ba je beeni, Nigba wo lo se gbeyin?

1. Lose yi 2. Lose to koja 3. Losu to koja 4. Losu bi melo kan seyin

47. Bi igba melo lera ni o se isesi ati sayewo oyan ara re?

1. Losoosu 2. Eekan losu mefa seyin 3. Eekan Losu mejila 4. Salaye omiran _____

48. Ki ni awon okunfa ti o le mu o se isesi ati sayewo oyan ara re fura re?

	Awon okunfa ti o le mu o se isesi ati sayewo oyan ara re fura re	Beeni	Beeko
1.	Si sakosile ojo ti o ba bere n kan osu re lasiko ti o ba n se		
2.	Ifowosowopo ati iranti lati odo olofufe eni		
3.	Nimo nipa bi a ti sayewo oyan ara eni daradara		
4.	Siso ati lilaraeniloye nipa isayewo oyan ara eni pelu awon obinrin miran		
5.	Kiko awon obinrin miran lona ati sayewo oyan ara eni fura eni		
6.	Didarapo mo egbe awon alafosowopo fun igbega awon obinrin lawujo		
7.	Nini imo miran si nipa jejere oyan		
8.	Gbigba idanileko nipa jejere oyan ati iwulo isayewo oyan ara eni fura eni lati sawari re		

IPIN E: ONA TI O DARA JULO LATI MA SAYEWO OYAN ARA ENI FURA ENI

49. N je o ni imo ti o peye nipa ona tabi igbese lati sayewo oyan ara eni fura eni

1. Beeni 2. Beeko

50. Ti o ba je beeni, bawo ni o ti gba imo ati ise re?

1. Ero asoromagbesi( ) 2. Ero Amohunmaworan( ) 3. Ile Ijosin( )4. Awon ore 5. Ero ayelujara( )6. Osise eto ilera( ) 7. Iwe iroyin ( ) 8. Ibi idanileko( ) 9. Odo ebi( )10. Ibi ipopolongo eto ilera( ) 11. Kiko ara eni fura eni

51. N je o le so tabi salaye ni kikun bi a ti le sayewo oyan ara eni fura eni lori irufe eere isayewo oyan kan? 1. Beeni 2. Beeko

52. Jeri si ona ti o mo pe o dara ju nipa sise ayewo oyan eni fura eni:

	Ona ti o darajulo fun sise ayewo oyan ara eni fura eni	O dara	Ko dara	N ko mo/ ko damiloju
1.	N o bere sise ayewo oyan ara mi fura mi ni wiwa ni iduro			
2.	N o bere sise ayewo oyan ara mi fura mi ni wiwaniidubule			

3.	N o nilo lati duro niwaju digi lati ri ami aleebu oyan mi			
4.	Lati ri aridaju aleebu oyan ara ti a bawa ni iduro, awon owo gbodo koko wa ni egbe wa leyin naa ni a o wa gbe owo wa le eyin ori nigba naa a o wa gbe owo le ibadiwa			
5.	Okan lara awon aleebu ti a o sakiyesi ti a ba duro niwaju digi ni oyan wiwu			
6.	Okan lara awon aleebu ti a o sakiyesi ti a ba duro niwaju digi ni ki a wo iho tototo ni oyan wa			
7.	Okan lara awon aleebu ti a o sakiyesi ti a ba duro niwaju digi iyipada ori oyan			
8.	Ti a ba wa ni iduro niwau digi, ti a ba fun oyan omi, eje tabi oyun yoo jade			
9.	Lati sayewo oyan ni wiwa ni idubule, o nilati fi taweli tabi irori ro ejika ki o to sayewo oyan legbe naa			
10.	Fifowo te oyan je ona lati sakiyesi koko lile tabi yiyi, lasiko wiwa ni idubule			
11.	Fifowo te oyan ni irufe ona meta (feerefe, laarin,rira wonu) pelu lilo ori ika ilabe ati ika aarin			
12.	Fifowo te oyan pelu owo otun lasiko ti o ba n sayewo oyan osi ati owo osi ti o ba n sayewo oyan otun			
13.	A o ye oyan kookan wo lona roboto, bi yiyi owo ago lati ita lo sinu			
14.	Eba oyan kookan ni o sayewo gbeyin legbe naa			
15.	Gbogbo awon aleebu gbodo wa ni kikosile lati sagbeyewo re pelu eri lasiko ayewo miran			
16.	Awon eri nipa tototo awooyan, koko inu oyan, sisomi ori oyan se koko fun eniyan lati safisun nile iwosan to sunmo fun ayewo eri kikun			

O seun pupo fun asiko re lati kopa ninu ise iwadi yi ati fun ifowosowopo lati pari ibeere yi.

Appenxix IVa

Research assistant training under supervision of project supervisor

Appendix IVb

Plastic Breast Model that was use for training

APPENDIX IVc

STEPWISE-PRACTICE OF BREAST SELF EXAMINATION

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

Breast Self-Exam — Step 1

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 — Steps 2 and 3

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 — Step 4

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.

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

SOURCE: Breastcancer.org's

APPENDIX IVd

BREAST SELF-EXAMINATION STEPS IN YORUBA

AWON IGBESE LATI SE AYEWO OYAN ARA ENI FUN RA ENI

E beere ayewo oyan ara eni fura eni ni wiwa ni iduro si iwaju digi.

Lati ri aridaju aleebu oyan ara ti a bawa ni iduro, awon owo gbodo koko wa ni egbe wa leyin naa ni a o wa gbe owo wa le eyin ori, nigba naa a o wa gbe owo le ibadi wa.

- Okan lara awon aleebu ti a o sakiyesi ti a ba duro niwaju digi ni oyan wiwu tabi iho tototo ni oyan wa, tabi iyipada ori oyan.
- Awon alebu ti a tun le ri nipe ti a ba duro niwaju digi, ti a ba fun oyan, ti omi, eje, tabi oyun yoo jade

Ao wa dubule. Ni wiwa ni idubule, o nilati fi taweli tabi irori ro ejika ki o to sayewo oyan legbe keji

Fifowo te oyan je ona lati sakiyesi koko lile tabi yiyi, lasiko wiwa ni idubule.

Fifowo te oyan wa ni irufe ona meta (feerefe, laarin,rira wonu) pelu lilo ori ika ilabe ati ika aarin.

Fifowo te oyan pelu owo otun lasiko ti o ba n sayewo oyan alaafia ati owo alaafia ti o ba n sayewo oyan otun.

A o ye oyan kookan wo lona roboto, bi yiyi owo ago lati ita lo sinu ni bibere lati eba oyan

Gbogbo awon aleebu gbodo wa ni kikosile lati sagbeyewo re pelu eri lasiko ayewo miran

Awon eri nipa tototo ni ara oyan, koko inu oyan, sisun omi ori oyan se koko fun eniyan lati safisun nile iwosan to sunmo fun ayewo eri kikun.

APPENDIX Va

INFORMED CONSENT FORM

IRB Research approval number: _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

This approval will lapse on: _ _/ _ _/ _ _

Title of Research:

EFFECTS OF TWO TRAINING APPROACHES ON BREAST SELF-EXAMINATION FOR CANCER DETECTION AMONG WOMEN IN SELECTED LOCAL GOVERNMENT AREAS IN IBADAN

Name(s) and affiliation(s) of researcher(s):

This study is being conducted by BAIYEWU SAKINAT TOPE, a PhD student at the Department of Health Promotion and Education, Faculty of Public Health, College of Medicine, University of Ibadan.

Sponsor(s) of Research: This research is self-sponsored.

Purpose(s) of Research:

The broad aim of this study is to determine the effects of education interventions on Breast Self-Examination (BSE) by Role Model Mothers (RMM) and Community Health Extension Workers (CHEWs) on breast cancer detection by community women in Ibadan

Procedure for the Research, what shall be required of each participant and the approximate total number of participants that would be involved in the research:

Using a multi-stage sampling technique and simple randomization, a total number of 300 community women from three local governments in Ibadan (100 per local government) will participate in the study. You will be required to complete a set of questionnaires within a reasonable period to determine the effects of education intervention on Breast Self-Examination (BSE) on your ability to detect breast cancer

Expected duration of research and participant(s) involvement:

You would be involved in the research over a 6-month period. At the beginning of the study, you will be required to take part in a Focus Group Discussion (FGD) that will last about 30 minutes. You will also complete an interviewer-administered Questionnaire which should last between 10 and 15minutes at the beginning of the study. Depending on your local government, you may be required to undertake a 6-month training by either a Role Model Mother (RMM) or a Community Health Extension Worker (CHEW) on how to perform Breast Self-Examination (BSE). All the training sessions will take place within your community at a convenient location. For those in this category, the training may take place between 3- 6 times over this 6-month period with each training session lasting about

30 minutes. At the end of the 6-month period, you will be required to complete another interviewer-administered Questionnaire which should last between 10 and 15 minutes.

Risk(s): This study will not pose any imminent injury or harm to you since it does not involve any invasive procedure. No demonstration of Breast Self-Examination will be done on you or any other women involved in the study. A breast model will be used to conduct the BSE training.

Costs to the participants, if any, of joining the research:

Your participation will only cost you your time.

Benefits(s):

This study will provide relevant information on an appropriate model for educating community women on Breast Self-Examination (BSE) for detecting breast cancer. Any woman involved in the study who has any suspicious or confirmed breast changes will have direct referral for Clinical Breast Examination (CBE) and evaluation by a collaborating breast surgeon at the University College Hospital, Ibadan. The study will also provide a guide for local and state health policy makers during the formulation of future large-scale preventive and screening programs for breast cancer among the women population in the local communities in the state.

Confidentiality: All information obtained from participants involved in this study will be coded and personal details will be anonymised.

Voluntariness: Your participant in this research is entirely voluntary. You are free to withdraw your consent at any time during the study.

Alternatives to participation:

If you choose not to participate, this will not affect you in any way. Also, if you have any breast changes that is suspicious of breast cancer, your withdrawal of participation will not in any way affect the arrangement of referral for specialist clinical evaluation. Statement of person giving informed consent:

The purpose of this study has been explained to me in details. I consent to take part by providing the requested information on the questionnaires at the beginning and end of the study period and if required, will undergo a 6-month training on Breast Self-Examination. My participant is entirely voluntary. I understand that am free to withdraw my participant at any time. If I withdraw my participation, it will not alter any need to be referred for specialist review and care should I find anything suspicious in my breast during the study period. The information that I provide in the questionnaire will be grouped with the responses from other people so that I cannot be identified.

DATE:____/____/_____ SIGNATURE/THUMB PRINT: _____

SERIAL NUMBER: _ _ _ _ _ _ _ _ _

WITNESS' SIGNATURE (if applicable):_____

WITNESS' NAME (if applicable): _____

Detailed contact information including contact address, telephone, fax, e-mail and any other contact information of researcher(s), instructional HREC and head of the institution:

This research has been approved by the Oyo State Research Ethical Review Committee, Ministry of Health Secretariat, Ibadan and the Chairman of this Committee can be contacted at the Ministry of Health, Oyo State Secretariat, Agodi, Ibadan. In addition, if you have any question about your participation in this research, you can contact the principal investigator,

Baiyewu Sakinat Tope

Health Education and Promotion, Faculty of Public Health, College of Medicine, University of Ibadan at the University College Hospital, Ibadan.

Phone: +2348035235239, +2348034455695

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College of Medicine, University of Ibadan

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APPENDIX Vb

INFORMED CONSENT: YORUBA VERSION

EKA TI ITESIWAJU ATI EKO ILERA

EKA ILERA GBOGBOGBO

ILE EKO FASITI TI IBADAN, NAIJIRIA

FOOMU IFOWOSI ATI IYONDA OLUKOPA

Ami Iyonda Iwadi lati odo Ajo Oludari Ise Iwadi Lagbaye: _____

Ifowosi yi yoo tenubodo ni __/__/__

Akole Ise Iwadi:

Ipa ti Eko n ko nibi Idasi lori Sise Ayewo Oyan Ara Eni Fura Eni lati Sawari Jejere Oyan Laarin Awon Obinrin ni Ilu Ibadan

Oruko ati Ibatan Oluwadi:

Ise iwadi yi n waye lati owo BAIYEWU SAKINAT TOPE, akeko imo ijile latiEka ti Itesiwaju ati Eko ilera Eka ti Ilera Gbogbogbo Ile Eko Isegun Igbalode Fasiti ti Ilu Ibadan.

Olugbowo Ise iwadi:

Ise iwadi yi je adase oluwadi

Idi iwadi ise yi:

Akori ise iwadi yi ni lati mo ipa ti eko n ko nibi idasi lori sise ayewo oyan ara eni fura eni larara awon awokose obinrin ati awon osise eleto itankale ilera ilu sililu latari sisawari jejere oyan latowo awon obinrin ni Ilu Ibadan

Ilana fun ise iwadi, ipa olukopa kookan ati odiwon onka gbogbo iye awwon olukopa ti yo kopa nibi ise iwadi yi:

Lilo ilana ati yanyan olukopa aladipele ati minu olukopa larin egbe re ti ko garaju, lapapo ogorun-meta awon obinrin laarin lati ijoba ibile meta ni ilu Ibadan. (ogorun kookan lati ijoba ibile kookan) ni yoo kopa ninu ise iwadi yi. Oo ni lati dahun awon ibeere lasiko ti ko garaju lati mo ipa ti Eko n ko nibi Idasi lori Sise Ayewo Oyan Ara Eni Fura Eni lori ipa re lati Sawari Jejere Oyan.

Gbendeke akoko ise iwadi ati didasi olukopa:

O ni lati dasi ise iwadi yi fun osu mefa gbako. Ni ibere ise iwadi yi, O ni lati kopa ninu Ifirojomitoro oro laarin egbe ti yo gba o to bi ogbon iseju. O tu ni lati pari ibeere ti oluwadi yoo beere ti ko ni gba o ju iseju meewa si meedogun lo ni ibere ise iwadi yi. Bi ijoba ibile re

base ri, o tun le ni lati gba idanileko olosu mefa lati odo awokose obinrin tabi osise eleto itankale ilera ilu sililu nipa bi a se n se ayewo oyan ara eni fura eni. Gbogbo asiko idanileko yoo waye ni agbegbe re ni ibi ti o ro o lorun. Fun awon ti o wa ni eka yi, idanileko le waye bi emeta si emefa laarin osu mefa pelu idanileko fun bi ogbon iseju. Leyin osu mefa, o nilati pari iwe ibeere miran ti oluwadi yoo beeere ti ko ni gba o ju iseju mewa si meedogun lo.

Awon ewu;

Ise iwadi yi ko ni ipalara kan bi o se le wu ki o mo niwon igba ti ko ti mu ona lile lowo. A ki yoo se ifihan isayewo oyan ara eni Kankan lara re tabi awon obinrin miran ti o n kopa ninu ise iwadi yi. Aworan oyan ti a ti pese ni a o fi se idanileko isayewo oyan ara eni fura eni.

Isuna fun olukopa, ti o ba wa, lati ara didarapo mo ise iwadi yi:

Ikopa reki yoo naa o ni n Kankan yato si asiko re.

Anfaani ti o wa fun olukopa:

Ise iwadi yi yoo pese alaye ti o ye nipa ona ti o ye lati le sedanileko fun awon obinrin agbegbe nipa isayewo oyan ara eni fura eni fun awaari jejere oyan. Obinrinkobinrin ti o ba kopa ninu ise iwadi yi ti o ni eyikeyi ifura tabi iyipada ti o fidi mule yoo gba didari lo sibi itoju isayewo oyan ati imoran lodo alafowosowopo onisegun nipa oyan ni ile eko imo isegun ti fasiti ti ilu Ibadan. Ise iwadi yi yoo tun pese itosona fun eleto ilera ni ijoba ibile ati ipnle fun ati sagbekale eto ilera lati dekun ati eto iyaworan/sayewo ti o gbongbon fun jejere oyan laarin awon obinrin ni igberiko ati awon agbegbe kaakiri ipinle.

Ikoko ati ifokantan:

Gbogbo alaye ti a ba gba lodo olukopa ninu ise iwadi yi ni a o fun ni ami ati pe ohun kan nipa olukopa ni yoo wa ni asiri.

Ikopa funra eni:

Ikopa re ninu ise iwadi yi je aayo re patapata. O leto lati yan lati kuro nibi ikopa ni igbakigba ti o ba wu o lasiko ise iwadi yi.

Awon ona miran si ikopa:

Ti o yan lati ma kopa, eleyi ki yoo ni ipa lori re ni eyikeyi ona. Bakannaa, bi o ba ni eyikeyi iyipada oyan ti mu ifura ti jjejere oyan lowo, yiyo kuro nibi ikopa re ki yoo di ona ati fa o le olutoju fun iwadi kikun.

Gbolohun eniyan ti n gba adehun ifowosi:

Mo ti ni agboye lori ise iwadi yi ati pe mo ti gbo agboye pupo, ara re ni nipa ewu ati anfaani lati yan fun ikopa fura eni.

Ojo: _____/_____/_____ Ibuwolu: _____

Oruko: _____

Gbolohun eniyan ti o n fowosi adehun idarapo:

Idi pataki ti a fi n se ise iwadi yi ni a ti gbo agboye re yekeyeke. Mo gba lati kopa pelu fifi idahun si awon ibeere lati ibere titi de opin asiko ise iwadi yi ati paapaa ti a ba o baje pe n o kopa ninu idanileko osu mefa nipa isayewo oyan ara eni fura eni. Ikopa mi je aayo mi. Mo ni agboye p emo le yan lati dekun ikopa mi ni igbakigba. Ti mob a yo kuro nibi ikopa , ko ni nkankan se pelu ati famile akosemose fun agbeyewo ati itoju ti mob a ri nkan yowu bi ifura ninu oyan mi lasiko ise iwadi yi. Alaye ti pese fun ibeere ni a o kopo pelu ti awon olukopa miran debi pe ko le yami soto.

Ojo:____/____/_____ Ibuwolu/Titeka: _____

AmiNomba ni telentele: _ _ _ _ _ _ _ _ _

Ibuwolu Olujeri si (Ti o ba ni) _____

Oruko Olujeri si (Ti o ba wa): _____

Alaye kikun nipa ona ati ri oluwadi, telifoonu, atejise, ayara bi ase, ati ona miran, igbimo ti o n bojuto iseiwadati olri ile eko:

Ise iwadi yi ti di bibuwolu lati owo igbimo ti o n ri si agbeyewo ise iwadi ni Ipinle Oyo, ti eka tie to ilera ileijoba, Ibadan ati pe a le kan si alaga igbimo yi ni eka eto ilera ti ijoba ipinle Oyo ti o wa ni Agodi, Ibadan. Ni afikun, ti o ba ni ibeere kan tabi omira lati beere ti o jemo ikopa re ninu ise iwadi yi, o le kan si oluwadi agba.

Oruko: Omidan Bayewu S. Tope

Eka: Eka ti itesiwaju ati eko ilera, eka ilera gbogbogbo , Ile eko Imo Isegun Igbalode ti Ile eko fasiti ti Ibadan.

Telifoonu: +2348035235239, +2348034455695

Email:ask4sakeenath.tb@gmail.com tabi ask4sakeenath@yahoo.com

APPENDIX XII

EFFECTS OF TWO TRAINING APPROACHES ON BREAST SELF-EXAMINATION FOR CANCER DETECTION AMONG WOMEN IN SELECTED LOCAL GOVERNMENT AREAS IN IBADAN

FORM 01

REFERRAL FORM

(*TO BE COMPLETED BY PRINCIPAL INVESTIGATOR*)

LGA …….

COMMUNITY ……

AGE …….SEX ……...

NAME OF PATIENT …….

DATE ……..…… ……..

DIVISION OF ONCHOLOGY,
DEARTMENT OF SURGERY,
UNIVERSITY COLLEGE HOSITAL, IBADAN

APPENDIX VIIa: ETHICAL APPROVAL

TELEGRAMS..... TELEPHONE.....

MINISTRY OF HEALTH

DEPARTMENT OF PLANNING, RESEARCH & STATISTICS DIVISION

PRIVATE MAIL BAG NO. 5027, OYO STATE OF NIGERIA

Your Ref. No. .....

All communications should be addressed to the Honorable Commissioner quoting

Our Ref. No. AD 13/479/1233

30th April, 2019

The Principal Investigator,
Department of Health Promotion and Education,
Faculty of Public Health,
College of Medicine,
University of Ibadan.

Attention: Baiyewu Sakinat

ETHICS APPROVAL FOR THE IMPLEMENTATION
OF YOUR RESEARCH PROPOSAL IN OYO STATE

This is to acknowledge that your Research Proposal titled: "Effects of Education Interventions on Breast Self-Examination for Breast Cancer Detection among Women in Ibadan." has been reviewed by the Oyo State Ethics Review Committee.

2. The committee has noted your compliance. In the light of this, I am pleased to convey to you the full approval by the committee for the implementation of the Research Proposal in Oyo State, Nigeria.

3. Please note that the National Code for Health Research Ethics requires you to comply with all institutional guidelines, rules and regulations, in line with this, the Committee will monitor closely and follow up the implementation of the research study. However, the Ministry of Health would like to have a copy of the results and conclusions of findings as this will help in policy making in the health sector.

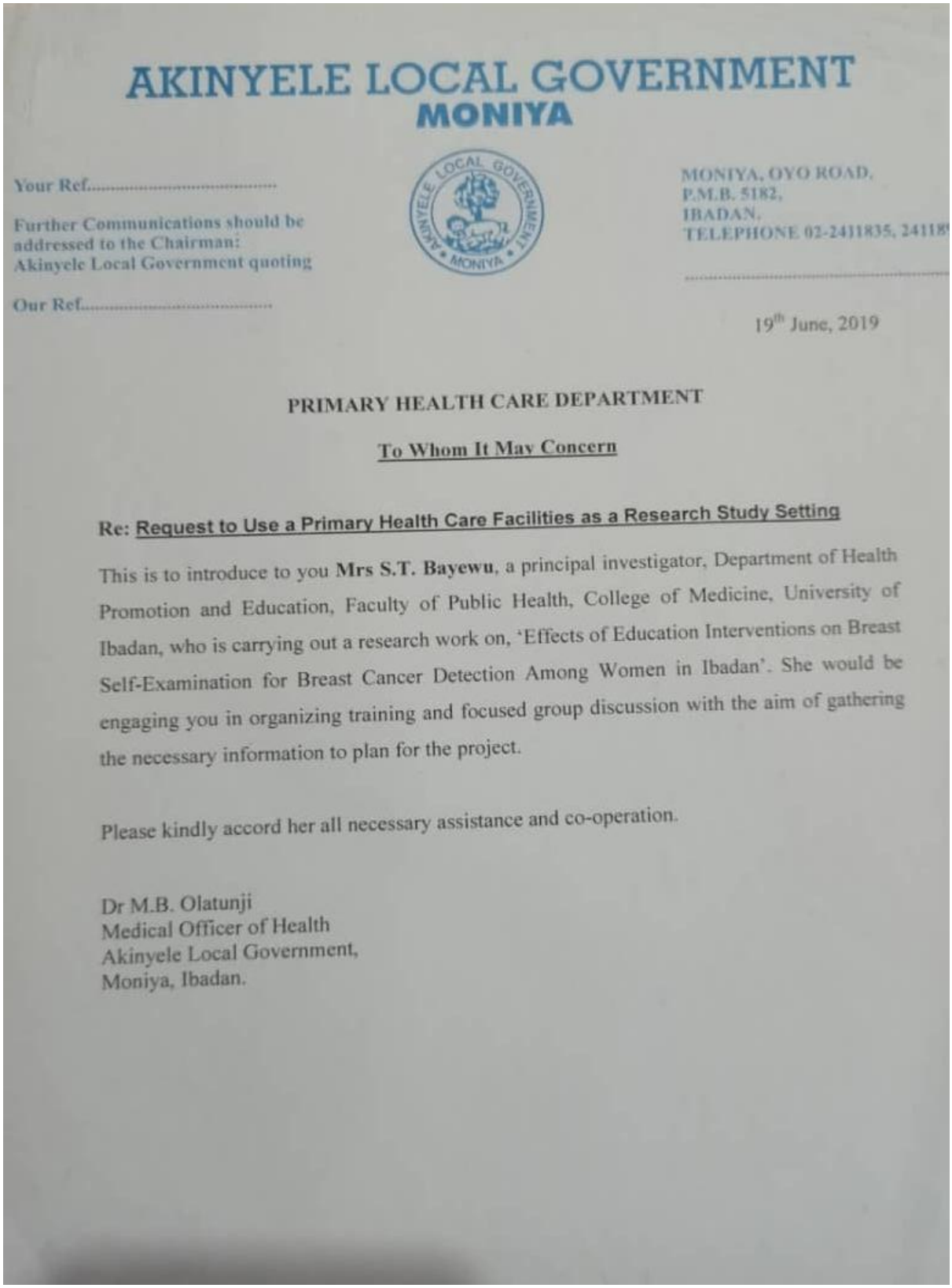
4. Wishing you all the best.

Signature & Date

Dr. Abbas Gbolahan
Director, Planning, Research & Statistics
Secretary, Oyo State, Research Ethics Review Committee

APPENDIX VIIb

LETTER OF SUPPORT FROM MEDICAL OFFICER OF HEALTH AKINYELE LGA



AKINYELE LOCAL GOVERNMENT
MONIYA

Your Ref.....

Further Communications should be addressed to the Chairman: Akinyele Local Government quoting

Our Ref.....

MONIYA, OYO ROAD,
P.M.B. 5182,
IBADAN,
TELEPHONE 02-2411835, 24118

19th June, 2019

PRIMARY HEALTH CARE DEPARTMENT

To Whom It May Concern

Re: Request to Use a Primary Health Care Facilities as a Research Study Setting

This is to introduce to you **Mrs S.T. Bayewu**, a principal investigator, Department of Health Promotion and Education, Faculty of Public Health, College of Medicine, University of Ibadan, who is carrying out a research work on, 'Effects of Education Interventions on Breast Self-Examination for Breast Cancer Detection Among Women in Ibadan'. She would be engaging you in organizing training and focused group discussion with the aim of gathering the necessary information to plan for the project.

Please kindly accord her all necessary assistance and co-operation.

Dr M.B. Olatunji
Medical Officer of Health
Akinyele Local Government,
Moniya, Ibadan.

APPENDIX VIII

FOCUS GROUP DISCUSSION SESSION AT IDO LGA

APPENDIX IX

CROSS PUZZLE: MATCH THE ABORMALITY TO ITS CORRESPONDING NAME

Refracted nipple

Growing vein

Bump

Hidden lump

New size

Indentation

Thick mass

Fluid discharge

Skin sore

Bump

APPENDIX X

Photographs of a cross section of the RMMs during the training at Ido LGA

APPENDIX XI

PRE/POST TEST FOR RMM/CHEWS

1) Have you ever heard about Breast cancer? 1. Yes 2. No
2) What were you told? 1) It is curable (2) it is incurable (3) it kills (4) it is communicable (5) it is spiritual (6) it is caused by keeping money in bra (7) I can't remember. (8) Others specify_____
3) Does every woman have a risk of developing breast cancer? 1. Yes 2. No 3. I don't know
4) Do you believe breast cancer is a major cause of death in women world-wide? 1. Yes. 2. No. 3. I don't know
5) Is breast cancer communicable? 1. Yes 2. No 3.I don't know
6) Does breast cancer have a cure? 1. Yes 2. No 3. I don't know
7) Does breast cancer grow through early and late stages 1. Yes 2. No 3.I don't know
8) Tick (√) either True or False, about risk factors to developing breast cancer

SN	Risk factors to developing breast cancer	True	False	Don't Know
1.	Physical inactivity			
2.	Obesity / overweight			
3.	Advancing age			
4.	Genetic predisposition			
5	Family history of breast cancer			
6.	Birth of first child after the age of 30 years			
7.	Early onset of menses (before the age of 12 years)			
8.	Intake of low-fat diet			

9) What are other ways of detecting a breast cancer?
1._____
2._____

10)

SN	Signs of abnormality to watch out for while performing BSE	True	False	Don't Know/Not sure
1.	Dimpling of the breast skin			
2.	Breast pain on palpation			
3.	Enlargement of lymph node (around armpit)			
4.	Nipple retraction			
5.	Discharge from nipple			
6.	Asymmetric sagging of the breast			
7.	Presence of a lump in the breast			
8.	Presence of a lump or swelling in the axilla			

11) If you have been trained adequately on BSE, will you like train other women ?
(1) Yes (2) No (3) I don't know
12) Suggest reasons why you probably may not teach others……
……

APPENDIX XII

Photograph showing a cross sections of the CHEWs during training at Akinyele LGA

APPENDIX XIII

AWON KOKO ORO TI A O SORO LE LORI

Ose kini- Ose Keji:	Aisan Jejere Oyan je aisan ti o le se iku pani
Ose keta-Ose Kaarun:	Okunfa ti o le mu aisan Jejere Oyan
Ose Kefa- Ose keeje:	Anfani ti o wa nini sise awari jejere oyan ni kia kia
Ose Keejo-Ose keesan	Mo bi Oyan re se ri
Ose Kewa-Ose kejila	Eko loro sise ayewo oyan eni funra eni lekun rere
Ose ketela-Ose keedogun	Igba ati akoko to a ma'n se ayewo oyan
Ose kerin-din-logbon	Eko loro siseayewooyaneni funra eni lekun reere
Ose keji le logbon- Ose kerin le logbon	Atun wo gbo gbo koko ti a soro le lori